METHODS TO PRODUCE MAPS OF DISTRIBUTION OF LONGFIN SMELT

Monitoring data.— In this study, we reviewed all available monitoring programs and datasets that detected longfin smelt in the Estuary. California Department of Fish and Game, the United States Fish and Wildlife Service (USFWS), and other agencies that comprise the Interagency Ecological Program (IEP) provide data on the distribution, frequency of occurrence, and abundance of Estuary longfin smelt at various life stages. The following six surveys provide data ranging from 1967 – 2009: the Bay Midwater Trawl (BMWT), Bay Otter Trawl (BOT), Fall Midwater Trawl (FMWT), Spring Kodiak Trawl (SKT), 20mm Trawl (20mm), and Summer Townet Survey (STN). The strengths and weaknesses of each survey type have been summarized previously (Bennett 2005). Regional data from non-IEP surveys (see Table 2) were use together with these six surveys to determine geographic extent of range.

Observed geographic extent.— We used six main surveys and a wide range of other publically-available survey data to identify the geographic extent of Estuary longfin smelt. We considered all years of available data for each monitoring program (Table 3). Longfin smelt were considered 'detected' when they were present at any given sampling site at least once. Otherwise they were designated 'not observed'. Probability of detection is not available for all survey and gear types, so we did not consider longfin smelt 'absent' from locations where they were not detected (Pearce and Boyce 2006). *Life stage determinations.*— Delineations of longfin smelt age classes: Age-0, -1, and -2, were based on fork-length criteria established by Baxter (1999) (Table 4) giving consideration to gear description, months of sampling, and length frequency distribution of these data. Three seasonal periods for each year were selected based on common

survey periods spring (January through April), Summer (May through August) and fall (September through December).

Mapped spatial distribution.— We mapped the spatial distribution of longfin smelt by life-stage and season to identify how the predominant majority (90%) of the longfin smelt of each life stage was typically distributed, and the location of marginal observations (the next 9% of observed longfin smelt). We excluded incidental observations (the remaining 1%) that may of little relevance to the overall distribution. We used the BOT survey dataset, which provided the highest catch across the greatest range (extending into San Francisco Bay when several other IEP surveys did not) and conducted throughout the year (for 12 months when other IEP surveys were of limited duration), to generate the maps of the relative concentrations of Estuary longfin smelt by life stage. Specifically, we first corrected the catch data for the volume of water sampled, so that the volumes of water sampled did not influence the catch results. Next we summed the catch across surveys for each life stage (see Table 1 for delineation of life stages) for the months of the season being considered. For the "Spring" for Age-0 and Age-1 fish, we used the months from January to April. For Age-2 we used December through May in order to capture the extended spawning season. Then we calculated the relative distribution within a year by calculating the percentage of longfin smelt of each life stage observed at each station during the season of each year by the total number of longfin smelt of that life stage in that season observed in the entire estuary (see Tables 4-6). We then calculated a simple average across years. Aggregating in this way provided an equal weighting between years, regardless of the abundance. Finally, for each life stage and season, we identified the minimum number of stations that accounted for 90% of the observed

longfin smelt, and then identified the minimum number of stations that, together with the previous group, accounted for 99% of the observed longfin smelt.

The predominant (90% of the sampled longfin smelt) distribution was depicted with darker circles on the maps. The minor distribution (next ~9%) were depicted with lighter circles, and the extent of the range of the survey was shown with a solid line.

Cutoff lengths (mm) Cutoff lengths (mm) Age-1 Age-2 separating age-0 from age-1 separating age-1 from age-2 1 40 41-90 90 >90 Jan 2 Feb 42 43-93 93 >93 3 Mar 46 47-96 96 >96 4 52 53-100 100 >100 Apr 5 59 May 60-105 105 >105 6 67 68-108 108 >108 Jun 7 71 72-111 Jul 111 >111 8 Aug 75 76-114 114 >114 9 Sep 80 81-117 117 >117

84-120

86-123

88-125

120

123

125

>120

>123

>125

TABLE 1.—This table provides the life stage cutoff lengths by month for longfin smelt based on Baxter (1999).

