Additional Ageing Data for Gulf of Mexico King Mackerel

Katherine Shepard

and

William F. Patterson, III

University of West Florida
Department of Biology
Pensacola, FL 32514
Phone: 850 857-6123
Fax: 850 474-2749
kes7d@hotmail.com
wpatterson@uwf.edu

Introduction

The 2004 SEDAR5 data workshop identified several areas where further research was needed to more effectively assess US king mackerel, *Scomberomorous cavalla*, stocks. Among the more critical data needs were determining precise estimates of winter mixing between eastern Gulf of Mexico (GOM) and Atlantic fish, evaluating spatial and temporal variability in mixing, and examining age and growth of the populations rather than the landed catch (Anon. 2004). In the past, samples collected exclusively from fishery-dependent sources were used to calculate growth functions for each population. This practice may bias estimates of growth by excluding individuals below the legal size limits. Sampling undersized fish is especially important for accurately estimating the von Bertalanffy parameter t_0, the hypothetical age at zero length, which strongly affects the shape of the calculated growth function. This study assesses age and growth in GOM king mackerel by including size-at-age data from fishery-dependent and -independent samples collected in the summers of 2006 and 2007. Atlantic 2007 samples are not yet available for aging, therefore are not included in this report. This study is currently in progress and the results presented herein represent preliminary data to compliment the growth functions reported in Shepard et al. (in press).

Methods

Fish were sampled from the northern GOM from May to November in 2006 and 2007 when stocks were separate. Juveniles and adults smaller than the legal size limit, as well as legal sized fish, were caught on fishery-independent hook-and-line research cruises with a permit to collect sub-legal fish from NOAA Fisheries. Juvenile fish were collected from SEAMAP trawl samples during the summer and fall groundfish surveys. Fish above the legal limit were sampled from hook-and line recreational charter boat landings in Orange Beach, AL. Samples from large fish were collected at fishing tournaments in Orange Beach and Dauphin Island, AL.

We measured the fork length (FL), determined the sex and removed both sagittal otoliths for all sampled individuals. Otoliths were read according to the methods of DeVries and Grimes (1997). Otoliths from males longer than 800 mm FL and females longer than 900 mm FL were sectioned for aging, while opaque zones were counted on whole otoliths of males shorter than 800 mm FL and females shorter than 900 mm FL. For both whole and sectioned otoliths, the number of opaque zones was recorded and the margin (area between the last annulus and the edge of the otolith) classified as nonexistent, small, average, or large relative to the previous increment (distance between the penultimate and final annuli). If the last opaque zone was on the edge of the otolith the margin was nonexistent. A small margin is defined as less than 1/3 the width of the previous increment. An average margin is 1/3 to 2/3 the width of the previous increment, and a large margin is greater than 2/3 the width of the previous increment.

Each annuli count and margin classification was converted to age according to the following rules. From January 1st to May 31st, if the margin was nonexistent or narrow, the age was equivalent to the number of annuli. If the margin was average or wide, the age was advanced 1 year. From June 1st to July 20th the age was advanced if the margin was wide or if it was average and there were more than 2 annuli. From July 21st to December 31st the age was equivalent to the number of annuli.

Ten percent of otoliths sampled in 2006 were read a second time by personnel at the NOAA Fisheries lab in Panama City, FL. Samples collected in 2007 have not yet been sub-sampled nor undergone a second read. The average percent error (APE) for 2006 samples that were read by two readers was calculated:

$$APE = \frac{1}{N}\sum_{j=1}^{N}\left[\frac{1}{R}\sum_{i=1}^{R}\frac{\left|X_{ij} - X_{j}\right|}{X_{j}}\right] \quad (1)$$

where: N = number of fish aged more than once, R = number of times each fish was aged (2), X_{ij} = *i*th age determination of the *j*th fish, and X_j = average age determination of the *j*th fish (Beamish and Fournier 1981).

Stock- and sex-specific von Bertalanffy growth functions (VBGF) were fitted to fish size at age data with Proc NLIN in SAS (SAS Institute, Inc. 1996):

$$L_t = L_\infty (1 - e^{-k(t-t_0)}) \quad (2)$$

where: L_t = estimated length at age t, L_∞ = asymptotic length, k = growth coefficient, t = age in years, and t_0 = hypothetical age at zero length. Juvenile fish were included in both male and female size-at-age plots and in growth function calculations. Three different approaches were employed to fit sex-specific growth functions. In the first approach juveniles that had not yet deposited the first annulus were included in models as having an age of zero years. In the second approach those fish were included in models as having age of 0.5 year. Finally, juveniles without an annulus were included as age-0.5 and t_0 was fixed at the origin (i.e., t_0 not included as a parameter in the model).

Results and Discussion

A total of 1,385 fish sampled in the northern GOM in summer 2006 and 2007 was aged (Table 1). The APE between readers for 2006 samples was 4.04. Sex-specific sample sizes for VBGFs were 1,045 for the three female plus juvenile models (Table 2) and 464 for the male plus juvenile models (Table 3). The three methods employed to fit VBGFs resulted in distinct estimates for each von Bertalanffy parameter. The method in which fish lacking an annulus were modeled as having an age of zero years produced the highest values for L_∞ and the lowest values for k and t_0 (Figs. 1&2). The approach in which fish lacking an annulus were treated as having age 0.5 year resulted in intermediate parameter estimates (Figs. 3&4). The final method, in which juveniles without an annulus were treated as being 0.5 year old and t_0 was fixed at the origin, produced the lowest estimates of L_∞ and highest of k (Figs. 5&6). This pattern was consistent between sexes. All six functions had high regression coefficients, with the highest coefficients resulting from the first method (Tables 2&3, Figs. 1- 6).

Growth functions reported here have lower estimates of L_∞ and higher estimates of k and t_0 than the historic functions reported by DeVries and Grimes (1997). This is likely due to our incorporation of fish under the legal size limit. The impact of fitting t_0 closer to the origin (or fixing it at the origin) on estimates of the other two von Bertalanffy parameters highlights the importance of including fish under the legal size limit, particularly age-0 fish, in estimating a fish

population's growth rate. A lack of size at age data for young fish affects the shape of the entire growth function, not simply the portion closest to the origin, due to correlations among VBGF parameters.

The VBGFs produced using the first method are similar to the functions reported for the GOM population by Shepard et al. (in press). This is not surprising considering the same methods were used and a portion of the data set is overlapping. The estimates of t_0 are higher with the additional data presented here, however. The difference is likely the result of increasing the number of juvenile fish 4-fold, with resultant estimates of t_0 being closer to the origin. As this study progresses we intend to include sub-legal Atlantic fish and to count the daily growth rings for age-0 fish such that their actual fractional ages can be incorporated into VBGFs.

Plots of residuals versus age for all VBGF models demonstrate a sigmoidal pattern. This pattern suggests a simple VBGF may not be sufficient to describe the variation in size at age data, although this pattern in the data may not be apparent when multiple sample years are modeled jointly. Currently, we are examining possible correlations between king mackerel growth and global climate phenomena, such as the North Atlantic Oscillation, in an effort to better understand patterns observed in size at age data and growth function fits for 2006 and 2007 samples.

Acknowledgments

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Table 1. The number of male, female, and juvenile GOM king mackerel collected each year for age and growth analysis from SEAMAP trawls, fishery-independent hook-and-line (H&L) cruises, and fishery-dependent hook-and-line recreational and tournament landings.

	Females	Males	Juveniles
2006	321	105	38
SEAMAP	1	2	36
Fishery-Independent H&L	16	11	0
Recreational	138	64	2
Tournament	166	28	0
2007	600	235	86
SEAMAP	0	0	85
Fishery-Independent H&L	86	46	0
Recreational	341	146	1
Tournament	173	43	0
Total	921	340	124

Table 3. Estimated von Bertalanffy growth function parameters for Gulf of Mexico female king mackerel sampled in summers 2006 and 2007 with juveniles with no annulus deposited included as having age = 0 (Method 1), age = 0.5 year (Method 2), and age = 0.5 with t_0 not fitted (Method 3).

Females (n=1045)	Parameter	Point Estimate	95% Confidence Limits
Method1 (R^2=0.990)	L_∞	1340.5	1315.3 – 1365.8
	k	0.1950	0.184 – 0.206
	t_0	-1.3160	-1.430 – -1.202
Method 2 (R^2=0.988)	L_∞	1304.4	1277.2 – 1325.6
	k	0.2290	0.215 – 0.243
	t_0	-0.8404	-0.989 – -0.722
Method 3 (R^2=0.984)	L_∞	1191.6	1175.5 – 1207.7
	k	0.3670	0.355 – 0.380

Table 4. Estimated von Bertalanffy growth function parameters for Gulf of Mexico male king mackerel sampled in summers 2006 and 2007 with juveniles with no annulus deposited included as having age = 0 (Method 1), age = 0.5 year (Method 2), and age = 0.5 with t_0 not fitted (Method 3).

Males (n=464)	Parameter	Point Estimate	95% Confidence Limits
Method 1 (R^2=0.991)	L_∞	942.2	926.0 – 958.5
	k	0.3693	0.344 – 0.395
	t_0	-0.8335	-0.912 – -0.755
Method 2 (R^2=0.990)	L_∞	914.7	900.8 – 928.6
	k	0.5013	0.466 – 0.537
	t_0	-0.1575	-0.222 – -0.093

Method 3 (R^2=0.989)	L_∞	896.3	884.5 – 908.1
	k	0.5926	0.566 – 0.620

Figure 1. (A) Size at age data from female king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits calculated resulted from Method 1 in which juveniles without an annulus were included as age = zero years. (B) Plot of residuals versus age from the calculated VBGF.

