

FAO/GOVERNMENT COOPERATIVE PROGRAMME



SCIENTIFIC BASIS FOR ECOSYSTEM-BASED MANAGEMENT IN THE LESSER ANTILLES INCLUDING INTERACTIONS WITH MARINE MAMMALS AND OTHER TOP PREDATORS

DERIVATION OF DIET COMPOSITIONS IN THE LESSER ANTILLES PELAGIC ECOSYSTEM

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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by

Sherry Heileman, Elizabeth Mohammed and Paul Fanning

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ABSTRACT

Scientific Basis for Ecosystem-Based Management in the Lesser Antilles Including Interactions with Marine Mammals and Other Top Predators: Derivation of Diet Compositions in the Lesser Antilles Pelagic Ecosystem, by Sherry Heileman, Elizabeth Mohammed and Paul Fanning, FAO, Barbados, 2008. vii + 77 pp. 2 Tables and 1 Figure. FI:GCP/RLA/140/JPN Technical Document No. 7

One of the medium-term objectives of the LAPE project is to enable fishery institutions in the Lesser Antilles to implement ecosystem approach to fisheries (EAF) management of the pelagic fisheries. An immediate objective of LAPE is the formulation of a food web model of the ecosystem to better understand the effects of fisheries on predator-prey relationships, and of the effects of food web dynamics on fisheries. This report presents average diet compositions of the 29 predator functional groups, which include seabirds, marine mammals, turtles, fish, squid and zooplankton, in the LAPE model. The data were obtained through field sampling and analysis of stomach contents of a number of species of large and medium sized pelagic fish and marine mammals, as well as through a comprehensive search of published and unpublished literature.

Data from 131 studies, of which about 8 percent were from the LAPE area, were used to derive the average diet compositions presented in this report. Despite the scarcity of data from within the LAPE area itself, a reasonable amount of data on same or similar species was available from adjacent areas in the Western Atlantic, including the Caribbean, and other areas mainly in the Atlantic. As expected, the availability of diet information was directly related to the commercial importance of the species. The analysis presented here does not consider differences in diet compositions arising from predator ontogenic changes and size, or seasonal changes in diets. A major problem encountered in a number of the studies was the low level of taxonomic disaggregation of the prey and relatively high proportion of unidentified prey items. Further studies are needed to better quantify diet compositions of the species in the LAPE ecosystem, including non-commercial species that might play an important ecological role.

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GLOSSARY

Diet composition - (DC) the proportional representation of prey groups by weight in the total annual consumption by a predator

Ecopath with Ecosim (or EwE) - a modelling system implementing a mass-balance model of tropho-dynamics frequently applied to aquatic systems and fisheries systems in particular (see www.ecopath.org for further description, the software and documentation)

Functional group: - a life-stage, species or group of species which plays an ecologically distinct role and is ecologically homogeneous i.e. similar prey field and predator field

ICCAT - International Commission for the Conservation of Atlantic Tunas

Import - the proportion by weight of a predators total annual consumption which is derived from sources outside the study area which includes both geographically remote areas and prey items not associated with the pelagic ecosystem being studied

BACKGROUND

The implementation of the Ecosystem Approach to Fisheries (EAF) entails important changes in the way fisheries management is conceived and practiced. The FAO technical guidelines for the ecosystem approach to fisheries (2003) define EAF as follows: *“An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries”*. Although the main principles that characterize EAF are not new, but already embedded in a number of international agreements and conference documents, there is limited practical experience in implementing them.

The project GCP/RLA/140/JPN (Scientific Basis for Ecosystem-based Management in the Lesser Antilles Including Interactions with Marine Mammals and Other Top Predators) addresses one of the challenges related to the implementation of the ecosystem approach to fisheries, i.e. the development of management strategies that take into account biological interactions among species, including cetaceans and other top predators and any species that may be of no direct importance to fisheries but yet, may play an important role in maintaining ecosystem structure and functioning.

The **medium-term objective** of the project is to enable fishery institutions in the region, by 2007, to carry out improved assessments and monitoring of the status of the pelagic resources and fisheries and the ecosystem of which they form a part, for continuous adaptation and improvement of optimum management strategies. **Immediate objectives** include:

- i. obtaining improved estimates of the abundance of key components of the Lesser Antilles pelagic ecosystem, including cetaceans and other top predators;
- ii. the formulation of a food web model of the ecosystem as a means of investigating ecosystem interactions and impacts;
- iii. the development of an ecosystem management plan for the pelagic waters of the EEZs of the participating countries, which will include management strategies for key species of fishery interest in the sub-region, as well as for other affected and dependent species; and
- iv. the development of research and management capacity for ecosystem-based management of their pelagic waters at a national and sub-regional level.

Project activities in support of Objective 1 included cetacean sighting surveys, both regional, offshore surveys and national, nearshore surveys. There was a pelagic acoustic/trawling survey to obtain estimates of abundance of forage species and environmental information. Work towards Objective 2 included collection, compilation and analysis of data to estimate model parameters regarding diets, physiology, fisheries and primary production. These were

incorporated into a mass-balance model of the pelagic food web using the Ecopath with Ecosim software. To address Objective 3 the LAPE project first completed a series of stakeholder consultations in each of the participating countries to identify fisheries management issues with a particular view towards ecological issues and prioritizing the identified issues. In most countries this process continued by developing performance reports, including specific indicators, for at least one of the high-priority issues. There remains work to be done in each case to complete this process for the pelagic fisheries, and other sectors have not been started. The development of national and sub-regional capacity in this regard (Objective 4) primarily included training sessions associated with specific activities i.e. 'on-the-job' training. There was also training for smaller groups involved in specific tasks e.g. GIS modellers or diet analysts.

INTRODUCTION

Understanding of predator-prey relationships in marine food webs has been steadily increasing in recent years. Simple qualitative descriptions of these relationships are being increasingly replaced with quantitative descriptions of entire marine ecosystems. As a consequence, fisheries biologists are able to better estimate the type and amount of food consumed by various species, and to make predictions about the effects of fisheries on predator-prey relationships, and of the effects of food web dynamics on fisheries.

One of the immediate objectives of the project is the formulation of a food web or trophic model of the ecosystem as a means for investigating ecosystem interactions and impacts. There are several ecological/management issues in the Lesser Antilles Pelagic Ecosystem (LAPE, Figure 1) that could be explored with a trophic model.

A methodology for describing in quantitative terms the trophic relationships and energy flows in aquatic ecosystems is Ecopath with Ecosim (EwE) (Christensen *et al.* 2004), which has been adopted in the LAPE project. Preliminary EwE models of the LAPE area have been constructed (Mohammed 2003; Vasconcellos *et al.* 2004), with diet composition data from published sources. The model has been updated using refined estimates of the model input parameters, including diet compositions. This component of the project is concerned with deriving more precise average diet compositions of the 29 vertebrate and invertebrate predator functional groups (FG) in the model, which include: seabirds, marine mammals, fish, turtles, squids and zooplankton, through field sampling and analysis of stomach contents of a number of species in the system, as well as a comprehensive search of published and unpublished studies.