10

11

12

Oct

Nov

Dec

83

85

87

Survey Type	Time Period	Project/Studies	Source	Agency
20 Tow Net	1995-2009	IEP	CDFG	CDFG
Bay Midwater Trawl	1980-2008	IEP	CDFG	CDFG
Fall Midwater Trawl	1967-2009	IEP	CDFG	CDFG
Plankton Net	1980-1989	IEP	CDFG	CDFG
Spring Kodiak Trawl	2002-2009	IEP	CDFG	CDFG
Summer Tow Net	1959-2009	IEP	CDFG	CDFG
Beach Seine	1979-2009	Distribution	USFWS	USFWS
Kodiak experimental trawl	2001	Distribution	USFWS	USFWS
Kodiak Trawl	1976-2008	Distribution	USFWS	USFWS
Mid-water Trawl	1976-2008	Distribution	USFWS	USFWS
Push Net	1992-1994	Distribution	USFWS	USFWS
Rotary Screw Trap	1990-2005	Monitoring	BDAT	EBMUD
Beach Seine	1979 - 2005	Suisun Marsh Fisheries Monitoring	BDAT	UCD
Larval Sled	1994 - 1998	Suisun Marsh Fisheries Monitoring	BDAT	UCD
Midwater Trawl	1980s-1990s	Suisun Marsh Fisheries Monitoring	BDAT	UCD
Otter Trawl	1979 - 2005	Suisun Marsh Fisheries Monitoring	BDAT	UCD
Beach Seine	1998-2005	Yolo Bypass Study	BDAT	DWR
Fyke Net	1998	Yolo Bypass Study	BDAT	DWR
Fyke Trap	1999-2005	Yolo Bypass Study	BDAT	DWR
Purse Seine	1998	Yolo Bypass Study	BDAT	DWR
Rotary Screw Trap	1998-2005	Yolo Bypass Study	BDAT	DWR
Rotary Screw Trap	1999-2002	Yolo Bypass Study	Sommer et al. 2004	DWR
Coine Electrofichies	1000 0005	Floodulain menitoring, Native and Alian Fick	Mayle et al. 2007	
Seine, Electronsning	1990-2000	Floodplain monitoring: Native and Allen Fish	Moyle et al. 2007	UCD
		Littoral Fish Assemblages of the Alien-		USFWS/
Electrofishing	1980s-2000s	dominated Sacramento-San Joaquin Delta	Brown and Michniuk 2007	CDFG
Seining, Backpack Electrofishing				
Surveys, Boat Electrofishing surveys	1997-2004	Fish Community Survey	Merz and Saldate 2005	EBMUD
lability and and the second	1990-2000	Spatial and temporal distribution of native		
Ichthyopiankton net	4070- 4000-	and alien ichthyopiankton in the Delta	Grimaido et al. 2004	DWR
	19795-19995	Native Alien Fishes in a California Estuarine	Matern et al. 2002	UCD
Otter Trawi	19795-19995	Native Alien Fishes in a California Estuarine	Matern et al. 2002	UCD
			Snider and Titus 2000,	
Seining, rotary screw tran	19902000-	Stream Evaluation	(ners comm.)	CDEG
Senning, rotary screw trap	13303-20003	Ecological Studies of the Sacramento-San		
Otter Trawl	1963-1964	Joaquin Delta: Fishes of the Delta	Radtke 1966	CDFG
	1000 0000	Calaveras River Barrier Removal Program -	T. Kennedy (pers. comm.,	-
Beach Seine	1990-2000	West Delta Survey	July 2010)	FFC
Seining, rotary screw trap	1990s-2000s	Stream Evaluation	R. Titus (pers. comm.)	CDFG

TABLE 2.—List of projects, survey type, time-periods and sources of monitoring survey data used for longfin smelt geographic extent range map.

Monitoring Program	Years	Sampling Period and Location	Fork length ranges (mm)	Age Groups	Dominant Age Groups
1. BMWT	1980-2008	Jan-Dec, S. San Francisco Bay to Delta	40-203	Age-0 to -2	Age-0, -1
2. BOT	1980-2008	Jan-Dec, S. San Francisco Bay to Delta	40-197	Age-0 to -2	Age-0, -1
3. FMWT	1967-2009	Sep-Dec, San Pablo Bay to Delta	15-282	Age-0 to -2	Age-0, -1
4. SKT	2002-2009	Jan-Jul, Suisun Bay to Delta	15-135	Age-0 to -2	Age-0, -1
5. 20mm	1995-2009	Mar-Aug, Napa River to Delta	3-236	Age-0	Age-0
6. STN	1959-2009	Jun-Sep, Suisun Bay to Delta	7-141	Age-0 to -1	Age-0

TABLE 3.—Summary of monitoring period, location, size ranges and age groups for Estuary longfin smelt.