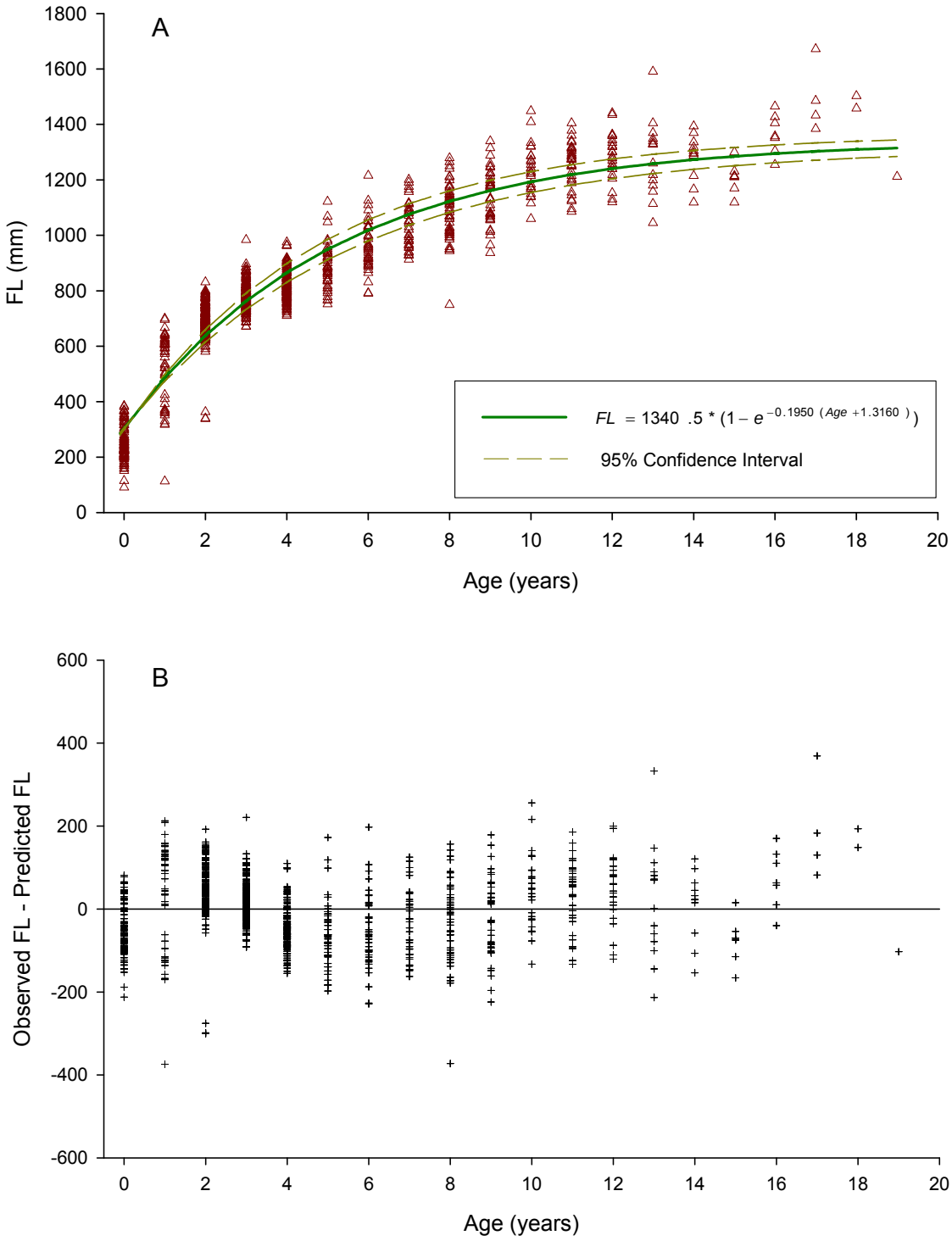
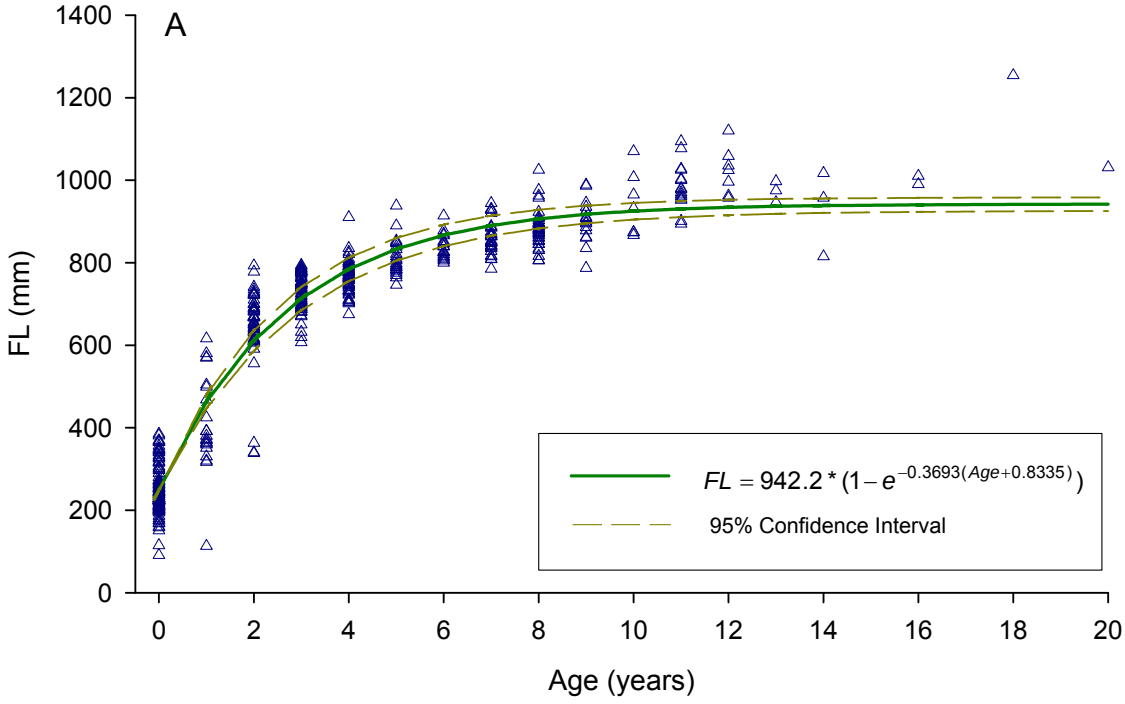


Figure 2. (A) Size at age data from male king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits calculated resulted from Method 1 in which juveniles without an annulus were included as age = zero years. (B) Plot of residuals versus age from the calculated VBGF.



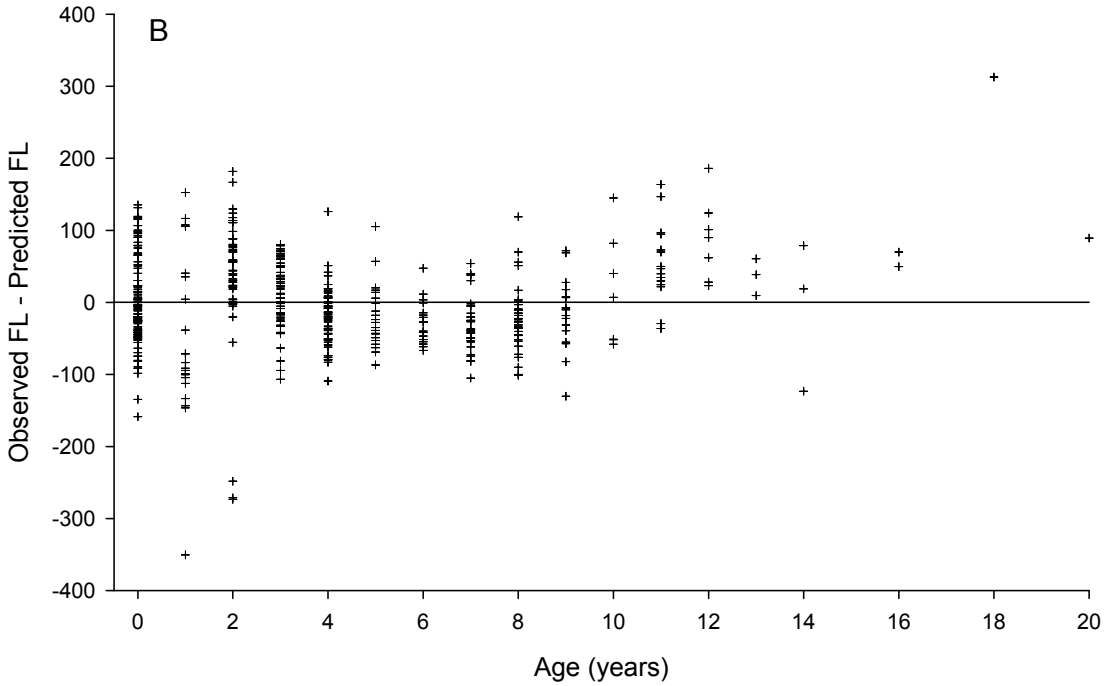


Figure 3. (A) Size at age data from female king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits resulted from Method 2 in which juveniles without an annulus were treated as having an age of 0.5 year. (B) Plot of residuals versus age from the calculated VBGF.

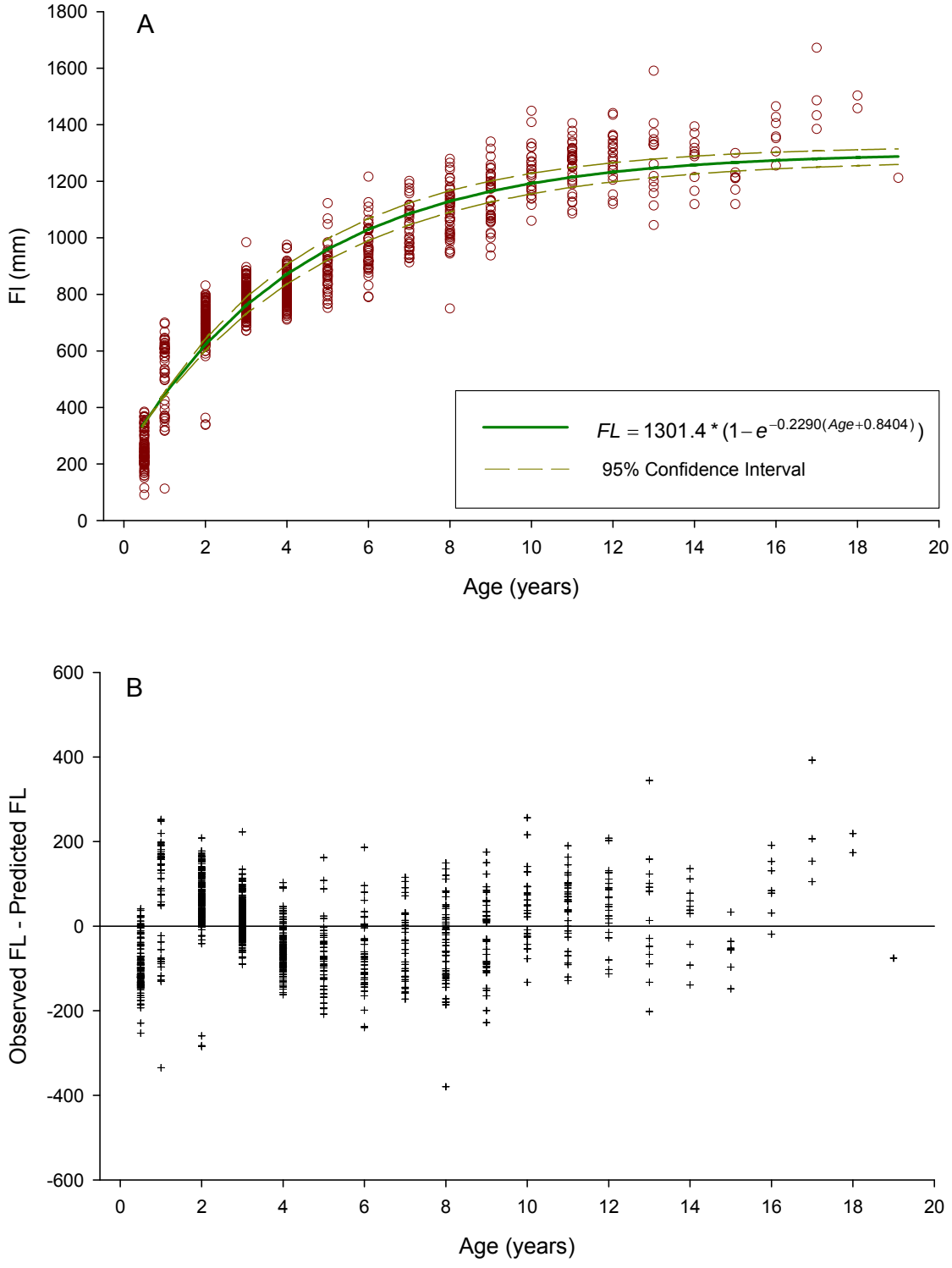


Figure 4. (A) Size at age data from male king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits resulted from Method 2 in which juveniles without an annulus were treated as having an age of 0.5 year. (B) Plot of residuals versus age from the calculated VBGF.