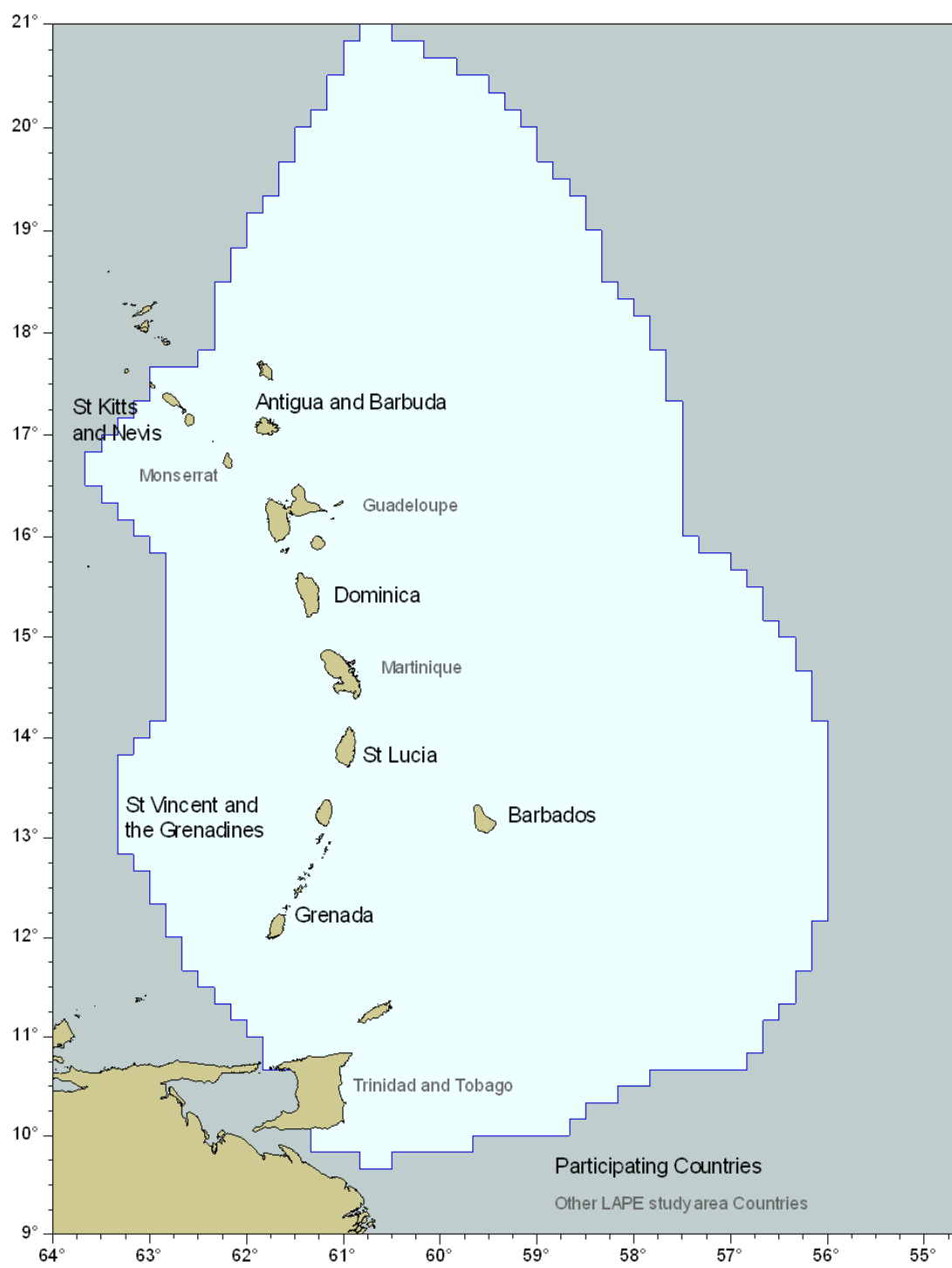


Figure 1 The Lesser Antilles Pelagic Ecosystem study area. Participating countries are designated by larger font labels.

APPROACH AND METHODOLOGY

Stomach contents have been the principal source of dietary data and continue to be the main tool for identifying the types of species and quantities consumed by fish, seabirds and marine mammals (e.g. Christensen 1995, Pauly *et al.* 1998). Other methods to determine diet include stable isotope analysis (e.g. Kaelher *et al.* 2000; Kelly 2000) and fatty acid signatures (e.g. Grahl-Nielsen and Mjaavatten 1991; Iverson *et al.* 1997; Kirsch *et al.* 1998). While many descriptions of fish diets are qualitative lists of prey items recovered from stomachs, quantitative information on the relative contributions of individual prey species to the overall diet of a predator is obtained using diet reconstruction indices. Traditional methods of diet reconstruction include counts, volume or weight of individual prey items, and frequency of occurrence (Hynes 1950; Hyslop 1980).

DATA SOURCES

In this study, two parallel approaches were employed to obtain diet information on the species in each function group:

Literature: Because of limited availability of diet information from within the LAPE area, it was necessary to use information from studies in other areas (on the same or similar species). These studies were obtained through FishBase (Froese and Pauly 2007), which was a major source of diet composition data for this study, as well as through keyword internet searches and other similar EwE models. Most of the work included peer-reviewed published articles, but some information was also obtained from the grey literature and unpublished theses. Criteria for inclusion of a study in this analysis were the species and geographic location. Preference was given (in order) to studies on the same species in the LAPE area, same species in similar areas (with preference given to studies in the Caribbean Sea and Atlantic Ocean), same species in non-similar areas, similar species in non-similar areas.

Collection and analysis of stomach contents in the LAPE area: The LAPE project conducted a number of cetacean and finfish diet studies. These included cetacean sampling by the Fisheries Division in St. Vincent and the Grenadines and the Department of Fisheries in St. Lucia, with subsequent laboratory processing in St. Lucia. Finfish diet studies included both student projects and contract studies by the University of the West Indies (Cave Hill, Barbados) and field sampling and laboratory processing by the Fisheries Divisions of Antigua and Barbuda, and Trinidad and Tobago and the Departments of Fisheries in St. Lucia and St. Kitts and Nevis (Table 1).

Table 1 Fish stomach samples collected by the LAPE project diet studies.

Functional group	Scientific name	Common Name	Antigua	Barbados	Grenada	Nevis	Tobago	Trinidad	Total
Swordfish	<i>Xiphias gladius</i>	Swordfish		1					1
Billfish	<i>Istiophorus albicans</i>	Atlantic sailfish		16	4				20
Billfish	<i>Makaira nigricans</i>	Blue marlin		23					23
Billfish	<i>Tetrapturus albidus</i>	White marlin		20					20
Billfish				59					59
Yellowfin tuna	<i>Thunnus albacares</i>	Yellowfin tuna	1	76	62	2			141
Skipjack tuna	<i>Katsuwonus pelamis</i>	Skipjack tuna			97				97
Albacore	<i>Thunnus alalunga</i>	Albacore				4			4
Blackfin tuna	<i>Thunnus atlanticus</i>	Blackfin tuna		5	13	1	284		303
Other offshore predators	<i>Auxis thazard</i>	Frigate tuna			2				2
Other offshore predators	<i>Canthidermis maculatus</i>	Spotted ocean triggerfish		31					31
Other offshore predators	<i>Sarda sarda</i>	Bonito				1			1
Other offshore predators				31		1			32
Mackerel	<i>Scomberomorus cavalla</i>	King mackerel			2				2
Mackerel	<i>Scomberomorus regalis</i>	Cero mackerel		2					2
Mackerel	<i>Scomberomorus barsiliensis</i>	Carite						63	63
Mackerel	<i>Scomberomorus cavalla</i>	Kingfish	4			2		66	72
Mackerel	<i>Scomberomorus maculatus</i>	Spanish Mackerel				1			1
Mackerel			4	2	2	3		129	136
Wahoo	<i>Acanthocybium solandri</i>	Wahoo	22	108	71	17			218
Dolphinfish	<i>Coryphaena equiselis</i>	Pompano dolphinfish		1					1
Dolphinfish	<i>Coryphaena hippurus</i>	Dolphinfish	2	8		3			13
Dolphinfish			2	9		3			14
Pelagic sharks	<i>Carcharhinus limbatus</i>	Blacktip shark						3	3
Pelagic sharks	<i>Carcharhinus porosus</i>	Smalltail shark						12	12
Pelagic sharks	<i>Rhizoprionodon porosus</i>	Sharpnose shark						3	3
Pelagic sharks	<i>Sphyrna lewini</i>	Scalloped hammerhead						7	7
Pelagic sharks								25	25
Flyingfish	<i>Cypselurus cyanopterus</i>	Margined flyingfish		3					3
Flyingfish	<i>Hirundichthys affinis</i>	Four-winged flyingfish		5					5
Flyingfish				8					8

Functional group	Scientific name	Common Name	Antigua	Barbados	Grenada	Nevis	Tobago	Trinidad	Total
Coastal predators	<i>Belonidae</i>	Needlefish		2					2
Coastal predators	<i>Caranx lugubris</i>	Black Jack			1				1
Coastal predators	<i>Carynx hippos</i>	Cavalli						9	9
Coastal predators	<i>Elegatis bipinnulata</i>	Rainbow runner		2					2
Coastal predators	<i>Lobotes surinamensis</i>	Tripletail		5	2				7
Coastal predators	<i>Sphyraena barracuda</i>	Barracuda	1			3			3
Coastal predators	<i>Sphyraena barracuda</i>	Great barracuda			11				11
Coastal predators			1	9	14	3		9	35
Small coastal pelagics	<i>Hemiramphus balao</i>	Balao		6					6
		Grand Total		314	265		284	163	1089

TREATMENT AND ANALYSIS OF DATA

Diet composition (DC) data for each predator were entered on a spreadsheet (Microsoft Excel) at the lowest available prey taxonomic level. While most of the data were available by percentage contribution by weight, in a few of the studies data were only available by percentage volume or numbers. In such cases, it was assumed that volume and numbers were equivalent to weight. The average composite diet compositions were derived in the following steps:

- i. Each prey species (or family, if not identified to species) was assigned to the appropriate functional group. Prey that do not occur within the pelagic system (e.g. demersal fish species, reef-associated species, zoobenthos) were considered as diet imports. FishBase was used extensively to assist in assigning prey to the functional groups (based on ecology, habitat, geographical distribution, feeding habits, etc). Prey species in the diets of predators from other geographic areas, and which do not occur in the LAPE area, were assigned to the same functional groups as similar prey species that occur in the LAPE area.
- ii. The relative proportions of the prey species were summed within their respective functional groups to give the total contribution of that prey functional group in the diet of the predator functional group.
- iii. For single species functional groups, the average DC was derived by first weighting the DC from each study by the sample size, then computing the average DC for the functional group, following the methodology used by Cortes (1999).
- iv. For multispecies functional groups, where data were obtained from more than one source per species, the DC of each species was first weighted by the sample sizes in the respective studies, following which the average DC of each species was derived (as above for single species groups). The final average DC for each functional group was derived by averaging the (weighted) DC of the individual species, weighted by their relative abundance or consumption. Where abundance or consumption estimates were unavailable, weights were assumed to be equal for all species in the functional group concerned. Weightings of other billfishes, other offshore predators and mackerels are based on relative consumption expressed as the product of biomass (B) and consumption (Q)/biomass ratio ($B \times Q/B$). Weightings of pelagic sharks, coastal predators and small pelagics are based on an indicator of relative consumption ($C \times Q/B$), assuming that catch is representative of the species abundance.
- v. Unidentified prey was allocated to similar groups that were already identified in the diet, roughly in accordance with the relative proportions of these groups in the diet. This was based on the assumption that the unidentified prey belonged to the same functional groups as the identified prey.