Table 4

Spring Ase V Image	Longfin Sme	elt - Bay Of	tter Trawl	; Relative	Distribu	tion By S	tation												
Sation 104 1986 1997 1987 1987 200 2001 2002 2003 2004 2005 2008 2007 2008 Gamma Transmit 1997 1988 1997 1988 1997 1988 1997 1988 1997 1988 1997 1988 1997 1998 1997 1998 1997 1998 1997 1998 1997 1998 1997 1998 1997 1998 1997 1998	Spring Age	0																	
Bit Into 1984 1986 1987 1988 2000 2011 2000 2004 2007 2008 Gamp I and I																			
Samo Diff Diff<	Station	1004	1005	1006	1007	1009	1000	2000	2001	2002	2002	2004	2005	2006	2007	2009	Crond Total	90%	Mino
102 00% <td>101</td> <td>1994</td> <td>1995</td> <td>0%</td> <td>1997</td> <td>0%</td> <td>0%</td> <td>2000</td> <td>2001</td> <td>2002</td> <td>2003</td> <td>2004</td> <td>2005</td> <td>2000</td> <td>2007</td> <td>2000</td> <td>0.0%</td> <td></td> <td></td>	101	1994	1995	0%	1997	0%	0%	2000	2001	2002	2003	2004	2005	2000	2007	2000	0.0%		
1103 Diff. Org. Org. <t< td=""><td>101</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></t<>	101			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
104 0%	103			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
105 108 096 096 096 096 096 096 0076 097 107 096 096 096 096 096 096 096 096 096 096 096 096 096 096 097	104			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
100 101 0% 0	105			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
107 108 0% 0	106			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
Image: 100 Image: 100 OPS	107			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
100 005 <td>108</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	108			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
110 100 100 005 <td>109</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	109			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
Her Org Org< Org< <td>110</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	110			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
112 0% 0% 0% 0% 0% 0% 0% 0% 00% 0% 00% 0% 00% 0%	140			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
1 0% </td <td>142</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	142			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
212 0% <t< td=""><td>211</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></t<>	211			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
213 0% <t< td=""><td>212</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>19%</td><td></td><td></td><td>2.1%</td><td></td><td>2.1%</td></t<>	212			0%		0%	0%		0%	0%	0%	0%	0%	19%			2.1%		2.1%
214 0%	213			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
215 0% 0% 0% 0% 0% 0% 0% 0.0% 0.0% 243 0% <t< td=""><td>214</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>62%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>6.8%</td><td>6.8%</td><td></td></t<>	214			0%		0%	0%		0%	62%	0%	0%	0%	0%			6.8%	6.8%	
216 0% 0% 0% 0% 0% 0% 81% 90% 90% 243 0% <td< td=""><td>215</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></td<>	215			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
243 0%	216			0%		0%	0%		0%	0%	0%	0%	0%	81%			9.0%	9.0%	
244 0%	243			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
317 0%	244			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
318 0% 0% 0% 0% 0% 0% 0% 4.3% 4.43% 4.43% 320 0% <td>317</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	317			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
319 0% 0% 0% 0% 0% 0% 0% 0.0% 321 18% 0% <td< td=""><td>318</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>38%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>4.3%</td><td></td><td>4.3%</td></td<>	318			0%		0%	0%		0%	38%	0%	0%	0%	0%			4.3%		4.3%
320 0%	319			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