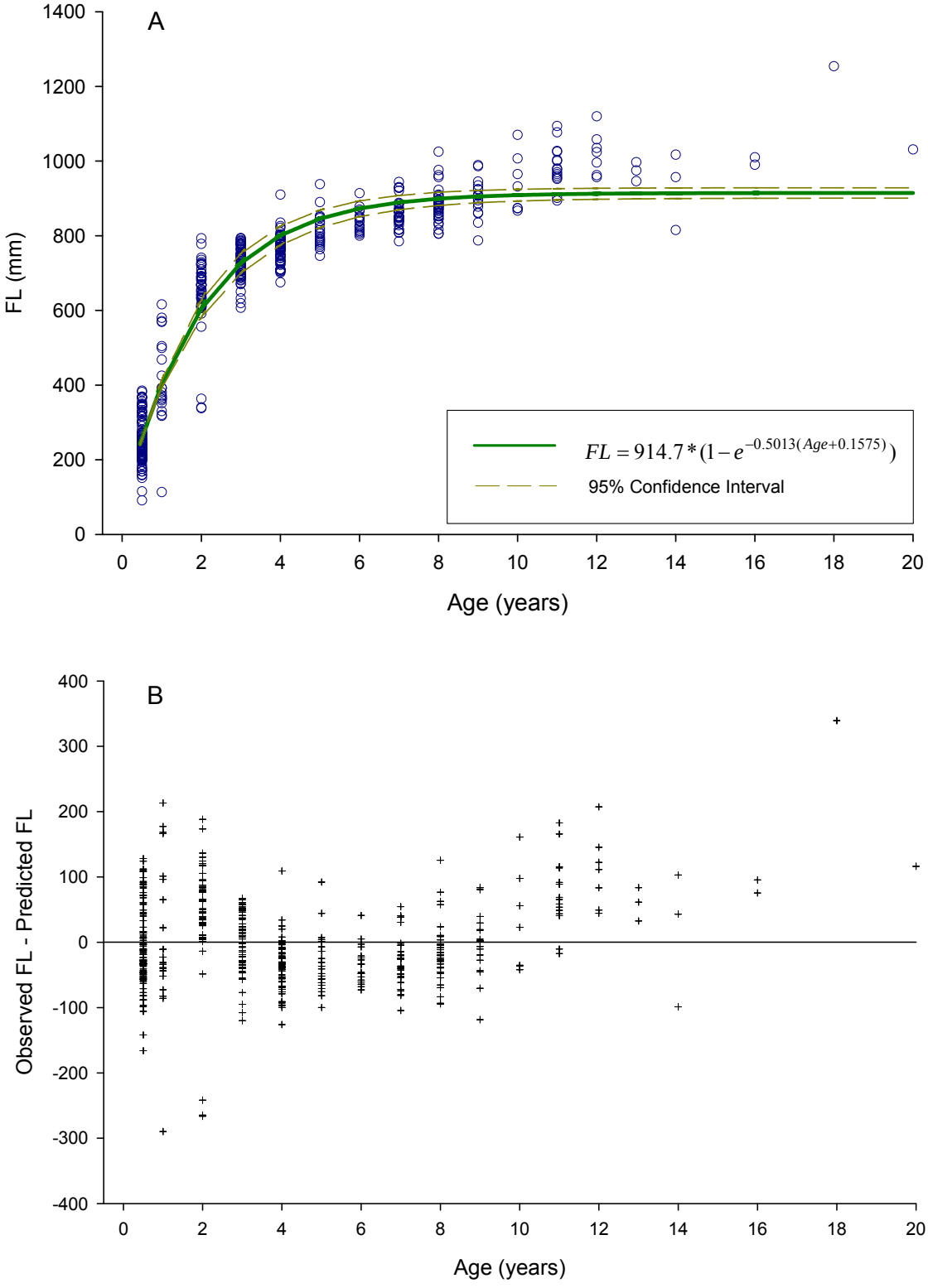


Figure 5. (A) Size at age data from female king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits resulted from Method 3 in which juveniles without an annulus were treated as having an age of 0.5 year and the t_0 parameter was not fit. (B) Plot of residuals versus age from the calculated VBGF.

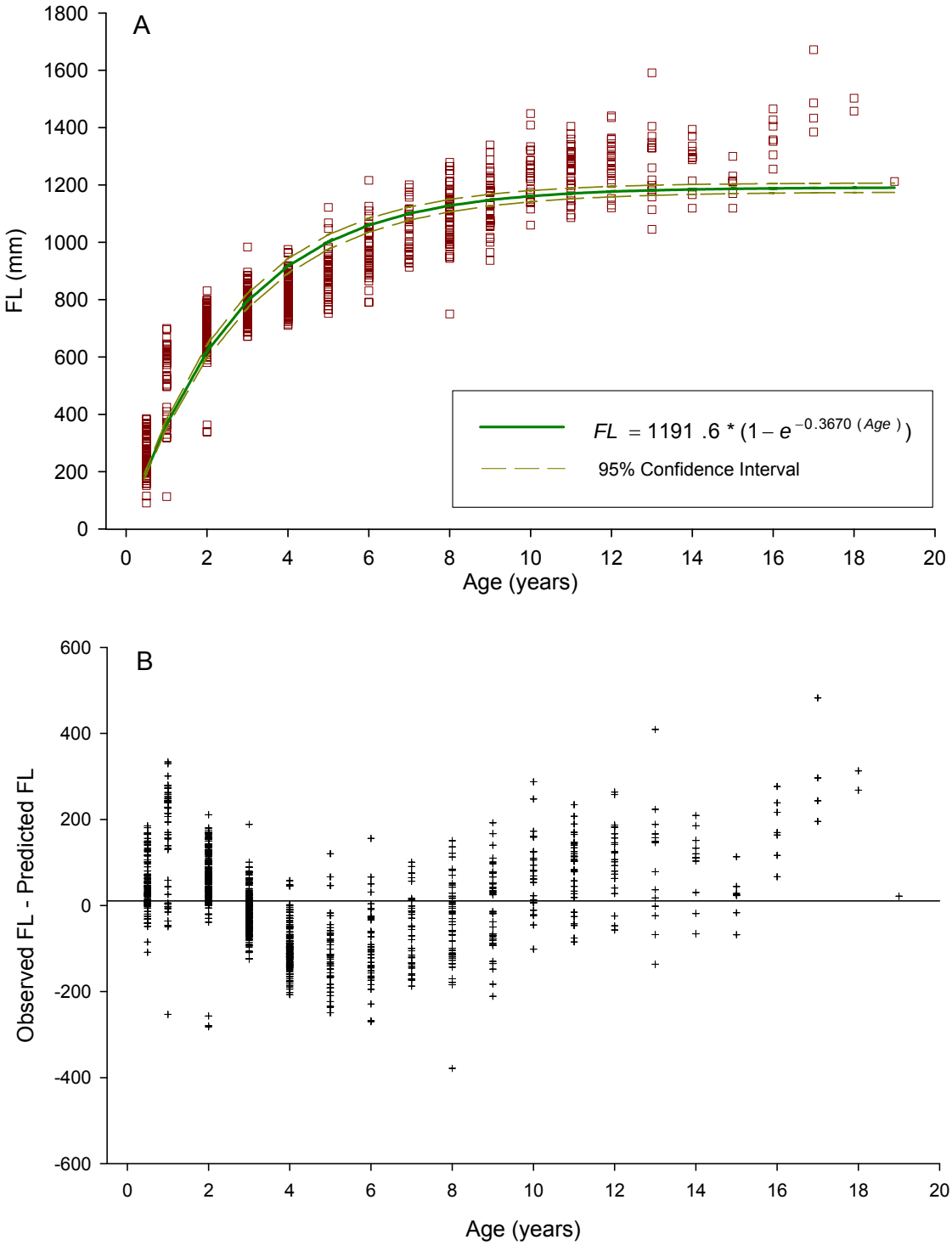
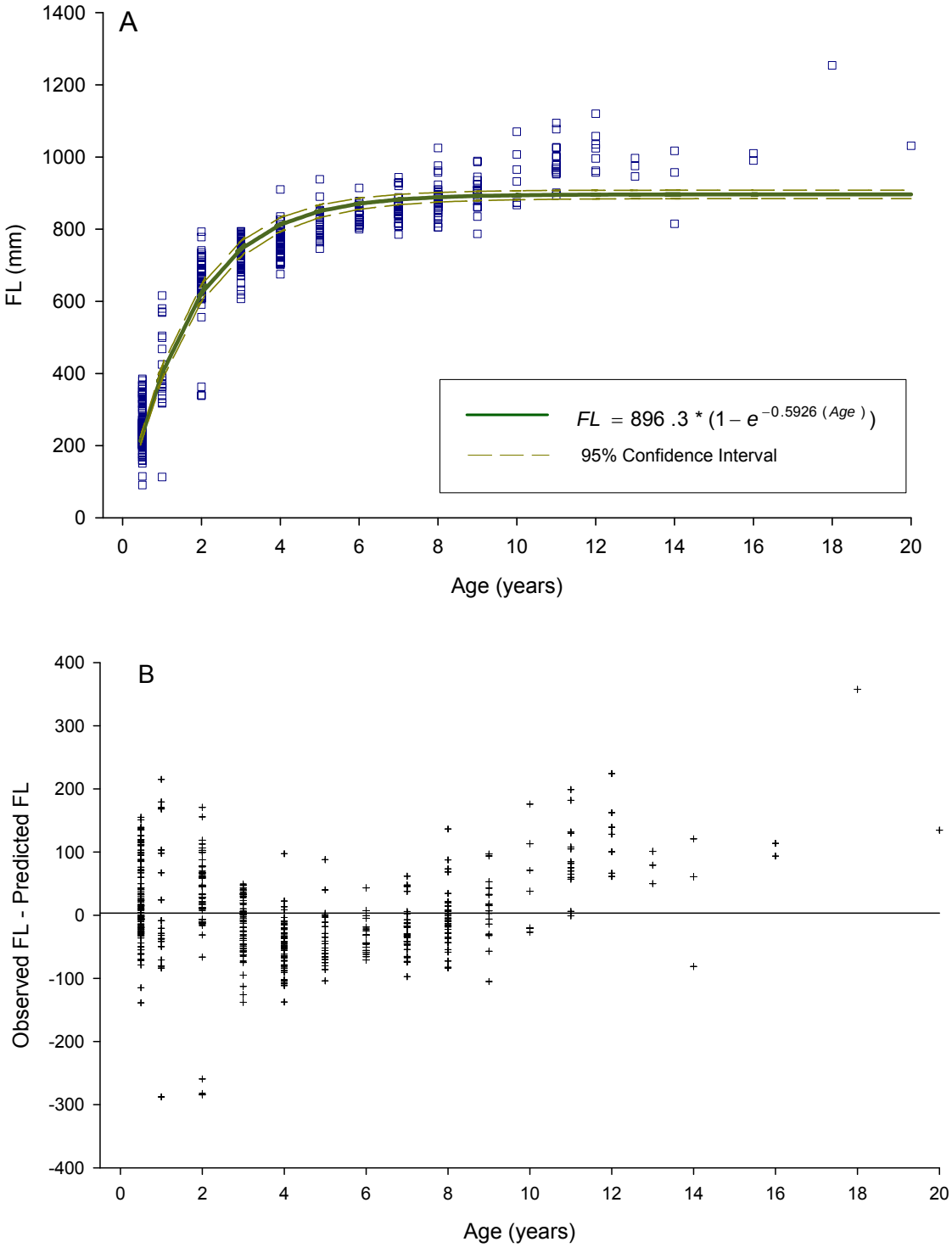


Figure 6. (A) Size at age data from male king mackerel sampled in the northern Gulf of Mexico. The fitted von Bertalanffy growth function (VBGF) and 95% confidence limits resulted from Method 3 in which juveniles without an annulus were treated as having an age of 0.5 year and the t_0 parameter was not fit. (B) Plot of residuals versus age from the calculated VBGF.



Appendix 1. Age and length data collected from female, male, and juvenile king mackerel in the northern GOM in the summers of 2006 and 2007. (Location landed: SEAMAP = NMFS survey, PC = Panama City, FL, GB = Gulf Breeze, FL, and DI = Dauphin Island, AL; Source: I = Fishery-independent, T = Tournament, and R = Recreational).