The diet components comprising small pelagic fish were partitioned into two spatially distinct components based on the acoustic biomass results of the LAPE ecosystem survey (Melvin *et al.*, 2007). The largest fraction of the small pelagic biomass was the offshore component (~96.8%) made up of mostly carangids. The coastal component, in addition to many of the same species as the offshore group, included groups such as clupeids and anchovies which were not seen offshore. The coastal biomass density was considerably higher but the limited extent of coastal, i.e. shelf, waters resulted in a much smaller total biomass (~3.2%) than offshore. The diet contributions of small pelagic fish were thus split into 3.2% small coastal pelagics and 96.8% small offshore pelagics.

The input diet matrix for the Ecopath model was constructed using the weighted average DCs reported here. The subsequent adjustments made to diet compositions in the process of balancing the Ecopath model are not reflected in this report.

RESULTS

The final results of the following analyses were compiled into the input diet matrix for the Ecopath model constructed by the LAPE project (Table 2). Functional group names, numbers and acronyms from Table 2 are used throughout this report. The derivation, description and diet composition information used to compute the average DC for each predator functional group is given in the subsequent sections. Except in cases of very limited data, the tables of diet composition data and derivations for most functional groups have been moved to Appendix 1.

Table 2 The final diet composition estimates for the functional groups in the Lesser Antilles Pelagic Ecosystem model.

			Predator Functional Groups														
Prey Functional Groups			1 SB	2 BW	3 DDW	4 KW	5 SDW	6 SWO	7 BIL	8 YFT	9 SKT	10 ALB	11 BET	12 BLT	13 OOP	14 MAC	15 WAH
1	SB	Seabirds															
2	BW	Baleen whales															
3	DDW	Deep-diving whales															
4	KW	Killer whales															
5	SDW	Shallow-diving small cetaceans				30.60	0.01										
6	SWO	Swordfish															
7	BIL	Other Billfishes									0.21			0.79			
8	YFT	Yellowfin tuna						0.18	0.81		0.99		1.23				
9	SKT	Skipjack						0.18	13.10	9.76	1.14		1.23				
10	ALB	Albacore						0.18	0.81	1.17	0.99		1.23				
11	BET	Bigeye						0.18	2.13	1.17	1.13						
12	BLT	Blackfin tuna						0.18	0.81	1.17	0.99		1.23			0.53	
13	OOP	Other offshore predators		7.74				0.20	26.80	17.60	12.50		1.23			0.89	34.00
14	MAC	Mackerels		7.74				3.08	0.81	1.17	0.99		1.23			1.69	0.05
15	WAH	Wahoo						0.18	0.81	1.17	0.99		1.23			0.53	0.05
16	DOL	Dolphinfish						0.17	3.75	0.68	0.10		2.76				
17	PS	Pelagic sharks				0.10											
18	FF	Flyingfish	7.45					0.37	5.42	1.51	3.49		25.60	8.38		4.71	3.91
19	CP	Coastal predators	1.20					12.60	6.96	9.00	5.77	0.12	0.29	32.10	0.01	32.00	2.31
20	SOP	Small offshore pelagics	20.80	9.63	0.12	6.34	15.10		0.20	0.06	0.31	0.01	0.03	1.29	0.09	9.96	0.24
21	SCP	Small coastal pelagics	5.77	2.66	0.03	1.75	4.20	0.22	0.06	0.02	0.09		0.01	0.36		2.76	0.06
22	SMF	Small mesopelagic fish		15.50	0.80	15.30	10.90	4.06	0.02	1.45	11.10	8.87	11.10				0.14
23	LMF	Large mesopelagic fish			1.20	15.30	10.90	14.20	15.80	14.00	21.10	48.30	40.50	4.50			20.50
24	LT	Leatherback turtles															
25	OT	Other turtles															
26	SS	Small squid	49.00		0.80	17.80	32.20	45.00	14.50	17.60	11.20	9.08	2.32	13.80	79.20	13.60	17.30
27	LS	Large squid			5.00	12.70	26.30	2.64	0.06	0.29		1.04					0.33
28	SZ	Small zooplankton	0.51							0.22	0.10			18.40	11.80	12.70	0.32
29	LZ	Large zooplankton	0.55	31.00				2.00	0.10	7.12	2.45	3.08	3.67			3.73	
30	PHY	Phytoplankton															
31	DET	Detritus															
Imports			14.70	25.80	92.00		0.32	14.40	7.03	14.80	24.20	29.50	5.13	20.40	8.86	16.90	20.70

Table 2 (continued)			Predator Functional Groups														
Prey Functional Groups			16 DOL	17 PS	18 FF	19 CP	20 SOP	21 SCP	22 SMF	23 LMF	24 LT	25 OT	26 SS	27 LS	28 SZ	29 LZ	
1	SB	Seabirds	0.58														
2	BW	Baleen whales															
3	DDW	Deep-diving whales															
4	KW	Killer whales															
5	SDW	Shallow-diving small cetaceans	0.99														
6	SWO	Swordfish	1.76														
7	BIL	Other Billfishes	1.29	1.58													
8	YFT	Yellowfin tuna	0.08														
9	SKT	Skipjack	0.08	0.04													
10	ALB	Albacore	0.04														
11	BET	Bigeye	0.04														
12	BLT	Blackfin tuna	1.10	0.04													
13	OOP	Other offshore predators	1.24	0.12	0.02			0.01			0.80						
14	MAC	Mackerels	1.11	1.88	0.03						0.80						
15	WAH	Wahoo	1.10	0.04													
16	DOL	Dolphinfish	22.90	0.03													
17	PS	Pelagic sharks	4.62														
18	FF	Flyingfish	21.60	0.01	1.07			18.00						8.33			
19	CP	Coastal predators	24.40	22.70	11.00			1.25			0.80			8.33			
20	SOP	Small offshore pelagics	0.10	0.06			0.01										
21	SCP	Small coastal pelagics	0.02	0.02			1.00										
22	SMF	Small mesopelagic fish	0.15	0.48			0.16			0.96		0.56		28.60		16.70	
23	LMF	Large mesopelagic fish	0.30	6.99						35.30				2.40			
24	LT	Leatherback turtles															
25	OT	Other turtles	0.06														
26	SS	Small squid	8.35	17.30			1.76			0.44		9.87		11.40		16.70	
27	LS	Large squid	0.50														
28	SZ	Small zooplankton	3.14	100.00			6.96	55.90	55.90	98.50	10.90	2.00	5.00	14.10	10.00		100.00
29	LZ	Large zooplankton	3.11	0.06			0.32	0.11	0.11	7.04		98.00	5.00	38.80	16.70		
30	PHY	Phytoplankton															
31	DET	Detritus	0.46														
		Imports	10.10	40.00			77.50	41.50	41.50	0.10	16.60		90.00		2.40	16.70	

Seabirds

The average diet composition of Seabirds was derived from the diet composition data of 13 species. These data were obtained in 27 studies in the Atlantic, Pacific and Indian Oceans, with none from the LAPE area (Appendix 1, Table 3).

All small pelagic fish in the diet data are initially included in the functional group small coastal pelagics, but were subsequently allocated to small coastal pelagics and small offshore pelagics. Unidentified fish prey was proportionally allocated to the non-mesopelagic fish groups that occurred in the diet including the imports category, while other unidentified (invertebrate) prey was allocated to the invertebrate groups (small squids, small and large zooplankton).

The average diet of seabirds in the LAPE is dominated by small squid, followed by small offshore pelagics, imports and flyingfish.

Baleen whales

The primary prey of the Bryde's whale (*Balaenoptera edeni*) are small pelagic fish and sometimes krill. Common food items of the species in the Pacific include anchovies, mesopelagic fish, and horse mackerels, as well as euphausiids (Northridge 1984). Diet composition of the group was derived from the generalized diet composition of Bryde's whales proposed by Pauly *et al.* (1998). This included 20 percent of miscellaneous fishes, dominated by gadoids and perciforms. These proportions were allocated to the functional groups represented in the model. The miscellaneous group was split between mackerels and other offshore pelagics.

The proportion of the diet of Baleen whales imported from outside the LAPE area depends on the proportion of the stock of Bryde's whale present in the area. Since there is strong indication that there are many local stocks of Bryde's whale present in the Atlantic, a resident population in the LAPE area was assumed, and it was presumed that the stock undertakes short range migrations within the Caribbean. As a result, it was also assumed that a considerable proportion of the prey consumed by this stock is from the LAPE area. The provisional assumption adopted in the model is that the resident stock spends three-quarters of the year feeding in the LAPE area, leaving to equatorial waters during the winter months (Romero *et al.* 2001). The model includes 25 percent of the diet imported from outside the LAPE.