321 18% 0% <	320			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
322 71% 0% <	321			18%		0%	0%		0%	0%	0%	50%	0%	0%			7.5%	7.5%	
323 0% <t< td=""><td>322</td><td></td><td></td><td>71%</td><td></td><td>0%</td><td>0%</td><td></td><td>35%</td><td>0%</td><td>0%</td><td>50%</td><td>0%</td><td>0%</td><td></td><td></td><td>17.3%</td><td>17.3%</td><td></td></t<>	322			71%		0%	0%		35%	0%	0%	50%	0%	0%			17.3%	17.3%	
325 0% <t< td=""><td>323</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></t<>	323			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
345 0% 0% 53% 0% <	325			0%		0%	0%		0%	0%	0%	0%	100%	0%			11.1%	11.1%	
346 0% <t< td=""><td>345</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>53%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>5.9%</td><td>5.9%</td><td></td></t<>	345			0%		0%	53%		0%	0%	0%	0%	0%	0%			5.9%	5.9%	
427 (1)	346			0%		0%	47%		0%	0%	0%	0%	0%	0%			5.2%	5.2%	
428 0 0% <td< td=""><td>427</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></td<>	427			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
429 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 11%	428			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
430 11% 0% 0% 0% 0% 0% 0% 0% 0% 1.3% 1.3% 1.3% 1.3% 1.3% 1.3% 1.3% 1.3% 1.1%	429			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
431 0% 100% 0% 0% 0% 0% 0% 0% 0% 11.1% 11.1% 432 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 11.1%	430			11%		0%	0%		0%	0%	0%	0%	0%	0%			1.3%		1.3%
432 0% 0% 0% 0% 0% 0% 0% 0% 0% 11.1% 11.1% 433 0%	431			0%		100%	0%		0%	0%	0%	0%	0%	0%			11.1%	11.1%	
433 0% <t< td=""><td>432</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>100%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>11.1%</td><td>11.1%</td><td></td></t<>	432			0%		0%	0%		0%	0%	100%	0%	0%	0%			11.1%	11.1%	
447 0% <t< td=""><td>433</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></t<>	433			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
5.34 0% <	447			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	534			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	535			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
750 0% <t< td=""><td>736</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td>= 00/</td><td></td></t<>	736			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%	= 00/	
751 0% <t< td=""><td>750</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>65%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>7.2%</td><td>7.2%</td><td></td></t<>	750			0%		0%	0%		65%	0%	0%	0%	0%	0%			7.2%	7.2%	
752 0% <t< td=""><td>751</td><td></td><td></td><td>0%</td><td></td><td>0%</td><td>0%</td><td></td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td></td><td></td><td>0.0%</td><td></td><td></td></t<>	751			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
100 0%	/52			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
761 0% 0% 0% 0% 0% 0% 0% 0% 0% 0.0% 0.0% 762 0%	760			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
102 0%	761			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
637 0%	/62			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
055 U%	837			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
ood 0%	853			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
Other Offa Offa Offa Offa Offa Offa Offa OLV6 865 0% </td <td>803</td> <td></td> <td></td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td></td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td></td> <td></td> <td>0.0%</td> <td></td> <td></td>	803			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
00-1 0/0 0/0 0/0 0/0 0/0 0/0 0/0 0/0 0/0 0/	804			0%		0%	0%		0%	0%	0%	0%	0%	0%			0.0%		
	Crond Tata	00/	00/	1000/	00/	1000/	1000/	00/	1000/	1000/	1000/	1000/	0%	1000/	00/	001	0.0%	02.20/	7 70/