Annuli	FL mm	Sex	Date	Source	Location Landed
4	775	F	6/8/06	R	OB
8	852	M	6/11/06	I	DI
7	785	M	6/11/06	I	DI
4	767	M	6/11/06	I	DI
2	705	F	6/11/06	I	DI
12	1035	M	6/24/06	T	OB
6	916	F	6/24/06	T	OB
2	723	F	6/24/06	T	OB
7	840	M	6/24/06	T	OB
11	1311	F	6/24/06	T	OB
8	1024	F	6/24/06	T	OB
12	1120	M	6/24/06	T	OB
14	1305	F	6/24/06	T	OB
6	1051	F	6/24/06	T	OB
9	1340	F	6/24/06	T	OB
9	937	F	6/24/06	T	OB
11	1003	M	6/24/06	T	OB
13	1339	F	6/24/06	T	OB
11	1318	F	6/24/06	T	OB
11	1275	F	6/24/06	T	OB
11	1204	F	6/24/06	T	OB
19	1212	F	6/24/06	T	OB
9	1226	F	6/24/06	T	OB
10	1449	F	6/25/06	T	OB
16	1358	F	6/25/06	T	OB
16	1465	F	6/25/06	T	OB
12	1279	F	6/25/06	T	OB
9	1188	F	6/25/06	T	OB
10	1184	F	6/25/06	T	OB
10	1169	F	6/25/06	T	OB
10	1150	F	6/25/06	T	OB
10	1116	F	6/25/06	T	OB
11	1285	F	6/25/06	T	OB
12	1240	F	6/25/06	T	OB
12	1250	F	6/25/06	T	OB
11	1291	F	6/25/06	T	OB
8	1001	F	6/25/06	T	OB
2	707	F	6/30/06	R	OB
3	788	F	6/30/06	R	OB
4	778	M	6/30/06	R	OB
8	1135	F	6/30/06	R	OB
6	915	F	6/30/06	R	OB
7	979	F	6/30/06	R	OB
10	1287	F	6/30/06	R	OB
8	1060	F	6/30/06	R	OB
10	1138	F	6/30/06	R	OB
10	873	M	6/30/06	R	OB
3	817	F	6/30/06	R	OB
7	938	F	6/30/06	R	OB
3	698	M	6/30/06	R	OB
6	846	M	6/30/06	R	OB
9	1075	F	6/30/06	R	OB
7	865	M	6/30/06	R	OB
12	1270	F	6/30/06	R	OB
3	764	M	6/30/06	R	OB
7	1001	F	6/30/06	R	OB
7	865	M	6/30/06	R	OB
5	800	F	6/30/06	R	OB
11	965	M	6/30/06	R	OB
7	853	M	6/30/06	R	OB
9	910	M	6/30/06	R	OB
3	710	F	6/30/06	R	OB
5	790	M	6/30/06	R	OB
3	671	F	7/10/06	R	OB
1	580	M	7/10/06	R	OB
2	726	F	7/10/06	R	OB
7	928	M	7/10/06	R	OB
7	809	M	7/10/06	R	OB
10	874	M	7/10/06	R	OB
8	806	M	7/10/06	R	OB
4	778	F	7/10/06	R	OB
3	896	F	7/10/06	R	OB
7	828	M	7/10/06	R	OB
3	750	M	7/10/06	R	OB
3	744	F	7/10/06	R	OB
4	740	M	7/10/06	R	OB
4	780	F	7/10/06	R	OB
3	776	F	7/10/06	R	OB
4	710	F	7/10/06	R	OB
2	685	F	7/10/06	R	OB
4	834	F	7/10/06	R	OB
7	985	F	7/10/06	R	OB
8	860	M	7/10/06	R	OB
7	888	M	7/10/06	R	OB
8	895	M	7/10/06	R	OB
2	748	F	7/10/06	R	OB
3	780	F	7/10/06	R	OB
6	820	M	7/15/06	T	DI
7	885	M	7/15/06	T	DI
5	917	F	7/15/06	T	DI
3	842	F	7/15/06	T	DI
2	770	F	7/15/06	T	DI
8	950	F	7/15/06	T	DI
9	1245	F	7/15/06	T	DI
5	938	M	7/15/06	T	DI
3	800	F	7/15/06	T	DI
2	800	F	7/15/06	T	DI
2	693	F	7/15/06	T	DI
3	770	F	7/15/06	T	DI
3	785	F	7/15/06	T	DI
3	725	F	7/15/06	T	DI
13	1045	F	7/15/06	T	DI
3	779	F	7/15/06	T	DI
6	886	F	7/15/06	T	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
5	847	M	7/15/06	T	DI
3	850	F	7/15/06	T	DI
3	820	F	7/15/06	T	DI
2	760	F	7/15/06	T	DI
2	715	F	7/15/06	T	DI
2	723	F	7/15/06	T	DI
3	867	F	7/15/06	T	DI
11	1145	F	7/15/06	T	DI
3	793	F	7/15/06	T	DI
8	866	M	7/15/06	T	DI
2	740	F	7/15/06	T	DI
2	745	F	7/15/06	T	DI
2	774	F	7/15/06	T	DI
1	610	F	7/15/06	T	DI
2	700	F	7/15/06	T	DI
5	746	M	7/15/06	T	DI
6	958	F	7/15/06	T	DI
10	1140	F	7/15/06	T	DI
3	884	F	7/15/06	T	DI
2	785	F	7/15/06	T	DI
11	1000	M	7/15/06	T	DI
17	1385	F	7/15/06	T	DI
10	1175	F	7/15/06	T	DI
6	831	F	7/15/06	T	DI
3	766	F	7/15/06	T	DI
3	734	F	7/15/06	T	DI
16	1010	M	7/15/06	T	DI
7	1201	F	7/15/06	T	DI
11	1405	F	7/15/06	T	DI
6	790	F	7/15/06	T	DI
5	870	F	7/15/06	T	DI
4	786	F	7/15/06	T	DI
8	1139	F	7/15/06	T	DI
2	695	F	7/15/06	T	DI
16	1427	F	7/21/06	T	DI
12	1024	M	7/21/06	T	DI
2	705	F	7/21/06	T	DI
2	670	F	7/21/06	T	DI
1	531	F	7/21/06	T	DI
1	605	F	7/21/06	T	DI
3	872	F	7/21/06	T	DI
11	1252	F	7/21/06	T	DI
12	1334	F	7/21/06	T	DI
13	1370	F	7/21/06	T	DI
11	1360	F	7/21/06	T	DI
5	933	F	7/21/06	T	DI
11	1250	F	7/21/06	T	DI
4	835	F	7/21/06	T	DI
10	1060	F	7/21/06	T	DI
11	1305	F	7/21/06	T	DI
10	1070	M	7/21/06	T	DI
7	885	M	7/21/06	T	DI
8	1171	F	7/21/06	T	DI
3	761	F	7/21/06	T	DI
12	1120	F	7/21/06	T	DI
6	827	M	7/21/06	T	DI
7	1051	F	7/21/06	T	DI
11	1095	F	7/21/06	T	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
8	1145	F	7/21/06	T	DI
13	975	M	7/21/06	T	DI
3	759	F	7/21/06	T	DI
14	1295	F	7/21/06	T	DI
10	1286	F	7/21/06	T	DI
12	1240	F	7/21/06	T	DI
7	1030	F	7/21/06	T	DI
9	1214	F	7/21/06	T	DI
7	955	F	7/21/06	T	DI
10	1223	F	7/21/06	T	DI
6	918	F	7/21/06	T	DI
8	1241	F	7/21/06	T	DI
13	1330	F	7/21/06	T	DI
9	1315	F	7/21/06	T	DI
7	965	F	7/21/06	T	DI
8	1113	F	7/21/06	T	DI
11	1273	F	7/21/06	T	DI
12	1284	F	7/22/06	T	DI
15	1300	F	7/22/06	T	DI
8	1018	F	7/22/06	T	DI
8	1176	F	7/22/06	T	DI
16	1305	F	7/22/06	T	DI
11	1278	F	7/22/06	T	DI
12	1300	F	7/22/06	T	DI
14	1288	F	7/22/06	T	DI
17	1433	F	7/22/06	T	DI
9	1258	F	7/22/06	T	DI
13	1405	F	7/22/06	T	DI
7	837	M	7/22/06	T	DI
17	1486	F	7/23/06	T	DI
10	1320	F	7/23/06	T	DI
11	1198	F	7/23/06	T	DI
12	1435	F	7/23/06	T	DI
11	1378	F	7/23/06	T	DI
2	760	F	7/19/06	R	OB
3	800	F	7/19/06	R	OB
3	830	F	7/20/06	R	OB
7	1094	F	8/2/06	R	OB
6	825	M	8/2/06	R	OB
3	737	M	8/2/06	R	OB
1	580	F	8/2/06	R	OB
11	1027	M	8/2/06	R	OB
4	791	M	8/2/06	R	OB
3	715	F	8/2/06	R	OB
7	815	M	8/2/06	R	OB
3	745	F	8/2/06	R	OB
2	700	M	8/3/06	R	OB
1	569	M	8/3/06	R	OB
5	809	M	8/3/06	R	OB
7	927	F	8/3/06	R	OB
3	805	F	8/3/06	R	OB
3	746	F	8/3/06	R	OB
7	851	M	8/3/06	R	OB
4	820	F	8/3/06	R	OB
3	771	F	8/3/06	R	OB
3	775	F	8/3/06	R	OB
2	741	F	8/3/06	R	OB
4	746	M	8/3/06	R	OB

Annuli	FL mm	Sex	Date	Source	Location Landed
4	800	M	8/3/06	R	OB
5	780	M	8/3/06	R	OB
5	775	M	8/3/06	R	OB
3	799	F	8/3/06	R	OB
5	887	F	8/9/06	I	DI
3	785	F	8/9/06	I	DI
3	815	F	8/9/06	I	DI
7	835	M	8/10/06	I	DI
4	822	F	8/11/06	I	DI
3	777	F	8/12/06	I	DI
3	714	M	8/13/06	I	DI
10	867	M	8/14/06	I	DI
20	1031	M	8/15/06	I	DI
1	646	F	8/24/06	R	OB
4	710	M	8/24/06	R	OB
4	855	F	8/24/06	R	OB
2	715	F	8/26/06	T	OB
3	822	F	8/26/06	T	OB
3	770	F	8/26/06	T	OB
4	907	F	8/26/06	T	OB
9	1060	F	8/26/06	T	OB
2	747	F	8/26/06	T	OB
5	950	F	8/26/06	T	OB
2	685	F	8/26/06	T	OB
2	695	F	8/26/06	T	OB
3	759	F	8/26/06	T	OB
3	760	F	8/26/06	T	OB
2	703	F	8/26/06	T	OB
11	1077	M	8/26/06	T	OB
7	967	F	8/26/06	T	OB
3	756	F	8/26/06	T	OB
7	941	F	8/26/06	T	OB
7	913	F	8/26/06	T	OB
3	747	M	8/26/06	T	OB
8	1010	F	8/26/06	T	OB
2	800	F	8/27/06	T	OB
1	505	F	8/27/06	T	OB
3	860	F	8/27/06	T	OB
2	700	F	8/27/06	T	OB
2	735	M	8/27/06	T	OB
2	744	F	8/27/06	T	OB
5	850	M	8/27/06	T	OB
2	725	F	8/27/06	T	OB
3	750	M	8/27/06	T	OB
6	920	F	8/27/06	T	OB
4	805	F	8/27/06	T	OB
2	695	F	8/27/06	T	OB
1	392	M	7/7/06	I	SEAMAP
1	330	U	7/12/06	I	SEAMAP
2	363	U	7/5/06	I	SEAMAP
1	372	U	7/5/06	I	SEAMAP
1	380	M	7/5/06	I	SEAMAP
1	364	U	7/5/06	I	SEAMAP
1	410	F	7/9/06	I	SEAMAP
0	198	U	7/9/06	I	SEAMAP
2	340	U	7/12/06	I	SEAMAP
0	224	U	6/25/06	I	SEAMAP
0	245	U	6/25/06	I	SEAMAP