Functional Group		Pauly et al	Re-allocated	Final
13	Other offshore predators		10	7.74
14	Mackerels		10	7.74
20	Small offshore pelagics	} 20	16	9.63
21	Small coastal pelagics		4	2.66
22	Small mesopelagics	20	20	15.50
28	Large zooplankton	40	40	31.00
	MISC FISH	20		
	IMPORT			25.00

Deep-diving whales

The species of the genus *Mesoplodon* are known to feed on squids, but a variety of fish are also taken (Northridge 1984). Other common diet items for some species of the genus are mesopelagic fish (20–30 percent) and other miscellaneous fishes (5–30 percent). The main food item of sperm whales is squid, but the species may also feed on fish (Jefferson *et al.* 1993). Based on the proportion of total stock within the LAPE it was assumed that 92 percent of the diet was imported from outside the LAPE.

Functional Group	Pauly et al	Re-allocated	Final
20 Small offshore pelagics	5	4	0.12
21 Small coastal pelagics		1	0.03
22 Small mesopelagics	5	10	0.80
23 Large mesopelagics		15	1.20
26 Small squid	10	10	0.80
27 Large squid	60	60	5.00
BENTHIC INVERTEBRATES	5		
MISC FISH	15		
IMPORT			92.00

Killer whales

Pauly *et al.* (1998) included diet composition for the pygmy killer whale (*Feresa attenuata*) and killer whales (*Orcinus orca*). A single specimen of false killer whale (*Pseudorca crassidens*) from St Lucia was examined in the LAPE project diet study. Although only small squids were identified in the stomach, this species is known to also feed on fish and small cetaceans. The average diet from Pauly *et al.* (1998) for the pygmy killer whale and killer whale was used as representative of the group. The diet categories which did not correspond directly with functional groups were re-allocated based on the species habitat. Since killer whales feed in both inshore and offshore areas the small pelagics were split between offshore and coastal and the miscellaneous fish was allocated to small and large mesopelagic fish groups. The higher vertebrate category was allocated to shallow-diving small cetaceans. The resulting diet composition for the group was 17.5% small squid, 12.5% large squid, 15% small mesopelagic fish, 15% large mesopelagic fish, 5% small offshore pelagics, 5% small coastal pelagics and 30% shallow-diving cetaceans.

Functional Group	Pauly et al	Re-allocated	Final
5 Shallow-diving small cetaceans	30	30	30.60
17 Pelagic sharks			0.10
20 Small offshore pelagics	10	8	6.34
21 Small coastal pelagics		2	1.75
22 Small mesopelagics		15	15.30
28 Large zooplankton		15	15.30
26 Small squid	17.5	17.5	17.80
27 Large squid	12.5	12.5	12.70
MISC FISH	30		
IMPORT			

Shallow-diving small cetaceans

The LAPE Project diet study analysed 26 specimens which included Pan-tropical spotted dolphin (*Stenella attenuate*), Clymene dolphin (*Stenella clymene*), Atlantic spotted dolphin (*Stenella frontalis*), Bottlenose dolphin (*Tursiops truncatus*) and Spinner dolphins (*Stenella* sp.). Functional groups identified in the diet of these species include pelagic fish, mesopelagic fish, small squids and large squids (percent frequency of occurrence given below).

	Predator species						
	Stenella attenuata	Stenella clymene	Stenella frontalis	Stenella longirostris	Stenella sp.	Tursiops truncatus	
Sample size	1	1	6	9	4	5	
Prey Functional Group	Percent frequency of occurrence in diet						Avg
Small pelagics	0	0	12.4	9.1	2.9	46.56	15.4
Small mesopelagics	0	13.6	3.6	86.8	30.9	21.3	40.3
Small squid	36.4	37.9	44.0	1.9	42.7	19.6	24.0
Large squid	63.6	48.6	40.0	2.1	23.5	12.6	20.3

However, in the absence of data on the species and relative sizes of the associated prey it was not possible to convert the diet composition, in number of animals, to the corresponding mass. Species estimates from Pauly *et al.* (1998) were used for this group. The diet composition was weighted by biomass with Clymene dolphin, Striped dolphin and Rough-toothed dolphin excluded from the analysis as these species were not sighted in the cetacean surveys. Since the group is considered coastal, the miscellaneous fish category was divided equally among the small coastal pelagic, small offshore pelagic, small mesopelagic fish and large mesopelagic fish groups. The final diet composition was adjusted to include 0.01 percent shallow-diving cetaceans (cannibalism by Clymene dolphin in Pauly *et al.* 1998).

Functional Group	Pauly et al	Re-allocated	Final
5 Shallow-diving small cetaceans	1	1	0.01
20 Small offshore pelagics	9.5	20	15.10
21 Small coastal pelagics		5	4.20
22 Small mesopelagics	12.5	14.25	10.90
28 Large mesopelagics		14.25	10.90
26 Small squid	25.5	25.5	32.20
27 Large squid	18	18	26.30
BENTHIC INVERTEBRATES	2		
MISC FISH	31.5		
IMPORT		2	0.32

Swordfish (*Xiphias gladius*)

The average diet composition of Swordfish was derived from nine studies conducted in the Atlantic Ocean and one study in the Western Indian Ocean on a total of 1,024 swordfish (Appendix 1, Table 4). Five of these studies were from the North and Western Atlantic (Stillwell and Kohler 1985; Barreto *et al.* 1996; Bowman *et al.* 2000; Junior 2000; Satoh *et al.* 2004).

A relatively high proportion of unidentified finfish (about 40 percent) were reported in the studies by Sabatie *et al.* and Barreto *et al.* The unidentified fish prey was distributed proportionally over all fish groups initially identified in the average diet, as well as to imports. Unidentified scombrids were distributed equally to FG8-FG15. All small pelagics in the diet data are initially included as small coastal pelagics, but subsequently allocated to this group and small offshore pelagics. In general, all the studies show a similar pattern in swordfish diet, which includes a wide diversity of fish and invertebrate prey. The dominant prey is small squids, followed by imports (mainly demersal fish and zoobenthos), large mesopelagics, small offshore pelagics and coastal predators.

Other Billfishes

Diet composition of Other Billfishes was derived from the diets of five species (*Istiophorus platypterus*, *Makaira nigricans*, *M. indica*, *Tetrapterus albidus*, *T. pfluegeri*), obtained in seven studies, including that conducted under the LAPE project (Appendix 1, Table 5). All of these studies were from the Western Atlantic, except for *M. indica*, which was from Malaysia (Bachok *et al.* 2004). A total of 903 fish, of which 63 were obtained under LAPE, were included in this analysis.

A relatively high proportion of unidentified finfish were reported by Sabatie *et al.* and Satoh *et al.* (>50%). Unidentified prey was proportionally allocated to all the identified prey groups, including imports, which occurred in the diet. Unidentified scombrids were distributed equally to FG8 – FG15. Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Other Billfishes consists of a wide range of fish groups, as well as of small squid. The dominant prey groups are other offshore predators, followed by large mesopelagics, small offshore pelagics, small squids and skipjack tuna. About 6 percent of the diet is imported from outside the system, and consists mainly of reef-associated fish.

Yellowfin Tuna (*Thunnus albacares*)

Diet composition of Yellowfin Tuna was derived from seven studies, of which three were in the Western Atlantic and one under LAPE (Appendix 1, Table 6). The study by Menard *et al.* (2000) was based on fish associated with Fish Attraction Devices (FADS) and unassociated schools; only data from the latter were used, since the diet of the FADS-associated schools is very likely

influenced by the behaviour of the prey. A total of 501 fish, of which 138 were obtained under LAPE, were included in this analysis.

Unidentified fish was proportionally allocated to all the identified fish groups in the diet, including imports (raw data suggested that imports were comprised mainly of finfish). Unidentified scombrids were distributed equally to FG9 – FG15. Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Yellowfin Tuna consists of a wide range of fish and invertebrate groups, with the dominant prey groups being other offshore predators and small squids in roughly equal proportions, followed by imports (mainly reef-associated fish) and large mesopelagics.

Skipjack Tuna (*Katsuwonus pelamis*)

The average diet composition of Skipjack Tuna was derived from five studies, four of which were in the Western Atlantic, including the study under LAPE (Appendix 1, Table 7). The study by Menard *et al.* (2000) was based on fish associated with FADs and unassociated schools; only data from the unassociated schools were used. A total of 878 skipjack tunas, of which 97 were obtained under LAPE, were included in this analysis.

A relatively high proportion of unidentified fish (>80%) was recorded Sierra *et al.* (1994). Unidentified fish was proportionally allocated to all the identified fish groups in the diet, as well as to imports (raw data suggested that imports were comprised mainly of finfish). Unidentified scombrids were distributed equally to FG8 – FG15 (excl. FG9). Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Skipjack Tuna consists of a wide range of fish and invertebrate groups, with the dominant prey being imports (mainly reef-associated fish) and small offshore pelagics in roughly equal proportions, followed by large mesopelagics, other offshore predators and small squids. Skipjack Tuna shows a slight degree of cannibalism (about 1 percent).