Table 5

Longfin Sm	elt - Bay Ot	ter Trawl;	Relative	Distribut	tion By S	tation												
Spring Age	1																	
																	90%	Minor
Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Grand Total		
101	0%	5%	2%	0%	0%	5%	2%	0%	21%	11%	2%	11%	0%	0%	0%	4.0%	4.0%	
102	0%	0%	0%	1%	0%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0.2%		0.2%
103	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	1%	0%	0%	0%	0.2%		
104	0%	0%	0%	0%	0%	0%	1%	2%	0%	0%	2%	0%	0%	2%	0%	0.5%		0.5%
105	0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	2%	2%	0%	0%	14%	1.4%	1.4%	
106	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	18%	0%	0%	1.3%		1.3%
107	0%	0%	2%	5%	19%	0%	3%	44%	0%	0%	1%	4%	0%	0%	0%	5.1%	5.1%	
108	0%	0%	1%	40%	18%	2%	0%	2%	0%	8%	4%	3%	2%	13%	44%	9.2%	9.2%	1.00/
109	0%	0%	0%	0%	0%	1%	3%	1%	0%	4%	1%	0%	6%	0%	0%	1.0%		1.0%
110	1%	0%	0%	0%	0%	1%	2%	1%	0%	3%	0%	0%	0%	7%	0%	1.0%		1.0%
140	0%	4%	1%	0%	0%	0%	1%	2%	0%	1%	1%	0%	0%	0%	0%	0.7%		0.7%
142	1%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.2%	0.00/	
211	7%	4%	3%	0%	4%	3%	3%	1%	0%	1%	0%	1%	0%	5%	0%	2.2%	2.2%	4.00/
212	0%	5%	0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	1.3%	0.40/	1.3%
213	2%	0%	0%	2%	0%	4%	5%	1%	0%	0%	0%	0%	0%	0%	22%	2.4%	2.4%	
214	21%	0%	0%	1%	0%	0%	0%	0%	7%	1%	6%	2%	0%	2%	0%	2.7%	2.7%	
215	7%	120/	110/	1%	7%	4%	0%	10%	110/	0%	2% 10/	3%	70/	3%	0%	1.8%	6.70/	
210	9%	0%	10%	10%	0%	20/	0%	0%	0%	2%	0%	0%	0%	22%	0%	0.7%	0.7%	1 20/
243	4 /0	0%	1076	0%	10%	2 /0	0%	0%	0%	0%	0%	0%	2494	0%	0%	2.7%	2 70/	1.370
244	0%	0%	1%	1%	0%	7%	0%	1%	0%	0%	0%	0%	24%	0%	0%	0.7%	2.1 /0	0.7%
318	0%	0%	2%	0%	0%	0%	1%	1%	1%	2%	2%	6%	3%	2%	0%	1.6%	1.6%	0.770
310	0%	17%	1%	2%	0%	0%	1%	3%	470	2%	1%	1%	2%	2 /0	0%	2.4%	2.4%	
320	13%	0%	2%	2 /0	0%	2%	1%	3%	0%	1%	6%	2%	270	7%	21%	5 1%	5.1%	
321	5%	4%	5%	5%	0%	17%	0%	0%	7%	28%	13%	7%	8%	7%	21%	7.0%	7.0%	
322	2%	0%	29%	0%	0%	1%	5%	3%	0%	8%	13%	2%	2%	6%	0%	4 7%	4 7%	
323	2%	4%	2%	12%	0%	0%	4%	1%	0%	0%	4%	2%	10%	3%	0%	2.9%	2.9%	
325	0%	5%	1%	2%	0%	3%	0%	6%	8%	2%	2%	25%	2%	2%	0%	3.9%	3.9%	
345	0%	4%	4%	2%	3%	5%	13%	0%	0%	11%	2%	0%	3%	0%	0%	3.2%	3.2%	
346	1%	9%	3%	1%	0%	5%	10%	0%	4%	2%	1%	1%	3%	1%	0%	2.7%	2.7%	
427	0%	0%	1%	4%	3%	9%	1%	2%	0%	1%	4%	1%	0%	0%	0%	1.7%	1.7%	
428	0%	0%	1%	0%	0%	2%	8%	0%	0%	5%	10%	1%	0%	0%	0%	1.8%	1.8%	
429	2%	0%	2%	6%	0%	0%	1%	0%	9%	1%	0%	0%	0%	1%	0%	1.5%	1.5%	
430	5%	0%	1%	0%	0%	0%	0%	2%	0%	0%	6%	9%	0%	2%	0%	1.8%	1.8%	
431	1%	0%	1%	0%	5%	0%	2%	0%	16%	1%	2%	5%	0%	5%	0%	2.6%	2.6%	
432	2%	10%	1%	1%	0%	3%	0%	4%	0%	2%	4%	2%	0%	0%	0%	1.8%	1.8%	
433	3%	0%	1%	1%	5%	1%	5%	3%	0%	0%	1%	1%	5%	1%	0%	1.7%	1.7%	
447	1%	0%	1%	0%	5%	1%	6%	4%	0%	1%	3%	0%	0%	2%	0%	1.6%	1.6%	
534	0%	0%	1%	0%	0%	0%	0%	5%	3%	0%	1%	4%	0%	0%	0%	0.9%		0.9%
535	5%	7%	10%	0%	14%	5%	7%	3%	0%	0%	1%	2%	0%	1%	0%	3.6%	3.6%	
736	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0.2%		
750	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0.1%		
751	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0.0%		
752	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%		
760	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
761	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0.1%		
762	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
837	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%		
853	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.1%		
863	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
864	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
865	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
Grand Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100.0%	90.0%	8.9%