Annuli	FL mm	Sex	Date	Source	Location Landed
1	369	U		I	SEAMAP
1	425	U	7/4/06	I	SEAMAP
1	359	U	7/4/06	I	SEAMAP
2	338	U	7/4/06	I	SEAMAP
16	1255	F	9/16/06	T	OB
6	920	F	9/16/06	T	OB
6	896	F	9/16/06	T	OB
9	895	M	9/16/06	T	OB
9	925	M	9/16/06	T	OB
8	1180	F	9/16/06	T	OB
5	1048	F	9/16/06	T	OB
2	705	F	9/16/06	T	OB
5	770	M	9/16/06	T	OB
2	675	F	9/16/06	T	OB
4	770	M	9/16/06	T	OB
13	1180	F	9/16/06	T	OB
12	1441	F	9/17/06	T	OB
11	1336	F	9/17/06	T	OB
7	980	F	9/17/06	T	OB
5	1122	F	9/17/06	T	OB
13	1260	F	9/17/06	T	OB
13	1348	F	9/17/06	T	OB
8	1091	F	9/17/06	T	OB
11	1341	F	9/17/06	T	OB
13	946	M	9/17/06	T	OB
3	824	F	9/17/06	T	OB
5	764	M	9/21/06	I	DI
1	571	M	9/29/06	R	OB
3	765	F	10/2/06	I	OB
2	556	M	10/2/06	I	OB
2	795	F	10/3/06	I	OB
9	886	M	10/3/06	I	OB
5	924	F	10/3/06	I	OB
2	778	F	10/3/06	I	OB
2	715	F	10/3/06	I	OB
2	744	F	10/3/06	I	OB
3	724	F	10/3/06	I	OB
2	793	M	10/3/06	I	OB
3	768	F	10/3/06	I	OB
3	754	F	10/3/06	I	OB
1	592	F	10/2/06	I	OB
1	113	U	10/19/0	I	SEAMAP
0	247	U	10/19/0	I	SEAMAP
0	151	U	10/20/0	I	SEAMAP
0	160	U	10/20/0	I	SEAMAP
0	169	U	10/20/0	I	SEAMAP
0	175	U	10/20/0	I	SEAMAP
1	320	U	11/1/06	I	SEAMAP
0	211	U	11/2/06	I	SEAMAP
0	202	U	11/2/06	I	SEAMAP
0	226	U	11/2/06	I	SEAMAP
0	228	U	11/2/06	I	SEAMAP
0	197	U	11/2/06	I	SEAMAP
0	200	U	11/2/06	I	SEAMAP
0	208	U	11/2/06	I	SEAMAP
0	175	U	11/2/06	I	SEAMAP
0	115	U	10/20/0	I	SEAMAP
0	203	U	11/2/06	I	SEAMAP

Annuli	FL mm	Sex	Date	Source	Location Landed
0	91	U	10/31/0	I	SEAMAP
0	194	U	11/14/0	I	SEAMAP
0	225	U	11/14/0	I	SEAMAP
0	220	U	11/13/0	I	SEAMAP
0	300	U	11/13/0	I	SEAMAP
0	268	U	11/13/0	I	SEAMAP
0	245	U	11/13/0	I	SEAMAP
3	692	M	5/24/06	R	PC
4	743	F	5/24/06	R	PC
3	728	F	5/24/06	R	PC
2	756	F	5/24/06	R	PC
2	720	F	5/24/06	R	PC
3	776	F	5/24/06	R	PC
2	780	F	5/24/06	R	PC
3	688	F	5/24/06	R	PC
3	764	F	5/24/06	R	PC
4	758	F	5/24/06	R	PC
2	729	F	5/24/06	R	PC
3	758	F	5/24/06	R	PC
4	793	F	5/24/06	R	PC
4	723	F	5/24/06	R	PC
2	651	F	5/24/06	R	PC
2	718	F	5/22/06	R	PC
3	796	F	5/22/06	R	PC
3	779	F	5/22/06	R	PC
2	686	F	5/23/06	R	PC
2	670	F	5/23/06	R	PC
2	717	F	5/23/06	R	PC
3	820	F	5/23/06	R	PC
3	751	M	5/23/06	R	PC
5	792	F	5/23/06	R	PC
2	758	F	5/23/06	R	PC
2	695	F	5/23/06	R	PC
2	692	F	5/23/06	R	PC
2	719	F	5/23/06	R	PC
2	748	F	5/23/06	R	PC
4	799	F	5/23/06	R	PC
2	681	M	5/23/06	R	PC
2	682	F	5/23/06	R	PC
3	705	M	5/23/06	R	PC
3	798	F	5/23/06	R	PC
4	788	F	5/23/06	R	PC
2	729	M	5/23/06	R	PC
2	700	U	5/23/06	R	PC
2	710	M	5/23/06	R	PC
2	725	U	5/23/06	R	PC
3	772	F	5/23/06	R	PC
2	630	M	6/2/06	R	PC
2	746	F	6/2/06	R	PC
2	610	M	6/2/06	R	PC
2	782	F	6/2/06	R	PC
2	788	F	6/2/06	R	PC
2	606	M	6/2/06	R	PC
2	663	F	6/2/06	R	PC
2	609	M	6/2/06	R	PC
4	843	F	6/2/06	R	PC
2	615	M	6/2/06	R	PC
3	822	F	6/4/06	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
2	646	F	6/4/06	R	PC
5	888	F	6/4/06	R	PC
2	665	F	6/3/06	R	PC
8	994	F	6/5/06	R	PC
4	701	M	6/5/06	R	PC
6	891	F	6/5/06	R	PC
3	751	M	6/5/06	R	PC
3	759	F	6/6/06	R	PC
2	755	F	6/6/06	R	PC
3	777	M	6/15/06	R	PC
7	944	M	6/15/06	R	PC
2	677	F	6/15/06	R	PC
4	675	M	6/15/06	R	PC
3	619	M	6/15/06	R	PC
2	645	F	6/15/06	R	PC
8	1115	F	6/15/06	R	PC
5	890	M	6/15/06	R	PC
2	683	F	6/15/06	R	PC
2	664	F	6/15/06	R	PC
5	861	F	6/15/06	R	PC
2	715	F	6/15/06	R	PC
3	790	F	6/15/06	R	PC
6	1216	F	6/15/06	R	PC
2	722	M	6/16/06	R	PC
2	609	M	6/16/06	R	PC
2	694	F	6/16/06	R	PC
2	700	F	6/16/06	R	PC
2	651	M	6/16/06	R	PC
3	736	F	6/16/06	R	PC
5	885	F	6/16/06	R	PC
6	969	F	6/16/06	R	PC
2	611	M	6/16/06	R	PC
5	752	F	6/16/06	R	PC
7	967	F	6/16/06	R	PC
1	606	F	6/16/06	R	PC
2	641	M	6/16/06	R	PC
2	755	F	6/16/06	R	PC
3	800	F	6/16/06	R	PC
2	680	F	6/16/06	R	PC
2	760	F	6/16/06	R	PC
5	810	F	6/19/06	R	PC
2	650	F	6/19/06	R	PC
5	821	M	6/19/06	R	PC
3	858	F	6/19/06	R	PC
4	829	F	6/19/06	R	PC
2	629	F	6/19/06	R	PC
2	678	F	6/19/06	R	PC
2	642	F	6/19/06	R	PC
2	758	F	6/19/06	R	PC
2	693	F	6/19/06	R	PC
2	673	F	6/19/06	R	PC
2	760	F	6/19/06	R	PC
2	677	F	6/19/06	R	PC
2	623	F	6/19/06	R	PC
2	710	F	6/19/06	R	PC
3	869	F	6/19/06	R	PC
3	783	F	6/19/06	R	PC
3	792	F	6/19/06	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
4	882	F	6/19/06	R	PC
3	746	F	6/19/06	R	PC
2	665	F	6/19/06	R	PC
3	726	M	6/19/06	R	PC
2	652	F	6/19/06	R	PC
3	854	F	6/27/06	R	PC
3	846	F	6/27/06	R	PC
3	845	F	6/27/06	R	PC
6	792	F	6/27/06	R	PC
5	853	M	6/28/06	R	PC
4	780	F	7/1/06	R	PC
6	870	M	7/1/06	R	PC
3	795	F	5/19/07	T	OB
4	806	F	5/20/07	T	OB
4	784	F	5/20/07	T	OB
4	804	F	5/20/07	T	OB
4	768	F	5/20/07	T	OB
2	656	M	5/22/07	I	DI
4	705	M	5/22/07	I	DI
3	725	M	5/22/07	I	DI
4	758	F	5/22/07	I	DI
4	805	F	5/22/07	I	DI
2	670	M	5/22/07	I	DI
3	751	F	5/22/07	I	DI
4	809	M	5/22/07	I	DI
4	798	F	5/22/07	I	DI
3	742	F	5/22/07	I	DI
6	865	F	5/22/07	I	DI
4	795	F	5/22/07	I	DI
4	748	M	5/22/07	I	DI
2	735	F	5/22/07	I	DI
9	835	M	5/22/07	I	DI
5	832	M	5/22/07	I	DI
5	789	M	5/22/07	I	DI
3	795	F	5/22/07	I	DI
3	715	F	5/22/07	I	DI
3	810	F	5/22/07	I	DI
4	715	F	5/22/07	I	DI
3	740	F	5/22/07	I	DI
3	797	F	5/22/07	I	DI
3	770	F	5/22/07	I	DI
4	870	F	6/6/07	I	DI
12	962	M	6/6/07	I	DI
6	946	F	6/6/07	I	DI
4	962	F	6/6/07	I	DI
4	791	M	6/6/07	I	DI
3	607	M	6/6/07	I	DI
9	1130	F	6/6/07	I	DI
3	689	F	6/6/07	I	DI
3	835	F	6/6/07	I	DI
4	835	M	6/6/07	I	DI
6	1026	F	6/6/07	I	DI
5	845	F	6/6/07	I	DI
3	819	F	6/6/07	I	DI
4	845	F	6/6/07	I	DI
6	914	M	6/6/07	I	DI
4	803	M	6/6/07	I	DI
4	819	F	6/6/07	I	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
4	806	F	6/6/07	I	DI
2	683	M	6/6/07	I	DI
3	768	M	6/6/07	I	DI
4	826	M	6/6/07	I	DI
4	753	F	6/6/07	I	DI
3	762	F	6/6/07	I	DI
4	734	M	6/6/07	I	DI
3	699	M	6/6/07	I	DI
2	718	F	6/6/07	I	DI
4	803	M	6/6/07	I	DI
4	759	M	6/6/07	I	DI
4	829	F	6/6/07	I	DI
9	787	M	6/6/07	I	DI
5	784	M	6/6/07	I	DI
2	616	M	6/6/07	I	DI
3	705	M	6/6/07	I	DI
2	635	M	6/6/07	I	DI
2	699	M	6/6/07	I	DI
2	614	F	6/12/07	I	OB
2	623	F	6/12/07	I	OB
2	600	F	6/12/07	I	OB
3	724	F	6/12/07	I	OB
2	633	F	6/12/07	I	OB
1	605	F	6/12/07	I	OB
2	723	F	6/12/07	I	OB
4	775	F	6/12/07	I	OB
2	630	F	6/12/07	I	OB
2	625	F	6/12/07	I	OB
4	725	M	6/16/07	R	OB
3	742	F	6/16/07	R	OB
10	965	M	6/16/07	R	OB
4	710	M	6/16/07	R	OB
8	816	M	6/16/07	R	OB
7	852	M	6/16/07	R	OB
3	719	M	6/16/07	R	OB
9	965	F	6/16/07	R	OB
4	796	F	6/16/07	R	OB
8	1061	F	6/16/07	R	OB
8	1014	F	6/16/07	R	OB
5	834	F	6/16/07	R	OB
2	750	F	6/16/07	R	OB
7	928	F	6/16/07	R	OB
4	799	F	6/16/07	R	OB
7	1053	F	6/16/07	R	OB
4	770	M	6/16/07	R	OB
3	720	M	6/16/07	R	OB
6	1091	F	6/23/07	T	OB
8	962	M	6/23/07	T	OB
8	1150	F	6/23/07	T	OB
10	1215	F	6/23/07	T	OB
11	980	M	6/23/07	T	OB
7	1071	F	6/23/07	T	OB
11	960	M	6/23/07	T	OB
8	1250	F	6/23/07	T	OB
9	1224	F	6/23/07	T	OB
10	1409	F	6/23/07	T	OB
10	1255	F	6/23/07	T	OB
14	1296	F	6/23/07	T	OB