Albacore Tuna (*Thunnus alalunga*)

Two studies in the Western Atlantic, including Brazil (Junior *et al.* 2004) were used to derive the average diet composition of Albacore Tuna (Appendix 1, Table 8). A total of 45 fish were included in these studies.

A relatively high proportion of unidentified prey was recorded in both studies. Unidentified fish was proportionally allocated to all the identified fish groups in the diet, as well as to imports (raw data suggested that imports were comprised mainly of finfish). Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Albacore Tuna is dominated by large mesopelagics, followed by imports, small squids and mesopelagics. About 29 percent of the diet is imported from outside the system, and consists mainly of bathypelagic and reef-associated fishes.

Bigeye Tuna (*Thunnus obesus*)

The average diet composition of Bigeye Tuna was derived from four studies (Appendix 1, Table 9), two of which were in the Eastern Atlantic (Menard *et al.* 2000; Sabatie *et al.* 2003) and two in the Western Atlantic including Brazil (Junior *et al.* 2004; Satoh *et al.* 2004). A total of 151 fish were analyzed in these studies.

A relatively high proportion of unidentified fish (>50%) was recorded by Sabatie *et al.* and Satoh *et al.* Unidentified fish was proportionally allocated to all the identified fish groups in the diet, as well as to imports (raw data suggested that imports were comprised mainly of finfish). Unidentified scombrids were distributed equally to FG8 – FG15 (excl. FG11). Small pelagic prey was split between coastal and offshore small pelagics. Prey recorded as only mesopelagics were split into small (25%) and large (75%) mesopelagics. The average diet of Bigeye Tuna consists of a wide range of fish and invertebrate prey, with the dominant groups being large mesopelagics, followed by flyingfish and small mesopelagics. About 5 percent of the average diet is imported from outside the system, and consists mainly of reef-associated fish.

Blackfin Tuna (*Thunnus atlanticus*)

The diet composition of Blackfin Tuna was derived from two studies on 456 fish, including the study under LAPE (Appendix 1, Table 10). Although the study by Sierra *et al.* (1994) in Northeast Cuba reported only unidentified fish and zoobenthos, it was included in this analysis because of the scarcity of diet studies on this species.

Unidentified fish was proportionally allocated to all the identified fish groups in the diet, excluding imports (raw data suggested that imports were comprised mainly of zoobenthos). Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Blackfin Tuna consists mainly of small offshore pelagics and coastal predators. Important invertebrate groups in the diet of this species are small zooplankton and small squids. About 10 percent of the diet is imported from outside the system.

Other Offshore Predators

The average diet composition of Other Offshore Predators was compiled from the diets of four species of small tunas and two species of triggerfish in seven studies, including one under the LAPE project (Appendix 1, Table 11). In addition to the LAPE study, diet data were obtained from four other studies from the Western Atlantic - Puerto Rico (Randall 1967), Florida (Browder *et al.* 1990), Cuba (Sierra *et al.* 1994) and Bowman *et al.* (2000). A total of 141 fish were included in these studies.

A relatively high proportion of unidentified fish (>50%) was reported by Blaber *et al.*, Randall, Bowman *et al.* and in the LAPE study. Unidentified fish

was proportionally allocated to the identified fish groups in the diet, as well as to imports. Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Other Offshore Predators is dominated by small squids and small zooplankton. About 8 percent of the diet is imported from outside the system, and consists mainly of zoobenthos and unidentified fish.

Mackerels

Five studies, including one under LAPE, on four species of mackerels (*Scomberomorus brasiliensis*, *S. cavalla*, *S. maculatus* and *S. regalis*), were used to determine the average diet composition of Mackerels (Appendix 1, Table 12). Apart from the LAPE studies, one other was from the Caribbean (Randall 1967) and the others from the Western Atlantic, specifically off the Southern USA. A total of 9,060 fish were analyzed in these studies, including 131 in the LAPE study.

A high percentage of unidentified finfish (between 30 percent and 75 percent were recorded in the studies by Finucane *et al.* (1990) and Salomon and Naughton (1983). These were proportionally allocated to the other fish groups in the diet, as well as to imports (raw data suggested imports consisted of mainly finfish). Randall reported 92.3 percent of the diet of king mackerel to consist of small coastal pelagics and coastal pelagic predators (*Caranx ruber*, *Harengula humeralis*, *Ocyurus chrysurus*, *Ophitonema oglinum*, *Parexocoetus brachypterus*, engraulids, etc.) and 7.7 percent of squid/cuttlefish. The former was allocated according to 80 percent small coastal pelagics and 12.3 percent coastal pelagic predators, and the latter to small squids. Small pelagic prey was split between coastal and offshore small pelagics. Unidentified Scombridae was distributed equally to FG12 - FG15. The average diet of Mackerels is heavily dominated by small offshore pelagics (87%). Mackerels show a slight degree of cannibalism (about 0.2%). About 2% of the diet is imported from outside the system and consists mainly of demersal fish.

Wahoo (*Acanthocybium solandri*)

The average diet composition of Wahoo was determined from three studies: LAPE, Satoh *et al.* (2004) in the North and Central Atlantic and Junior (2000) off Brazil (Appendix 1, Table 13). A total of 263 wahoo, of which 179 came from the LAPE study, were analyzed in these studies.

About 28 percent and 58 percent of the prey were unidentified finfish in Satoh *et al.* and Junior, respectively, and were allocated to other fish groups in the diet and to imports. Small pelagic prey was split between coastal and offshore small pelagics. Unidentified Scombridae was distributed equally to FG13 - FG15. The average diet of Wahoo consists mainly of fish and small squids, with the dominant prey being other offshore predators, followed by imports (mainly reef-associated fish), large mesopelagics, small squids and small offshore pelagics.

Dolphinfish

The average diet composition of Dolphinfish was determined from diets of two species of dolphinfish (*Coryphaena hippurus* and *C. equiselis*) in eight studies (Appendix 1, Table 14), two of which were in the Caribbean - Randall (1967) and Oxenford and Hunte (1998) for Eastern Caribbean (LAPE area), two in the Southeastern USA and Gulf of Mexico (Rose 1966; Manooch *et al.* 1983), three off Brazil (Junior 2000, Pimenta *et al.* 2001, Satoh 2004) and one in Malaysia (Bachok *et al.* 2004). Over 3,000 dolphinfish were analyzed in these studies.

The studies by Randall, Manooch *et al.* and Satoh *et al.* reported a relatively high percentage of unidentified fish (>20%). All unidentified fish was allocated to other fish groups in the diet as well as to imports (raw data suggested that imports comprised of mainly fish). No catch data were available for *C. equiselis*; however *C. hippurus* is prevalent in the catch and it was assumed that this species comprises 90 percent of the catch and the other 10 percent. Unidentified Scombridae was distributed equally to FG12 - FG16. Small pelagic prey was split between coastal and offshore small pelagics. The dominant prey groups in the average diet of Dolphinfish are coastal predators and dolphinfish (the latter comprising 21 percent of the diet, indicating a significant degree of cannibalism), followed by flyingfish, imports (mainly of reef-associated fish) and small squids. About 9 percent of the average diet is imported from outside the system.

Pelagic Sharks

The average diet composition of Pelagic Sharks was derived from the diets of 14 species of pelagic sharks, including two species (*Carcharhinus limbatus*, *Sphyrna lewini*) under LAPE, in 10 studies (Appendix 1, Table 15). All of the other studies, with the exception of three in the Eastern Atlantic and the study by Cortes (1999), were from the Western Atlantic, including Brazil. A total of 9,124 sharks, including 10 in the LAPE study, were analyzed.

A relatively high proportion of unidentified prey (>80%) was recorded in the LAPE study and by Cortes (1999). All unidentified prey was allocated to other fish groups in the diet, as well as to imports. Unidentified Scombridae was distributed equally to FG8 - FG15. Small pelagic prey was split between coastal and offshore small pelagics. In general the studies showed a relatively wide diet spectrum for the various species of sharks, with prey ranging from seabirds, marine mammals, a number of fish groups, squids and zooplankton. Up to 38 percent of the average diet of pelagic sharks is comprised of imports, which consists mainly of reef-associated fish and zoobenthos. Other important prey groups are coastal predators and small squids. About 4 percent of the diet of Pelagic sharks is attributed to cannibalism.

Flyingfish

A draft sub-regional management plan for flyingfish in the Eastern Caribbean (Oxenford, 2002) indicates that *Hirundichthys affinis*, *Cypselurus cyanopterus* and *Parexocoetus brachypterus* are the main flyingfish species caught out of 13 species thought to be present in the region. Only one study, from the Pacific Islands, was available for the diet composition of *H. affinis* (Gillet and Ianelli 1991) which reported the diet to consist of 70 percent small zooplankton and 30 percent bony fish, most likely larval and juvenile stages. No diet composition data were available for other species (e.g. *Cheilopogon cyanopterus* and *Parexocoetus brachypterus*); however, these groups are thought to feed mainly on zooplankton. Lipskya (1987) reported that the diet composition for *Exocoetus volitans* in the Eastern Pacific was mainly zooplankton with some zoobenthos, although *E. volitans* was not included in the LAPE functional group. The LAPE model attributed 100 percent of the group diet to small zooplankton.