Table 6

Spring Age 2 Spring Age 2<	Longfin Sm	elt - Bay Of	tter Trawl	; Relative	e Distribu	ition By S	tation												
Select 1994 1996 1997 1994 1996 1997 1998 <	Spring Age	2																	
Station 1994 1995 1997 1998 1999 2001 2002 2003 2004 2005 2007 2008 Gmm 1 2008 3.8 1010 0% 0% 0% 0% 0% 0% 0.8 0% 0.8																		90%	Minor
101 9% 9% 3% 2% 9% 0%	Station	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Grand Total		
102 0%	101	9%	0%	3%	3%	4%	2%	0%	0%	6%	3%	2%	3%	24%	0%	0%	3.8%	3.8%	
103 0%	102	0%	0%	2%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0.2%		
108 0% 0% 0% 0% 0% 0% 0% 0% 0.4% 0.0 108 0% <td< td=""><td>103</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0.0%</td><td></td><td></td></td<>	103	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.0%		
108 0%	104	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%	3%	0%	0%	0.4%		0.4%
100 0%	105	0%	0%	0%	0%	0%	0%	1%	0%	2%	0%	1%	3%	0%	0%	0%	0.5%		0.5%
107 19% 0% 0% 0% 22% 0%	106	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	12%	0%	0%	0.9%		0.9%
108 0%	107	15%	0%	0%	5%	6%	0%	0%	22%	3%	0%	4%	2%	0%	0%	0%	3.7%	3.7%	
110 076 <td>108</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>4%</td> <td>0%</td> <td>3%</td> <td>0%</td> <td>1%</td> <td>0%</td> <td>3%</td> <td>0%</td> <td>7%</td> <td>0%</td> <td>18%</td> <td>5%</td> <td>2.7%</td> <td>2.7%</td> <td></td>	108	0%	0%	0%	4%	0%	3%	0%	1%	0%	3%	0%	7%	0%	18%	5%	2.7%	2.7%	
110 0%	109	0%	0%	0%	0%	0%	0%	0%	0%	8%	10%	0%	0%	4%	0%	0%	1.5%	1.5%	
140 9% 2% 0% 3% 1% 1% 1% 0%	110	0%	6%	0%	3%	0%	1%	0%	5%	8%	11%	3%	1%	0%	0%	5%	3.0%	3.0%	
142 0%	140	9%	2%	0%	1%	0%	3%	1%	1%	0%	0%	1%	0%	0%	0%	0%	1.3%	1.3%	
211 0% 0% 0% 2% 2% 1% 0%	142	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0.1%	4.00/	
121 0%	211	0%	0%	Z%	0%	4%	2%	2% 00/	1%	2% 00/	2%	1%	0%	0%	3%	0%	1.2%	1.2%	0.00/
213 0 % 0 % 2 % 0 % <td>212</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>2%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>3%</td> <td>U%</td> <td>0%</td> <td>0.3%</td> <td>1 70/</td> <td>0.3%</td>	212	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	3%	U%	0%	0.3%	1 70/	0.3%
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	213	0%	0%	0%	Z%	0%	0%	2%	0%	8%	0%	0%	0%	0%	4%	5%	1.7%	1.7%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	214	19%	3%	0%	1%	4%	1%	2% 0%	1%	0%	Z%	Z%	4%	4%	0%	0%	2.9%	2.9%	
2100% </td <td>215</td> <td>11%</td> <td>0%</td> <td>6%</td> <td>4%</td> <td>0%</td> <td>4%</td> <td>9%</td> <td>0%</td> <td>2%</td> <td>1%</td> <td>7%</td> <td>8%</td> <td>5%</td> <td>1%</td> <td>0%</td> <td>4.2%</td> <td>4.2%</td> <td></td>	215	11%	0%	6%	4%	0%	4%	9%	0%	2%	1%	7%	8%	5%	1%	0%	4.2%	4.2%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	216	6%	16%	11%	0%	6%	8%	5%	3%	8%	4%	3%	2%	0%	15%	5%	6.2%	6.2%	0.40/