Annuli	FL mm	Sex	Date	Source	Location Landed
13	1218	F	6/23/07	T	OB
11	1025	M	6/23/07	T	OB
11	1124	F	6/23/07	T	OB
10	1241	F	6/23/07	T	OB
11	1315	F	6/23/07	T	OB
13	1199	F	6/23/07	T	OB
12	1205	F	6/24/07	T	OB
12	1257	F	6/24/07	T	OB
11	1296	F	6/24/07	T	OB
11	1094	M	6/24/07	T	OB
10	1223	F	6/24/07	T	OB
11	1274	F	6/24/07	T	OB
11	1189	F	6/24/07	T	OB
15	1212	F	6/24/07	T	OB
8	1070	F	6/24/07	T	OB
12	1302	F	6/24/07	T	OB
9	1180	F	6/24/07	T	OB
11	1316	F	6/24/07	T	OB
12	1364	F	6/24/07	T	OB
14	1166	F	6/24/07	T	OB
13	1158	F	6/24/07	T	OB
10	1271	F	6/24/07	T	OB
18	1254	M	6/24/07	T	OB
16	1352	F	6/24/07	T	OB
11	1284	F	6/24/07	T	OB
18	1503	F	6/24/07	T	OB
9	1013	F	6/26/00	I	DI
9	1078	F	6/26/00	I	DI
6	812	M	6/26/00	I	DI
3	766	F	6/26/00	I	DI
6	878	M	6/26/00	I	DI
5	888	F	6/26/00	I	DI
8	950	F	6/26/00	I	DI
5	818	F	6/26/00	I	DI
4	785	M	6/26/00	I	DI
11	955	M	6/26/00	I	DI
8	891	M	6/26/00	I	DI
2	755	F	6/26/00	I	DI
3	799	F	6/26/00	I	DI
3	716	F	6/26/00	I	DI
7	875	M	6/26/00	I	DI
3	810	F	6/26/00	I	DI
6	866	M	6/26/00	I	DI
2	691	F	6/26/00	I	DI
4	818	F	6/26/00	I	DI
4	771	M	6/30/07	R	OB
6	952	F	6/30/07	R	OB
3	793	F	6/30/07	R	OB
4	776	M	6/30/07	R	OB
4	740	F	6/30/07	R	OB
1	609	F	6/30/07	R	OB
5	854	F	6/30/07	R	OB
3	785	F	6/30/07	R	OB
5	810	F	6/30/07	R	OB
4	751	M	6/30/07	R	OB
3	808	F	6/30/07	R	OB
8	875	M	6/30/07	R	OB
9	907	M	6/30/07	R	OB

Annuli	FL mm	Sex	Date	Source	Location Landed
4	741	M	6/30/07	R	OB
6	1035	F	7/5/07	I	OB
4	773	F	7/5/07	I	OB
1	536	F	7/5/07	I	OB
1	620	F	7/5/07	I	OB
2	673	F	7/5/07	I	OB
2	672	F	7/5/07	I	OB
8	1122	F	7/6/07	I	OB
4	850	F	7/6/07	I	OB
5	765	F	7/6/07	I	OB
4	765	M	7/12/07	R	OB
2	662	F	7/12/07	R	OB
3	779	F	7/12/07	R	OB
2	681	F	7/12/07	R	OB
2	696	F	7/12/07	R	OB
9	1082	F	7/12/07	R	OB
8	883	M	7/12/07	R	OB
7	841	M	7/12/07	R	OB
8	923	M	7/12/07	R	OB
8	871	M	7/12/07	R	OB
3	754	F	7/12/07	R	OB
3	759	F	7/12/07	R	OB
3	779	F	7/12/07	R	OB
4	865	F	7/13/07	R	OB
5	839	M	7/13/07	R	OB
3	748	F	7/13/07	R	OB
2	725	M	7/13/07	R	OB
2	633	F	7/13/07	R	OB
4	796	F	7/13/07	R	OB
6	1000	F	7/13/07	R	OB
4	909	F	7/13/07	R	OB
4	828	F	7/13/07	R	OB
3	750	M	7/13/07	R	OB
1	667	F	7/13/07	R	OB
2	665	F	7/13/07	R	OB
3	788	M	7/13/07	R	OB
3	747	M	7/13/07	R	OB
9	1018	F	7/13/07	R	OB
5	836	F	7/13/07	R	OB
4	842	F	7/13/07	R	OB
3	851	F	7/13/07	R	OB
5	900	F	7/14/07	T	DI
4	752	F	7/14/07	T	DI
3	788	F	7/14/07	T	DI
6	1053	F	7/14/07	T	DI
5	861	F	7/14/07	T	DI
11	901	M	7/14/07	T	DI
4	840	F	7/14/07	T	DI
5	920	F	7/14/07	T	DI
7	1021	F	7/14/07	T	DI
2	831	F	7/14/07	T	DI
14	1017	M	7/14/07	T	DI
9	989	M	7/14/07	T	DI
6	1029	F	7/14/07	T	DI
9	1182	F	7/14/07	T	DI
8	1199	F	7/14/07	T	DI
6	1110	F	7/14/07	T	DI
5	984	F	7/14/07	T	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
4	778	M	7/14/07	T	DI
3	696	M	7/14/07	T	DI
4	910	M	7/14/07	T	DI
3	734	F	7/14/07	T	DI
3	884	F	7/14/07	T	DI
4	965	F	7/14/07	T	DI
7	959	F	7/14/07	T	DI
4	917	F	7/14/07	T	DI
3	834	F	7/14/07	T	DI
3	826	F	7/14/07	T	DI
8	1015	F	7/14/07	T	DI
3	784	F	7/14/07	T	DI
2	774	F	7/14/07	T	DI
3	788	F	7/14/07	T	DI
6	964	F	7/14/07	T	DI
4	919	F	7/14/07	T	DI
8	1098	F	7/14/07	T	DI
10	1230	F	7/14/07	T	DI
7	928	M	7/14/07	T	DI
14	815	M	7/14/07	T	DI
8	750	F	7/14/07	T	DI
8	1025	M	7/14/07	T	DI
7	1176	F	7/14/07	T	DI
14	1318	F	7/14/07	T	DI
8	1068	F	7/17/07	I	OB
4	901	F	7/17/07	I	OB
3	820	F	7/17/07	I	OB
4	778	F	7/17/07	I	OB
14	1370	F	7/20/07	T	DI
4	799	M	7/20/07	T	DI
3	725	F	7/20/07	T	DI
2	706	F	7/20/07	T	DI
3	830	F	7/20/07	T	DI
9	1173	F	7/20/07	T	DI
4	901	F	7/20/07	T	DI
16	990	M	7/20/07	T	DI
8	1265	F	7/20/07	T	DI
11	1086	F	7/20/07	T	DI
2	659	F	7/20/07	T	DI
3	766	F	7/20/07	T	DI
3	885	F	7/20/07	T	DI
7	1085	F	7/20/07	T	DI
3	775	M	7/20/07	T	DI
6	938	F	7/20/07	T	DI
9	1079	F	7/20/07	T	DI
7	1088	F	7/20/07	T	DI
9	1098	F	7/20/07	T	DI
11	1155	F	7/20/07	T	DI
8	1109	F	7/20/07	T	DI
6	1033	F	7/20/07	T	DI
13	1328	F	7/20/07	T	DI
9	1134	F	7/20/07	T	DI
6	998	F	7/20/07	T	DI
3	824	F	7/20/07	T	DI
14	1119	F	7/20/07	T	DI
8	1070	F	7/20/07	T	DI
8	879	M	7/20/07	T	DI
6	825	M	7/20/07	T	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
4	768	M	7/20/07	T	DI
7	1113	F	7/20/07	T	DI
4	869	F	7/20/07	T	DI
9	935	M	7/20/07	T	DI
8	884	M	7/20/07	T	DI
11	1249	F	7/20/07	T	DI
11	1275	F	7/20/07	T	DI
11	1215	F	7/20/07	T	DI
9	1249	F	7/20/07	T	DI
8	845	M	7/20/07	T	DI
8	1122	F	7/20/07	T	DI
11	977	M	7/20/07	T	DI
10	1243	F	7/20/07	T	DI
9	1200	F	7/20/07	T	DI
8	1126	F	7/20/07	T	DI
18	1458	F	7/21/07	T	DI
14	1215	F	7/21/07	T	DI
7	1099	F	7/21/07	T	DI
12	996	M	7/21/07	T	DI
9	1223	F	7/21/07	T	DI
4	894	F	7/21/07	T	DI
8	1122	F	7/21/07	T	DI
9	945	M	7/21/07	T	DI
8	1131	F	7/21/07	T	DI
8	985	F	7/21/07	T	DI
12	1218	F	7/21/07	T	DI
7	1165	F	7/21/07	T	DI
6	800	M	7/21/07	T	DI
9	1133	F	7/21/07	T	DI
10	1267	F	7/21/07	T	DI
12	1130	F	7/21/07	T	DI
3	741	F	7/21/07	T	DI
9	1198	F	7/21/07	T	DI
6	893	F	7/21/07	T	DI
8	1157	F	7/21/07	T	DI
8	1279	F	7/21/07	T	DI
12	1153	F	7/21/07	T	DI
15	1231	F	7/21/07	T	DI
11	1128	F	7/21/07	T	DI
9	1190	F	7/21/07	T	DI
12	1344	F	7/21/07	T	DI
7	1117	F	7/21/07	T	DI
9	1067	F	7/21/07	T	DI
6	1032	F	7/21/07	T	DI
8	1029	F	7/21/07	T	DI
8	870	M	7/21/07	T	DI
8	903	M	7/21/07	T	DI
10	1167	F	7/22/07	T	DI
9	1129	F	7/22/07	T	DI
10	1334	F	7/22/07	T	DI
4	964	F	7/22/07	T	DI
15	1215	F	7/22/07	T	DI
17	1672	F	7/22/07	T	DI
6	1126	F	7/22/07	T	DI
12	1319	F	7/22/07	T	DI
10	1322	F	7/22/07	T	DI
13	1330	F	7/22/07	T	DI
11	970	M	7/22/07	T	DI

Annuli	FL mm	Sex	Date	Source	Location Landed
12	1359	F	7/22/07	T	DI
9	1055	F	7/22/07	T	DI
12	1323	F	7/22/07	T	DI
11	894	M	7/22/07	T	DI
14	957	M	7/22/07	T	DI
8	805	M	7/22/07	T	DI
3	773	M	7/22/07	T	DI
3	873	F	7/22/07	T	DI
13	1591	F	7/22/07	T	DI
9	1057	F	7/22/07	T	DI
11	1228	F	7/22/07	T	DI
4	822	F	7/22/07	T	DI
11	1254	F	7/22/07	T	DI
16	1405	F	7/22/07	T	DI
8	1210	F	7/22/07	T	DI
12	1360	F	7/22/07	T	DI
8	896	M	7/22/07	T	DI
7	995	F	7/22/07	T	DI
9	1288	F	7/22/07	T	DI
14	1394	F	7/22/07	T	DI
14	1336	F	7/22/07	T	DI
9	1176	F	7/22/07	T	DI
8	1149	F	7/22/07	T	DI
6	996	F	7/22/07	T	DI
6	1064	F	7/22/07	T	DI
11	1285	F	7/22/07	T	DI
8	1213	F	7/22/07	T	DI
7	1191	F	7/22/07	T	DI
4	745	M	7/27/07	I	DI
7	1080	F	7/27/07	I	DI
3	735	M	7/27/07	I	DI
5	805	M	7/27/07	I	DI
4	799	F	7/27/07	I	DI
8	854	M	7/27/07	I	DI
9	924	M	7/27/07	I	DI
5	866	F	7/27/07	I	DI
6	815	M	7/27/07	I	DI
4	819	F	7/27/07	I	DI
3	726	F	7/27/07	I	DI
3	699	F	7/27/07	I	DI
3	779	M	7/27/07	I	DI
4	757	M	7/27/07	I	DI
4	822	F	7/27/07	I	DI
4	799	F	7/27/07	I	DI
5	815	M	7/27/07	I	DI
3	753	F	7/27/07	I	DI
2	697	F	7/27/07	I	DI
2	741	M	7/27/07	I	DI
4	817	F	7/27/07	I	DI
4	808	F	7/27/07	I	DI
3	766	F	7/27/07	I	DI
3	791	F	7/27/07	I	DI
3	788	F	7/27/07	I	DI
3	774	F	7/27/07	I	DI
2	719	F	8/8/07	R	OB
1	521	F	8/8/07	R	OB
1	499	U	8/8/07	R	OB
2	699	F	8/8/07	R	OB