Coastal Predators

The average diet composition of this group was based on 17 species in seven studies, which came from a geographic area extending from the Southern USA to Brazil, and including the Caribbean Sea (Appendix 1, Table 16). Among these are two species studied under LAPE (*Sphyrna barracuda*, *Caranx hippos*).

A high percentage of unidentified finfish (up to 100%) were reported in the some of the species in the studies by Randall and Sierra *et al.* All unidentified prey was allocated to other fish groups in the diet, as well as to imports. These two authors also reported relatively high proportions of demersal fish and zoobenthos (up to 100%) for some of the species. Unidentified Scombridae was distributed equally to FG8 - FG15. Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Coastal predators is dominated by small offshore pelagics (38%) and imports (48%), which consists mainly of zoobenthos and demersal fish.

Small Pelagics

The Small Pelagics group was split into two: Small Offshore Pelagics and Small Coastal Pelagics. This was necessary to facilitate policy exploration on the small coastal pelagics caught with beach seines. It was assumed that small offshore pelagics perform a similar ecological role in the offshore area as do the small coastal pelagics do inshore. As a result the diet compositions are similar for both groups. For predation on the offshore small pelagic group, the same predators were assigned to both groups and the diet partitioned based on the relative biomass of small offshore pelagics and small coastal pelagics, derived from the ecosystem survey, with some other minor adjustments.

Eleven studies on 18 species of small pelagic fishes were used for the average diet of these two groups (Appendix 1, Table 17). All of these studies were from the Western Atlantic, including the Caribbean.

Relatively high proportions of unidentified prey (up to 60 percent) in the diets were reported by a number of authors (Vega-Cendejas *et al.* 1994, Randall 1967, Val and de Almeida-Val 1995, Bowman *et al.* 2000). Unidentified prey was allocated to imports. Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Small Coastal Pelagics consists mainly of small zooplankton (56 percent) and imports (41 percent), which consist mainly of zoobenthos.

Small Mesopelagic Fish

Six studies on 20 species of Small Mesopelagic Fish were used to derive the average diet composition of Small Mesopelagic Fish (Appendix 1, Table 18). These studies were based on a total of 1,480 fish collected in the Eastern Gulf of Mexico (Hopkins and Baird), Cariaco Trench (Hopkins and Baird) and Northeast (Pusch *et al.* 2004) and Northwest Atlantic (Kinzer 1977).

Equal weighting of abundance of all species was assumed, as no catch or biomass data were available for these species. "Unidentified fish" in the diet was allocated to "Small Mesopelagics" and "Unidentified" allocated equally to small squid and small zooplankton. The average diet of Small Mesopelagics is heavily dominated by small zooplankton, which constitutes nearly 99 percent of the diet. The other prey groups are small mesopelagics, small squids and imports.

Large Mesopelagic Fish

The Average DC of Large Mesopelagic Fish was derived from five studies on three species of Large Mesopelagic Fish from the Atlantic Ocean, Western Central Indian Ocean and Eastern Pacific Ocean (Appendix 1, Table 19). These studies were based on a total of 474 fish.

In deriving the average diet composition, equal weighting was given to all three species since no catch data or biomass estimates by species were available. A relatively high proportion of unidentified prey (>35%) was recorded in three of the studies (Junior 2000; Moteki *et al.* 1993; Sabatie *et al.* 2003). The unidentified component of the diet was redistributed proportionally to all fish groups (including imports, which were comprised of mainly fish). Small pelagic prey was split between coastal and offshore small pelagics. The average diet of Large Mesopelagic Fish consists of 35 percent large mesopelagic fish, indicating a significant degree of cannibalism in this group, followed by flyingfish, imports small zooplankton and small squids.

Turtles

The diets of the two groups were assumed based on descriptions of food items (species profiles from OBIS-SEAMAP - <http://seamap.env.duke.edu>). Leatherback turtles feed primarily on jellyfish and consume miscellaneous invertebrates coincidentally when feeding. A diet of 98 percent large zooplankton and 2 percent small zooplankton was assumed.

Functional Group		Final
28	Small zooplankton	2.00
29	Large zooplankton	98.00

Loggerhead turtles eat a wide variety of prey items, including invertebrates from eight phyla. They feed mainly on shellfish and crabs on the seafloor may also scavenge on fish (from fisheries discards). The pelagic stage feeds on an assemblage of species found on sargassum rafts, especially coelenterates and gastropods. Green turtles show a dramatic dietary shift between their juvenile pelagic and adult benthic stages. While in the pelagic realm they eat worms, young crustaceans, aquatic insects, grasses and algae but as adults they become strictly herbivorous feeding on plant material (seagrasses and algae). Hawksbill are specialist feeders with a diet comprised mainly of sponges although tunicates, mollusks, algae and marine plants may be occasionally eaten these comprise a very small proportion of the diet. Adult Olive Ridley appear to exploit a wide variety of forage habitats and are generalist carnivores feeding on salps, jellyfish tunicates, crabs, fish, mollusca, algae, bryozoans, fish eggs, sipunculids and ascidians. A diet of 90 percent import (seagrasses, algae, invertebrates, etc.); 5 percent small zooplankton and 5 percent large zooplankton was assumed for this group.

Functional Group		Final
28	Small zooplankton	5.00
29	Large zooplankton	5.00
	IMPORT	90.00

Squids

The diet of small squids and large squids was taken from Vasconcellos *et al.* (2004). According to Arnold (1979), squids are active predators and occupy the same trophic level as mackerel. As a general rule, squids feed on macrozooplankton when young/small and shift the diet to small fish when adult/large. Cannibalism is evident in many species (Arnold 1979). Diets were adapted from Vasconcellos and Watson (2004) after Nixon (1987). For small squids, the proportion of the diet composed of medium-size epipelagic fish was divided equally among other offshore predators, mackerels and coastal predators. For large squids, the proportion of the diet composed of small-size epipelagic fish was assigned equally to small mesopelagic fish, small squid, large squid and large zooplankton. For both groups the proportion of the diet composed of bathypelagic fish was considered as diet import.

Functional Group		Predators	Small squid	Large squid
Prey				
13	Other offshore predators		0.80	
14	Mackerels		0.80	
18	Flyingfish			8.35
19	Coastal predators		0.80	8.35
22	Small mesopelagics		28.6	4.20
23	Large mesopelagics		2.4	
26	Small squid		11.4	4.20

Functional Group	Predators	Small squid	Large squid
Prey			
27 Large squid			4.20
28 Small zooplankton		14.1	
29 Large zooplankton		38.8	4.20
IMPORT		2.40	16.70

Zooplankton

Most species of the macrozooplankton (FG: large zooplankton) are carnivorous, feeding on mesozooplankton (FG: small zooplankton) organisms (Vinogradov 1970), whereas a mix of predators, herbivores and detritivores is characteristic of the mesozooplankton groups (Longhurst 1998). Diet composition values were assigned accordingly.

Functional Group	Predators	Small	Large
Prey		zooplankton	zooplankton
28 Small zooplankton		10.00	100.00
30 Phytoplankton		80.00	
31 Detritus		10.00	

DISCUSSION

Diet compositions of fish, marine mammals, invertebrates and other functional groups in the system are an essential input in trophic models of marine food webs, such as EwE, which has been adopted in the LAPE project. Preliminary EwE models of the LAPE area have been constructed using diet composition data from published and unpublished sources (Mohammed 2003; Vasconcellos *et al.* 2004). This report presents updated average DCs of the 29 vertebrate and invertebrate predator functional groups in the LAPE model. The data are based on field sampling and analysis of stomach contents of a number of the functional groups in the system, as well on published and unpublished studies. FishBase (Froese and Pauly 2007) was used extensively to obtain fish diet composition data.

A major concern has been the availability of diet composition data for the same species in each functional group from within the LAPE area. Preference for inclusion in these analyses was given to studies on: (i) the same species in the LAPE area; (ii) the same species in other similar or adjacent areas (with preference given to studies in the Caribbean Sea and Atlantic Ocean); (iii) the same species in non-similar areas; and (iv) similar species in non-similar areas (in descending order of preference).

This study revealed that very few diet studies have been conducted within the LAPE area. Of the 131 studies included in this report, only 11 (8.4%) were from the LAPE area, while slightly more than 7 percent were from immediate adjacent areas (Southwest Cuba, Puerto Rico and the US Virgin Islands, and Venezuela). Furthermore, these studies were based on relatively small sample sizes. No studies from within the LAPE area were found for seabirds, all the

marine mammals (except small cetaceans), swordfish, albacore, bigeye tuna, flyingfish, and the groups from coastal pelagics to zooplankton (inclusive). The studies from within the LAPE area and adjacent areas were mainly on large and medium sized pelagic fishes, and one on small cetaceans. It was notable that the availability of diet information was directly related to the commercial importance of the species, with the commercially valuable species having been more intensively studied. Nevertheless, for the fish functional groups, diet composition data were available for almost all the species, in studies from both within and outside the LAPE area. Most of the latter studies were from the North and Central Atlantic Ocean, with few from the Indian and Pacific Oceans.