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	243	0%	0%	1%	1%	0%	0%	0%	1%	0%	0%	0%	2%	0%	0%	0%	0.4%	0.40/	0.4%
317 0% 0	244	4%	0%	0%	1%	14%	0%	0%	1%	0%	0%	0%	0%	12%	0%	0%	2.1%	2.1%	
310 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 1% 0	317	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0.2%	4 40/	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	318	6% 0%	0%	5% 20/	2%	0%	4%	0%	0%C	0%	1%	0%	0%	0%	0%	0%	1.4%	1.4%	4.00/
320 0% 5% 0	319	0%	5%	Z%	0%	0%	0%	1%	1%	0%	2%	3%	2%	3%	0%	0%	1.2%	4.00/	1.2%
321 0% 3% 0% 1% 0% 0% 1% 1% 1% 1% 322 0% 0	320	0%	5%	0%	0%	4%	3%	8%	3%	2%	2%	5%	7%	0%	20%	14%	4.9%	4.9%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	321	0%	3%	0%	1%	0%	0%	0%	2%	0%	12%	1%	0%	0%	4%	0%	1.9%	1.9%	0.50/
3.23 0% 0% 0% 0% 2% 0%	322	0%	0%	Z%	0%	0%	1%	2% 00/	2% 00/	0%	0%	1%	0%	0%	0%	0%	0.5%	4 40/	0.5%
3.45 0% <t< td=""><td>323</td><td>0%</td><td>0%</td><td>0%</td><td>1%</td><td>0%</td><td>4%</td><td>0%</td><td>0%</td><td>2%</td><td>0%</td><td>0%</td><td>2%</td><td>5%</td><td>0%</td><td>0%</td><td>1.4%</td><td>1.4%</td><td></td></t<>	323	0%	0%	0%	1%	0%	4%	0%	0%	2%	0%	0%	2%	5%	0%	0%	1.4%	1.4%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	325	0%	0%	6%	22%	4%	0%	6%	9%	8%	0%	9%	8%	0%	8%	5%	5.7%	5.7%	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	345	4%	5% 0%	0%	8%	2%	4%	8%	5% 20/	10%	10%	9%	0%	0%	3%	0%	5.0%	5.0%	
427 $0%$ $0%$ $0%$ $1%$ $3%$ $12%$ $3%$ $3%$ $3%$ $3%$ $0%$ $0%$ $0%$ $0%$ $0%$ $1.3%$ $1.3%$ 429 $0%$ $3%$ $4%$ $9%$ $0%$ $6%$ $2%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $1.3%$ $1.3%$ $1.3%$ 429 $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $1.9%$ $1.9%$ $1.9%$ 430 $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $1.9%$ $1.9%$ $1.9%$ 431 $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $0%$ $1.1%$ $1.1%$ $1.1%$ 432 $0%$ <td< td=""><td>340</td><td>0%</td><td>0%</td><td>0%</td><td>1%</td><td>0%</td><td>10%</td><td>0%</td><td>Z%</td><td>10%</td><td>9%</td><td>0%</td><td>3%</td><td>0%</td><td>2%</td><td>0%</td><td>1.8%</td><td>1.8%</td><td></td></td<>	340	0%	0%	0%	1%	0%	10%	0%	Z%	10%	9%	0%	3%	0%	2%	0%	1.8%	1.8%	
428 0% 0% 0% 0% 0% 1% 1% 0%	427	0%	0%	8%	1%	3%	12%	9%	5%	3%	3%	8%	0%	0%	0%	0%	3.5%	3.5%	
429 0% 3% 4% 9% 0% 6% 0%	428	0%	0%	0%	4%	0%	0%	2%	0%	0%	7%	14%	0%	0%	0%	0%	1.8%	1.8%	
430 0% <t< td=""><td>429</td><td>0%</td><td>3%</td><td>4%</td><td>9%</td><td>0%</td><td>0%</td><td>2% 00/</td><td>0%</td><td>5% 70/</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>1.9%</td><td>1.9%</td><td>4 40/</td></t<>	429	0%	3%	4%	9%	0%	0%	2% 00/	0%	5% 70/	0%	0%	0%	0%	0%	0%	1.9%	1.9%	4 40/
441 0% 0% 0% 0% 0% 0% 0% 1% 2% 1% 2% 1% 0% 0% 0% 0% 1% 0% <t< td=""><td>430</td><td>0%</td><td>0%</td><td>3%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>7%</td><td>0%</td><td>5%</td><td>3%</td><td>0%</td><td>0%</td><td>0%</td><td>1.1%</td><td>4 70/</td><td>1.1%</td></t<>	430	0%	0%	3%	0%	0%	0%	0%	0%	7%	0%	5%	3%	0%	0%	0%	1.1%	4 70/	1.1%