Annuli	FL mm	Sex	Date	Source	Location Landed
9	860	M	8/8/07	R	OB
8	888	M	8/8/07	R	OB
3	872	F	8/8/07	R	OB
3	745	M	8/8/07	R	OB
6	963	F	8/9/07	R	OB
3	779	F	8/9/07	R	OB
4	849	F	8/9/07	R	OB
4	805	F	8/9/07	R	OB
3	742	M	8/9/07	R	OB
4	804	F	8/9/07	R	OB
15	1170	F	8/9/07	R	OB
8	1006	F	8/9/07	R	OB
7	870	M	8/9/07	R	OB
8	908	M	8/9/07	R	OB
8	1046	F	8/9/07	R	OB
6	849	M	8/9/07	R	OB
8	830	M	8/9/07	R	OB
9	878	M	8/9/07	R	OB
6	928	F	8/9/07	R	OB
7	920	M	8/9/07	R	OB
7	869	M	8/9/07	R	OB
8	897	M	8/9/07	R	OB
8	834	M	8/9/07	R	OB
4	764	M	8/9/07	R	OB
4	810	F	8/9/07	R	OB
8	944	F	8/9/07	R	OB
8	861	M	8/9/07	R	OB
5	838	F	8/9/07	R	OB
4	848	F	8/9/07	R	OB
4	776	M	8/9/07	R	OB
2	695	F	8/9/07	R	OB
2	704	F	8/9/07	R	OB
3	875	F	8/9/07	R	OB
4	814	F	8/9/07	R	OB
3	848	F	8/9/07	R	OB
7	849	M	8/9/07	R	OB
1	609	F	8/10/07	R	OB
1	496	F	8/10/07	R	OB
1	504	M	8/10/07	R	OB
1	468	M	8/10/07	R	OB
1	523	F	8/10/07	R	OB
3	744	F	8/10/07	R	OB
2	689	F	8/10/07	R	OB
2	684	F	8/10/07	R	OB
2	638	F	8/10/07	R	OB
9	899	M	8/11/07	R	OB
2	708	F	8/11/07	R	OB
2	748	F	8/11/07	R	OB
4	708	M	8/11/07	R	OB
10	1007	M	8/11/07	R	OB
8	873	M	8/11/07	R	OB
4	888	F	8/11/07	R	OB
4	867	F	8/11/07	R	OB
3	781	M	8/11/07	R	OB
3	807	F	8/11/07	R	OB
7	808	M	8/11/07	R	OB
3	874	F	8/11/07	R	OB
8	880	M	8/11/07	R	OB

Annuli	FL mm	Sex	Date	Source	Location Landed
3	767	F	8/11/07	R	OB
2	788	F	8/11/07	R	OB
3	632	M	8/11/07	R	OB
2	733	F	8/11/07	R	OB
2	739	F	8/11/07	R	OB
3	736	F	8/11/07	R	OB
3	779	M	8/11/07	R	OB
4	821	M	8/11/07	R	OB
4	728	F	8/11/07	R	OB
9	986	M	8/11/07	R	OB
4	907	F	8/11/07	R	OB
3	780	F	8/11/07	R	OB
3	776	F	8/11/07	R	OB
8	891	M	8/11/07	R	OB
4	776	M	8/11/07	R	OB
3	779	M	8/25/07	T	OB
3	778	M	8/25/07	T	OB
7	1001	F	8/25/07	T	OB
2	669	F	8/25/07	T	OB
2	738	F	8/25/07	T	OB
2	709	F	8/25/07	T	OB
1	644	F	8/25/07	T	OB
4	790	M	8/25/07	T	OB
2	676	F	8/25/07	T	OB
2	667	M	8/25/07	T	OB
4	815	F	8/25/07	T	OB
4	748	M	8/25/07	T	OB
8	976	M	8/25/07	T	OB
8	957	M	8/25/07	T	OB
8	958	F	8/25/07	T	OB
2	707	F	8/25/07	T	OB
4	785	F	9/1/07	R	OB
7	1157	F	9/1/07	R	OB
3	800	F	9/1/07	R	OB
8	879	M	9/1/07	R	OB
2	698	F	9/1/07	R	OB
7	930	M	9/2/07	R	OB
3	808	F	9/2/07	R	OB
3	873	F	9/2/07	R	OB
8	910	M	9/2/07	R	OB
4	802	F	9/2/07	R	OB
5	798	M	9/2/07	R	OB
8	1084	F	9/2/07	R	OB
2	688	F	9/2/07	R	OB
2	749	F	9/2/07	R	OB
3	771	F	9/8/07	I	DI
1	638	F	9/8/07	I	DI
2	738	F	9/8/07	I	DI
5	794	M	9/8/07	I	DI
2	688	F	9/8/07	I	DI
9	1178	F	5/3/07	R	PC
5	884	F	5/3/07	R	PC
8	845	M	5/3/07	R	PC
5	778	F	5/4/07	R	PC
4	793	M	5/4/07	R	PC
6	903	F	5/4/07	R	PC
4	803	F	5/4/07	R	PC
4	729	M	5/4/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
3	717	F	5/5/07	R	PC
7	849	M	5/9/07	R	PC
3	756	F	5/9/07	R	PC
4	732	M	5/9/07	R	PC
4	791	F	5/9/07	R	PC
4	793	F	5/9/07	R	PC
5	837	F	5/12/07	R	PC
3	812	F	5/12/07	R	PC
4	834	F	5/12/07	R	PC
6	809	M	5/17/07	R	PC
3	689	M	5/17/07	R	PC
4	732	M	5/17/07	R	PC
3	708	M	5/17/07	R	PC
3	670	M	5/17/07	R	PC
4	704	M	5/17/07	R	PC
3	782	F	5/17/07	R	PC
2	763	F	5/17/07	R	PC
6	876	F	5/18/07	R	PC
3	682	M	5/18/07	R	PC
3	687	M	5/18/07	R	PC
3	693	M	5/18/07	R	PC
2	669	M	5/18/07	R	PC
8	993	F	5/22/07	R	PC
3	672	F	5/22/07	R	PC
2	634	M	5/22/07	R	PC
3	680	M	5/22/07	R	PC
3	672	M	5/22/07	R	PC
3	712	M	5/22/07	R	PC
4	819	F	5/23/07	R	PC
3	774	F	5/23/07	R	PC
3	739	F	5/23/07	R	PC
3	802	F	5/25/07	R	PC
2	716	F	5/25/07	R	PC
3	728	F	5/25/07	R	PC
4	793	F	5/27/07	R	PC
3	687	M	5/27/07	R	PC
2	612	M	5/27/07	R	PC
2	581	F	5/27/07	R	PC
2	645	F	5/27/07	R	PC
2	590	F	5/27/07	R	PC
4	763	M	5/27/07	R	PC
2	679	F	5/27/07	R	PC
2	645	F	5/27/07	R	PC
2	658	F	5/27/07	R	PC
2	639	M	5/27/07	R	PC
2	632	F	5/27/07	R	PC
4	823	F	5/30/07	R	PC
4	865	F	5/30/07	R	PC
4	830	F	5/30/07	R	PC
3	719	F	5/30/07	R	PC
4	773	F	5/30/07	R	PC
3	757	F	5/30/07	R	PC
4	758	F	5/30/07	R	PC
2	714	F	5/30/07	R	PC
3	755	F	5/30/07	R	PC
3	725	F	5/30/07	R	PC
4	778	F	5/30/07	R	PC
1	581	F	5/30/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
7	847	M	5/30/07	R	PC
5	784	M	5/30/07	R	PC
13	997	M	5/30/07	R	PC
9	908	M	5/30/07	R	PC
6	840	M	5/30/07	R	PC
4	821	F	5/30/07	R	PC
4	805	F	5/31/07	R	PC
3	727	F	5/31/07	R	PC
2	655	M	5/31/07	R	PC
4	798	F	5/31/07	R	PC
2	665	F	5/31/07	R	PC
4	740	F	5/31/07	R	PC
2	622	F	5/31/07	R	PC
4	830	F	5/31/07	R	PC
4	814	F	5/31/07	R	PC
5	767	F	5/31/07	R	PC
3	743	F	5/31/07	R	PC
1	625	F	5/31/07	R	PC
3	744	F	5/31/07	R	PC
3	703	F	5/31/07	R	PC
3	738	F	5/31/07	R	PC
3	831	F	5/31/07	R	PC
3	702	F	5/31/07	R	PC
2	761	F	6/6/07	R	PC
4	782	F	6/6/07	R	PC
2	776	F	6/6/07	R	PC
3	829	F	6/6/07	R	PC
4	774	F	6/6/07	R	PC
4	795	F	6/6/07	R	PC
4	849	F	6/9/07	R	PC
5	978	F	6/10/07	R	PC
7	1045	F	6/14/07	R	PC
2	657	F	6/14/07	R	PC
4	844	F	6/14/07	R	PC
3	733	F	6/14/07	R	PC
3	788	F	6/14/07	R	PC
2	599	F	6/14/07	R	PC
2	642	F	6/14/07	R	PC
3	729	F	6/14/07	R	PC
3	722	F	6/14/07	R	PC
4	887	F	6/20/07	R	PC
10	932	M	6/20/07	R	PC
11	952	M	6/20/07	R	PC
12	1058	M	6/20/07	R	PC
7	930	F	6/20/07	R	PC
5	877	F	6/20/07	R	PC
4	873	F	6/20/07	R	PC
9	862	M	6/20/07	R	PC
4	827	F	6/20/07	R	PC
4	722	M	6/20/07	R	PC
3	708	M	6/20/07	R	PC
4	761	M	6/20/07	R	PC
3	746	F	6/20/07	R	PC
2	683	F	6/20/07	R	PC
3	856	F	6/20/07	R	PC
2	738	F	6/20/07	R	PC
2	663	F	6/20/07	R	PC
2	625	F	6/20/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
2	621	F	6/20/07	R	PC
2	637	F	6/20/07	R	PC
3	815	F	6/20/07	R	PC
2	721	F	6/20/07	R	PC
4	812	F	6/20/07	R	PC
2	620	F	6/20/07	R	PC
7	1115	F	6/20/07	R	PC
6	908	F	6/20/07	R	PC
4	747	F	6/7/07	R	PC
2	687	F	6/7/07	R	PC
4	846	F	6/7/07	R	PC
3	705	F	6/9/07	R	PC
2	695	F	6/9/07	R	PC
2	653	F	6/9/07	R	PC
2	636	F	6/9/07	R	PC
3	795	F	6/9/07	R	PC
15	1119	F	6/21/07	R	PC
7	863	M	6/21/07	R	PC
3	794	M	6/21/07	R	PC
4	783	M	6/21/07	R	PC
3	729	F	6/21/07	R	PC
2	668	M	6/21/07	R	PC
2	690	F	6/21/07	R	PC
4	763	F	6/21/07	R	PC
6	805	M	6/21/07	R	PC
9	1070	F	6/21/07	R	PC
4	820	F	6/21/07	R	PC
3	814	F	6/21/07	R	PC
13	1114	F	6/21/07	R	PC
15	1210	F	6/21/07	R	PC
6	852	M	6/21/07	R	PC
5	943	F	6/21/07	R	PC
3	873	F	6/21/07	R	PC
5	881	F	6/21/07	R	PC
3	759	F	6/26/07	R	PC
3	984	F	6/26/07	R	PC
2	661	F	6/26/07	R	PC
2	661	F	6/26/07	R	PC
2	637	F	6/26/07	R	PC
2	664	F	6/26/07	R	PC
4	762	M	6/26/07	R	PC
3	749	F	6/26/07	R	PC
4	731	F	6/26/07	R	PC
3	761	F	6/26/07	R	PC
3	747	F	6/26/07	R	PC
2	670	M	6/26/07	R	PC
2	724	F	6/26/07	R	PC
2	685	M	6/26/07	R	PC
5	938	F	6/26/07	R	PC
4	816	F	6/26/07	R	PC
2	791	F	6/26/07	R	PC
3	753	F	6/26/07	R	PC
4	836	F	6/26/07	R	PC
5	937	F	6/26/07	R	PC
4	887	F	6/26/07	R	PC
3	814	F	6/27/07	R	PC
1	616	M	6/27/07	R	PC
2	683	F	6/27/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
2	628	F	6/27/07	R	PC
2	657	F	6/27/07	R	PC
6	956	F	6/27/07	R	PC
9	1110	F	6/27/07	R	PC
5	910	F	6/27/07	R	PC
3	740	M	6/27/07	R	PC
4	792	M	6/27/07	R	PC
4	784	M	6/27/07	R	PC
4	825	F	6/27/07	R	PC
2	628	F	6/27/07	R	PC
4	735	F	6/27/07	R	PC
2	788	F	6/27/07	R	PC
3	795	F	6/28/07	R	PC
3	731	F	6/28/07	R	PC
4	809	F	6/28/07	R	PC
2	642	F	6/28/07	R	PC
2	654	F	6/28/07	R	PC
2	643	F	6/28/07	R	PC
2	686	F	6/28/07	R	PC
2	631	F	6/28/07	R	PC
2	639	F	6/28/07	R	PC
2	691	F	6/28/07	R	PC
2	632	M	6/28/07	R	PC
3	803	F	6/28/07	R	PC
4	766	F	6/28/07	R	PC
5	957	F	6/28/07	R	PC
3	751	F	6/28/07	R	PC
3	798	F	6/28/07	R	PC
2	683	F	6/28/07	R	PC
4	777	F	6/29/07	R	PC
4	732	M	6/29/07	R	PC
3	762	M	6/29/07	R	PC
4	785	F	6/29/07	R	PC
4	778	M	6/29/07	R	PC
4	833	F	6/30/07	R	PC
4	797	M	6/30/07	R	PC
7	817	M	6/30/07	R	PC
4	770	F	6/30/07	R	PC
2	722	M	6/30/07	R	PC
2	654	F	6/30/07	R	PC
2	690	F	6/30/07	R	PC
3	727	F	7/19/07	R	PC
4	780	M	7/19/07	R	PC
5	921	F	7/20/07	R	PC
5	867	F	7/20/07	R	PC
4	829	F	7/20/07	R	PC
3	761	F	7/20/07	R	PC
4	778	F	7/20/07	R	PC
3	686	F	7/20/07	R	PC
4	799	F	7/20/07	R	PC
2	698	F	7/20/07	R	PC
2	634	F	7/20/07	R	PC
2	591	M	7/20/07	R	PC
2	644	F	7/20/07	R	PC
2	644	M	7/20/07	R	PC
2	668	M	7/20/07	R	PC
2	651	M	7/20/07	R	PC
2	671	F	7/20/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
2	645	F	7/20/07	R	PC
2	639	F	7/20/07	R	PC
2	631	F	7/20/07	R	PC
2	628	F	7/20/07	R	PC
2	659	F	7/20/07	R	PC
2	633	M	7/20/07	R	PC
2	645	F	7/20/07	R	PC
2	665	F	7/20/07	R	PC
2	656	F	7/20/07	R	PC
2	657	F	7/20/07	R	PC
2	662	F	7/20/07	R	PC
2	649	F	7/20/07	R	PC
2	663	F	7/20/07	R	PC
3	764	M	7/20/07	R	PC
2	682	M	7/20/07	R	PC
2	655	F	7/20/07	R	PC
2	667	M	7/20/07	R	PC
2	650	F	7/20/07	R	PC
2	649	M	7/20/07	R	PC
2	669	F	7/20/07	R	PC
2	704	F	7/20/07	R	PC
2	678	F	7/20/07	R	PC
2	668	M	7/20/07	R	PC
2	682	F	7/20/07	R	PC
2	689	M	7/20/07	R	PC
2	652	F	7/20/07	R	PC
3	650	M	7/20/07	R	PC
9	1000	F	7/20/07	R	PC
2	688	M	7/20/07	R	PC
4	850	F	7/20/07	R	PC
3	760	F	7/20/07	R	PC
2	692	M	7/20/07	R	PC
2	671	F	7/20/07	R	PC
2	649	F	7/24/07	R	PC
5	1068	F	7/24/07	R	PC
1	560	F	7/24/07	R	PC
4	878	F	7/25/07	R	PC
3	739	F	7/25/07	R	PC
12	957	M	7/25/07	R	PC
3	732	M	7/25/07	R	PC
2	774	F	7/25/07	R	PC
3	737	M	7/25/07	R	PC
7	864	M	7/25/07	R	PC
2	690	M	7/25/07	R	PC
2	778	M	7/25/07	R	PC
3	812	F	7/25/07	R	PC
2	695	F	7/27/07	R	PC
1	617	F	7/27/07	R	PC
2	652	F	7/27/07	R	PC
2	718	F	7/27/07	R	PC
2	709	F	7/28/07	R	PC
4	893	F	7/28/07	R	PC
6	987	F	7/28/07	R	PC
3	808	F	7/28/07	R	PC
2	698	F	7/28/07	R	PC
2	630	F	7/28/07	R	PC
3	755	M	7/28/07	R	PC
2	648	F	7/28/07	R	PC