Other constraints in this analysis included the low taxonomic level to which prey was identified, as well as the relatively high proportion of unidentified prey, in a number of the studies. This could have been attributed to several factors, including state of digestion of the ingested prey. Very few of the studies considered predator ontogenic changes and size or seasonal differences in the diets. Therefore, the DCs presented here are average values, with no consideration of these factors that are known to influence diets.

There is need for further diet studies in the LAPE area, which should also include non-commercial species, especially those that might play an important ecological role in the system. Factors that influence diets, such as predator ontogenic changes and size, as well as seasonal changes, should be taken into consideration in these studies. Attempts should also be made to identify prey species to the lowest taxonomic level.

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APPENDIX 1 DIET COMPOSITIONS FOR FUNCTIONAL GROUPS

The tables in this appendix contain the diet composition data and derivations of the diet composition for the LAPE functional groups.

Table 3. Diet studies for seabirds and derived diet composition

Seabirds		Sooty tern (<i>Sterna fuscata</i>)				Brown noddy (<i>Anous stolidus</i>)				Red-footed booby (<i>Sula sula</i>)			
Source	Locality	Surman et al; 2002	Surman et al; 2002	Surman et al; 2002	Average	Surman et al; 2002	Surman et al; 2002	Surman et al; 2002	Average	Seki and Blaber et al., 1995	Harrison, 1989	Harrison, 1990	Average
Year		Abrollos 1998	Abrollos 1999	Abrollos 2000		Abrollos 1998	Abrollos 1999	Abrollos 2000		Great Barrier Reef 1994	Hawaii 1982	Hawaii 1988	
1	Seabirds	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
2	Baleen whales	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
3	Deep-diving whales	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
4	Killer whales	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
5	Small cetaceans	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
6	Swordfish	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
7	Other billfishes	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
8	Yellowfin tuna	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
9	Skipjack tuna	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
10	Albacore	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
11	Bigeye tuna	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
12	Blackfin tuna	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
13	Other offshore predators	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
14	Mackerels	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
15	Wahoo	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
16	Dolphinfish	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
17	Pelagic sharks	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
18	Flyingfish	0.3	1.1	0	0.47	0.2	0.1	0.2	0.17	12.9	57.4	26.7	32.33
19	Coastal predators	0	0	0	0.00	0	0.5	0	0.17	0	0	0	0.00
20	*Small offshore pelagics												
21	Small coastal pelagics	1.5	1.7	2.2	1.80	5.7	0.1	8.8	4.87	20.5	8.1	12.2	13.60
22	Small mesopelagics	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
23	Large mesopelagics	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
24	Leatherback turtles	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
25	Other turtles	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
26	Small squids	72.7	52.9	83	69.53	15.2	5.3	19.9	13.47	45	22.2	28.9	32.03
27	Large squids	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
28	Small zooplankton	0.1	0	2.2	0.77	0.4	0	0.2	0.20	0	0	0	0.00
29	Large zooplankton	1.3	0.3	0	0.53	0	0.5	0.2	0.23	0	0	0	0.00
30	Phytoplankton	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
31	Detritus	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
	Imports	4.7	11.3	1.4	5.80	1.3	0.3	1.3	0.97	0	1.8	0	0.60
	Unidentified fish	14.8	29.2	11.2	18.40	77.2	93.2	69.4	79.93	21.6	10.5	32.2	21.43
	Unidentified	4.6	3.5	0	2.70	0	0	0	0.00	0	0	0	0.00

* All small pelagics in diet data are initially included as small coastal pelagics

Table 3. Diet studies for seabirds (continued)

Seabirds		Masked booby (<i>Sula dactylaptra</i>)							Sandwich tern (<i>Sterna sandivensis acufflavida</i>)		
Source	Locality	Blaber et al., 1995	Seki and Harrison, 1989	Harrison et al, 1984	Jahncke and Goya (2000)	Jahncke et al., 1998	Dorward, 1962	Average	Dunnet et al., 1990	Shealer, 1995	Average
Year	Barrier Reef	Hawaii	Samoa	Peru	Peru	Ascension	1955		England E	Puerto Rico	
	1994	1988	1980	1997	1998	1998	1995		1963	1993	
1	Seabirds	0	0	0	0	0	0	0.00	0	0	0.00
2	Baleen whales	0	0	0	0	0	0	0.00	0	0	0.00
3	Deep-diving whales	0	0	85	0	0	0	14.17	0	0	0.00
4	Killer whales	0	0	0	0	0	0	0.00	0	0	0.00
5	Small cetaceans	0	0	0	0	0	0	0.00	0	0	0.00
6	Swordfish	0	0	0	0	0	0	0.00	0	0	0.00
7	Other billfishes	0	0	0	0	0	0	0.00	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0.00	0	0	0.00
9	Skipjack tuna	0	0	0	0	0	0	0.00	0	0	0.00
10	Albacore	0	0	0	0	0	0	0.00	0	0	0.00
11	Bigeye tuna	0	0	0	0	0	0	0.00	0	0	0.00
12	Blackfin tuna	0	0	0	0	0	0	0.00	0	0	0.00
13	Other offshore predators	0	0	0	0	0	0	0.00	0	0	0.00
14	Mackerels	0	0	0	0	0	0	0.00	0	0	0.00
15	Wahoo	0	0	0	0	0	0	0.00	0	0	0.00
16	Dolphinfish	0	0	0	0	0	0	0.00	0	0	0.00
17	Pelagic sharks	0	0	0	0	0	0	0.00	0	0	0.00
18	Flyingfish	56.1	56.4	0	0	21.5	0	22.33	0	0	0.00
19	Coastal predators	0	0	25.2	0	8.3	0	5.58	0	0	0.00
20	*Small offshore pelagics										
21	Small coastal pelagics	0	32.9	64.1	57.7	10.9	0	27.60	24	0	12.00
22	Small mesopelagics	0	0	0	0	0	0	0.00	0	0	0.00
23	Large mesopelagics	0	0	0	0	0	0	0.00	0	0	0.00
24	Leatherback turtles	0	0	0	0	0	0	0.00	0	0	0.00
25	Other turtles	0	0	0	0	0	0	0.00	0	0	0.00
26	Small squids	17.4	2.8	0	0	0.9	0	3.52	1	0	0.50
27	Large squids	0	0	0	0	0	0	0.00	0	0	0.00
28	Small zooplankton	0	0	0	0	0	0	0.00	0	0	0.00
29	Large zooplankton	0	0	0	0	0	0	0.00	1	0	0.50
30	Phytoplankton	0	0	0	0	0	0	0.00	0	0	0.00
31	Detritus	0	0	0	0	0	0	0.00	0	0	0.00
	Imports	0	0	0	0	0	0	0.00	62	0	31.00
	Unidentified fish	26.5	7.9	10.7	42.3	58.4	100	40.97	12	100	56.00
	Unidentified	0	0	0	0	0	0	0.00	0	0	0.00

* All small pelagics in diet data are initially included as small coastal pelagics

Table 3. Diet studies for seabirds (continued)

Seabirds		Bridled tern (<i>Sternus anathetus</i>)			Roseate tern (<i>Sterna dougallii</i>)							
Source	Locality	Dunlop, 1997	Diamond, 1983	Average	Surman et al. 2002	Surman et al. 2002	Surman et al. 2002	Ramos et al., 1995	Ramos et al, 1998	Safina et al 1990	Randall and Randall, 1977	Average
Year		Penguin I. 1996	Seychelles 1967		Abrolhos 1998	Abrolhos 1999	Abrolhos 2000	Azores 1995	Azores 1996	NE US 1987	Africa E 1977	
1	Seabirds	0	0	0.00	0	0	0	0	0	0	0	0.00
2	Baleen whales	0	0	0.00	0	0	0	0	0	0	0	0.00
3	Deep-diving whales	0	0	0.00	0	0	0	0	0	0	0	0.00
4	Killer whales	0	0	0.00	0	0	0	0	0	0	0	0.00
5	Small cetaceans	0	0	0.00	0	0	0	0	0	0	0	0.00
6	Swordfish	0	0	0.00	0	0	0	0	0	0	0	0.00
7	Other billfishes	0	0	0.00	0	0	0	0	0	0	0	0.00
8	Yellowfin tuna	0	0	0.00	0	0	0	0	0	0	0	0.00
9	Skipjack tuna	0	0	0.00	0	0	0	0	0	0	0	0.00
10	Albacore	0	0	0.00	0	0	0	0	0	0	0	0.00
11	Bigeye tuna	0	0	0.00	0	0	0	0	0	0	0	0.00
12	Blackfin tuna	0	0	0.00	0	0	0	0	0	0	0	0.00
13	Other offshore predators	0	0	0.00	0	0	0	0	0	0	0	0.00
14	Mackerels	0	0	0.00	0	0	0	0	0	0	0	0.00
15	Wahoo	0	0	0.00	0	0	0	0	0	0	0	0.00
16	Dolphinfish	0	0	0.00	0	0	0	0	0	0	0	0.00
17	Pelagic sharks	0	0	0.00	0	0	0	0	0	0	0	0.00
18	Flyingfish	0	1.9	0.95	0	0	0	0	0	0	0	0.00
19	Coastal predators	0	0	0.00	0	0	0	0	0	0	0	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	27.1	0	13.55	1.9	0	0	6.8	0	0	0	1.24
22	Small mesopelagics	0	0	0.00	0	0	0	0	0	0	0	0.00
23	Large mesopelagics	0	0	0.00	0	0	0	0	0	0	0	0.00
24	Leatherback turtles	0	0	0.00	0	0	0	0	0	0	0	0.00
25	Other turtles	0	0	0.00	0	0	0	0	0	0	0	0.00
26	Small squids	0.1	0	0.05	1.9	0	0	0	0	0	0	0.27
27	Large squids	0	0	0.00	0	0	0	0	0	0	0	0.00
28	Small zooplankton	0	0	0.00	0	0	0	0	0	0	0	0.00
29	Large zooplankton	11.7	4	7.85	1.7	0	0	0	0	0	0	0.24
30	Phytoplankton	0	0	0.00	0	0	0	0	0	0	0	0.00
31	Detritus	0	0	0.00	0	0	0	0	0	0	0	0.00
	Imports	25	89.3	57.15	4	6.7	16.7	0	0	72.6	0	14.29
	Unidentified fish	34	4.8	19.40	90.5	91.8	83.3	93.2	100	20.6	100	82.77
	Unidentified	2.1	4	3.05	0	0	0	0	0	0	0	0.00