442 0% 0% 0% 2% 0% 1% 0% 0% 0% 2% 2% 2% 0% 1% 0% <t< td=""><td>431</td><td>0%</td><td>0%</td><td>U%</td><td>3% E0/</td><td>0%</td><td>0%</td><td>2%</td><td>1%</td><td>2% 0%</td><td>1%</td><td>0%</td><td>2%</td><td>U%</td><td>9%</td><td>0%</td><td>1.7%</td><td>1.1%</td><td></td></t<>	431	0%	0%	U%	3% E0/	0%	0%	2%	1%	2% 0%	1%	0%	2%	U%	9%	0%	1.7%	1.1%	
443 0% 0% 0% 0% 1% 1% 1% 1% 1% 1% 1% 1% 1% 0% 0% 0% 3% 1% 0% 0% 0% 3% 1% 0% <t< td=""><td>432</td><td>0%</td><td>0 /0</td><td>J /0</td><td>J /0</td><td>70/</td><td>22 /0</td><td>2 /0</td><td>2 /0</td><td>0%</td><td>1 /0</td><td>20/</td><td>10%</td><td>129/</td><td>070</td><td>0%</td><td>2.070</td><td>2.0%</td><td></td></t<>	432	0%	0 /0	J /0	J /0	70/	22 /0	2 /0	2 /0	0%	1 /0	20/	10%	129/	070	0%	2.070	2.0%	
447 0% 4% 2% 0% 2% 0% 1% 0% 3% 0% 0% 0% 1.1% 1.	433	0%	40/	0%	2%	00/	2%	0%	2%	0%	1 70	3%	10% E9/	00/	0%	0%	3.1%	3.1%	1 10/
354 0%	447 524	0%	4%	270	0%	0%	2%	0%	270	0%	09/	0%	5%	0%	0%	0%	0.6%		0.6%
353 13% 20% 3% 0% 2% 1% 0% 4% 1% 9% 0% 3% 4% 11%	534	120/	0%	0%	0%	0%	110/	240/	470	0%	40/	10/	0%	0%	0%	0% 40/	0.0%	11 10/	0.0%
136 0% 1% 0%	333	13%	20%	00/	0%	23%	00/	24%	13%	0%	4%	00/	9%	0%	3%	4%	0.0%	11.170	0.09/
130 0%	750	0%	1 70	0%	2%	0%	0%	0%	0%	0%	0%	40/	0%	0%	0%	0%	0.9%		0.9%
1731 0% 0% 0% 0% 0% 0% 1% 0% 1	750	0%	0%	0%	0%	0%	0%	0%	0%	0%	10/	4%	0%	0%	40/	120/	0.2%	1 20/	
132 0%	751	0%	0%	0%	0%	0%	0%	10/	10/	0%	09/	0%	2%	0%	4%	13%	0.2%	1.3%	0.20/
760 0% 0% 0% 0% 0% 1% 0%	752	0%	0%	0%	0%	0%	0%	09/	170	270	10/	0%	0%	0%	0%	0%	0.3%		0.3%
761 0% 10% 2% 2% 0% 0% 0% 0% 2% 2% 0% 0% 1% 2.1	760	0%	10%	0%	0%	0%	0%	0%	3%	0%	09/	0%	0%	0%	0%	1 40/	0.3%	2 10/	
837 0%	701	0%	20/	∠% ∩%	∠% /0/	70/	0%	2%	0%	0%	0%	2 70	∠% 80/	6%	0%	14%	2.1%	2.1%	
657 678 <td>102</td> <td>0%</td> <td>3%</td> <td>0%</td> <td>470</td> <td>1 70</td> <td>0%</td> <td>∠70 10/</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>3%</td> <td>0%</td> <td>0%</td> <td>0%</td> <td>4%</td> <td>2.5%</td> <td>2.370</td> <td>0.6%</td>	102	0%	3%	0%	470	1 70	0%	∠70 10/	0%	0%	0%	3%	0%	0%	0%	4%	2.5%	2.370	0.6%
863 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 1.6% 1.6% 1.6% 863 0%	037	0%	0%	0%	0%	0%	0%	1 %	0%	0%	0%	0%	2%	0%	0%	1%	0.0%	1 60/	0.0%
003 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	000	0%	0%	0%	∠% 0%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1.0%	1.0%	
	003	0%	0%	0%	0%	0%	0%	0%	U%	0%	0%	0%	0%	0%	0%	0%	0.0%		
925 094 078 078 078 078 078 078 078 078 078 078	004	0%	0%	0%	0%	0%	0%	0%	1 70	0%	0%	0%	0%	0%	0%	0%	0.0%		
Creard Total 100% 100% 100% 100% 100% 100% 100% 100	Grand Total	100%	100%	100%	100%	10.0%	10.0%	100%	170	270 1000/	100%	100%	100%	100%	100%	100%	100.0%	80.0%	8 O0/