Annuli	FL mm	Sex	Date	Source	Location Landed
4	868	F	7/28/07	R	PC
3	746	M	7/28/07	R	PC
4	757	F	7/28/07	R	PC
2	673	F	7/28/07	R	PC
4	863	F	7/28/07	R	PC
4	913	F	8/9/07	R	PC
2	777	F	8/9/07	R	PC
7	841	M	8/9/07	R	PC
4	856	F	8/9/07	R	PC
3	792	M	8/15/07	R	PC
2	644	F	8/15/07	R	PC
2	642	M	8/15/07	R	PC
2	722	M	8/15/07	R	PC
2	631	F	8/15/07	R	PC
2	645	F	8/15/07	R	PC
2	649	F	8/15/07	R	PC
1	640	F	8/15/07	R	PC
4	903	F	8/15/07	R	PC
2	674	F	8/15/07	R	PC
3	784	M	8/15/07	R	PC
2	689	F	8/15/07	R	PC
1	629	F	9/12/07	R	PC
1	614	F	9/12/07	R	PC
2	749	F	9/12/07	R	PC
3	786	M	9/12/07	R	PC
4	975	F	9/21/07	R	PC
2	749	F	9/21/07	R	PC
1	700	F	9/21/07	R	PC
1	573	F	9/21/07	R	PC
1	610	F	9/21/07	R	PC
1	594	F	9/21/07	R	PC
1	696	F	9/21/07	R	PC
1	595	F	9/21/07	R	PC
2	674	F	9/21/07	R	PC
2	682	F	9/21/07	R	PC
6	839	M	10/21/0	R	PC
0	186	U	11/4/07	I	SEAMAP
0	225	U	10/23/0	I	SEAMAP
0	254	U	10/23/0	I	SEAMAP
1	392	U	10/30/0	I	SEAMAP
0	350	U	11/3/07	I	SEAMAP
0	342	U	11/5/07	I	SEAMAP
0	254	U	11/7/07	I	SEAMAP
0	306	U	10/30/0	I	SEAMAP
0	243	U	11/7/07	I	SEAMAP
0	340	U	10/19/0	I	SEAMAP
0	365	U	10/19/0	I	SEAMAP
0	356	U	11/5/07	I	SEAMAP
0	234	U	11/5/07	I	SEAMAP
0	223	U	11/5/07	I	SEAMAP
0	238	U	11/5/07	I	SEAMAP
0	224	U	11/5/07	I	SEAMAP
0	253	U	10/28/0	I	SEAMAP
0	329	U	10/29/0	I	SEAMAP
0	369	U	11/4/07	I	SEAMAP
0	230	U	11/4/07	I	SEAMAP
0	368	U	11/4/07	I	SEAMAP
0	345	U	11/4/07	I	SEAMAP

Annuli	FL mm	Sex	Date	Source	Location Landed
0	210	U	11/4/07	I	SEAMAP
0	210	U	11/4/07	I	SEAMAP
0	200	U	11/4/07	I	SEAMAP
0	205	U	11/4/07	I	SEAMAP
0	180	U	11/4/07	I	SEAMAP
0	328	U	11/5/07	I	SEAMAP
0	385	U	11/5/07	I	SEAMAP
0	222	U	11/5/07	I	SEAMAP
0	216	U	11/5/07	I	SEAMAP
0	381	U	10/20/0	I	SEAMAP
0	244	U	10/20/0	I	SEAMAP
0	224	U	10/20/0	I	SEAMAP
0	273	U	10/21/0	I	SEAMAP
0	240	U	10/18/0	I	SEAMAP
0	158	U	10/24/0	I	SEAMAP
0	280	U	10/24/0	I	SEAMAP
0	241	U	10/24/0	I	SEAMAP
0	224	U	11/7/07	I	SEAMAP
0	348	U	10/20/0	I	SEAMAP
0	273	U	10/20/0	I	SEAMAP
0	168	U	10/23/0	I	SEAMAP
0	265	U	10/18/0	I	SEAMAP
1	351	U	10/29/0	I	SEAMAP
0	318	U	10/30/0	I	SEAMAP
0	229	U	11/6/07	I	SEAMAP
0	214	U	11/6/07	I	SEAMAP
0	325	U	10/29/0	I	SEAMAP
1	317	U	10/16/0	I	SEAMAP
0	333	U	10/19/0	I	SEAMAP
0	228	U	10/19/0	I	SEAMAP
0	251	U	10/20/0	I	SEAMAP
0	255	U	10/20/0	I	SEAMAP
0	366	U	10/20/0	I	SEAMAP
0	212	U	11/6/07	I	SEAMAP
0	224	U	10/019/	I	SEAMAP
0	271	U	10/019/	I	SEAMAP
1	363	U	10/019/	I	SEAMAP
0	316	U	10/019/	I	SEAMAP
0	346	U	10/019/	I	SEAMAP
0	263	U	10/019/	I	SEAMAP
0	297	U	10/21/0	I	SEAMAP
0	257	U	10/21/0	I	SEAMAP
0	238	U	10/21/0	I	SEAMAP
0	208	U	10/21/0	I	SEAMAP
0	246	U	10/21/0	I	SEAMAP
0	223	U	10/21/0	I	SEAMAP
0	205	U	11/16/0	I	SEAMAP
0	203	U	11/16/0	I	SEAMAP
0	229	U	11/16/0	I	SEAMAP
0	222	U	11/16/0	I	SEAMAP
0	230	U	11/16/0	I	SEAMAP
0	212	U	11/16/0	I	SEAMAP
0	228	U	11/16/0	I	SEAMAP
0	224	U	11/16/0	I	SEAMAP
0	207	U	11/16/0	I	SEAMAP
0	201	U	11/16/0	I	SEAMAP
0	290	U	10/19/0	I	SEAMAP
0	260	U	10/19/0	I	SEAMAP

Annuli	FL mm	Sex	Date	Source	Location Landed
0	315	U	10/19/0	I	SEAMAP
0	263	U	10/19/0	I	SEAMAP
0	271	U	10/19/0	I	SEAMAP
0	302	U	10/19/0	I	SEAMAP
0	233	U	10/19/0	I	SEAMAP