* All small pelagics in diet data are initially included as small coastal pelagics

Table 3. Diet studies for seabirds (continued)

Seabirds		Gun-billed tern (<i>Sterna nilotica</i>)							White-tailed tropicbird (<i>Phaethon</i>)	Royal tern (<i>Sterna maxima</i>)	Magnificant frigatebird (<i>Frigata magnificens</i>)	Brown pelican (<i>Pelecanus occidentalis</i>) general info on internet- 90% anchovies
Source	Locality	Harris and Riddiford, 1989	Barrett and Anker-Nilssen, 1976	Bogliani et al. 1990	Costa, 1984	Erwin et al., 1998	Erwin et al., 1998	Average	Diamond, 1983	McGinnis and Emslie, 2001	Calixto-Albarran and Osorno (2000)	
Year		Italy W 1983	Spain SE 1976	Denmark 1975	Iberian 1982	NE US 1995	NE US 1996		Seychelles 1967	SE US 1998	Mexico W 1991	
1	Seabirds	0	0	0	0	0	0	0.00	0	0	0	0
2	Baleen whales	0	0	0	0	0	0	0.00	0	0	0	0
3	Deep-diving whales	0	0	0	0	0	0	0.00	0	0	0	0
4	Killer whales	0	0	0	0	0	0	0.00	0	0	0	0
5	Small cetaceans	0	0	0	0	0	0	0.00	0	0	0	0
6	Swordfish	0	0	0	0	0	0	0.00	0	0	0	0
7	Other billfishes	0	0	0	0	0	0	0.00	0	0	0	0
8	Yellowfin tuna	0	0	0	0	0	0	0.00	0	0	0	0
9	Skipjack tuna	0	0	0	0	0	0	0.00	0	0	0	0
10	Albacore	0	0	0	0	0	0	0.00	0	0	0	0
11	Bigeye tuna	0	0	0	0	0	0	0.00	0	0	0	0
12	Blackfin tuna	0	0	0	0	0	0	0.00	0	0	0	0
13	Other offshore predators	0	0	0	0	0	0	0.00	0	0	0	0
14	Mackerels	0	0	0	0	0	0	0.00	0	0	0	0
15	Wahoo	0	0	0	0	0	0	0.00	0	0	0	0
16	Dolphinfish	0	0	0	0	0	0	0.00	0	0	0	0
17	Pelagic sharks	0	0	0	0	0	0	0.00	0	0	0	0
18	Flyingfish	0	0	0	0	0	0	0.00	51.8	0	0	0
19	Coastal predators	0	0	0	0	0	0	0.00	0	0	0	10
20	*Small offshore pelagics											
21	Small coastal pelagics	7	0	0	0	0	0	1.17	21.6	9	0	90
22	Small mesopelagics	0	0	0	0	0	0	0.00	0	0	0	0
23	Large mesopelagics	0	0	0	0	0	0	0.00	0	0	0	0
24	Leatherback turtles	0	0	0	0	0	0	0.00	0	0	0	0
25	Other turtles	0	0	0	0	0	0	0.00	0	0	0	0
26	Small squids	0	0	0	0	53	69	20.33	11	0	2.3	0
27	Large squids	0	0	0	0	0	0	0.00	0	0	0	0
28	Small zooplankton	0	0	0	0	0	0	0.00	0	0	0	0
29	Large zooplankton	0	0.3	17	72.8	0	0	15.02	0	0	0.9	0
30	Phytoplankton	0	0	0	0	0	0	0.00	0	0	0	0
31	Detritus	0	0	0	0	0	0	0.00	0	0	0	0
	Imports	0	0	0	0	0	0	0.00	0	0	22.2	0
	Unidentified fish	14.7	0	9.3	0	32	14	11.67	15.6	91	74.6	0
	Unidentified	78.3	99.7	73.7	27.2	15	17	51.82	0	0	0	0

* All small pelagics in diet data are initially included as small coastal pelagics

Table 3. Diet studies for seabirds (continued)

Seabirds		Common tern (<i>Sterna hirundo</i>)										Average
Source	Locality	Granadeiro	Ramos et	Dunnet at	Saffina et	Granadeiro	Braune and	Braune and	Cairns et	Kirkham,	Mauco et	
		et al., 2002	al., (1998)	al, 1990	al., 1990	et al., 2002	Gaskin,	Gaskin,	al, 1997	1986	al., 2001	
		Azores	Azores	England E	NE US	NE US	New Brunswick	New Brunswick	Quebec	Nova Scotia	Argentina	
Year		1994	1996	1963	1987	1998	1978	1979	1990	1983	1999	
1	Seabirds	0	0	0	0	0	0	0	0	0	0	0.00
2	Baleen whales	0	0	0	0	0	0	0	0	0	0	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0	0	0	0.00
4	Killer whales	0	0	0	0	0	0	0	0	0	0	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0	0	0	0.00
6	Swordfish	0	0	0	0	0	0	0	0	0	0	0.00
7	Other billfishes	0	0	0	0	0	0	0	0	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0	0	0.00
9	Skipjack tuna	0	0	0	0	0	0	0	0	0	0	0.00
10	Albacore	0	0	0	0	0	0	0	0	0	0	0.00
11	Bigeye tuna	0	0	0	0	0	0	0	0	0	0	0.00
12	Blackfin tuna	0	0	0	0	0	0	0	0	0	0	0.00
13	Other offshore predators	0	0	0	0	0	0	0	0	0	0	0.00
14	Mackerels	0	0	0	0	0	0	0	0	0	0	0.00
15	Wahoo	0	0	0	0	0	0	0	0	0	0	0.00
16	Dolphinfish	0	0	0	0	0	0	0	0	0	0	0.00
17	Pelagic sharks	0	0	0	0	0	0	0	0	0	0	0.00
18	Flyingfish	0	0	0	0	0	0	0	0	0	0	0.00
19	Coastal predators	0	0	0	0	0	0	0	0	0	0	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	0	0	10	11.4	44	0	0	22	29	0	11.64
22	Small mesopelagics	0	0	0	0	0	0	0	0	0	0	0.00
23	Large mesopelagics	0	0	0	0	0	0	0	0	0	0	0.00
24	Leatherback turtles	0	0	0	0	0	0	0	0	0	0	0.00
25	Other turtles	0	0	0	0	0	0	0	0	0	0	0.00
26	Small squids	0	0	1	0.1	0	0	0	0	0	0	0.11
27	Large squids	0	0	0	0	0	0	0	0	0	0	0.00
28	Small zooplankton	0	0	0	0	0	0	0	0	0	0	0.00
29	Large zooplankton	0.4	0	0	3.3	4	0	0	36	15	0	5.87
30	Phytoplankton	0	0	0	0	0	0	0	0	0	0	0.00
31	Detritus	0	0	0	0	0	0	0	0	0	0	0.00
	Imports	0	0	68	35.5	6	0	0	42	17	0	16.85
	Unidentified fish	99.6	100	21	47.3	46	100	100	0	39	91.1	64.40
	Unidentified	0	0	0	2.4	0	0	0	0	0	0	0.24

* All small pelagics in diet data are initially included as small coastal pelagics

Table 3. Diet composition calculations for seabirds

Seabirds											
Source		Sterna fuscata	Anous stolidus	Sula dactylatra	Sula sula	Sterna anaethetus	Sterna dougallii	Sterna nilotica	Phaethon lepturus	Sterna hirundo	Sterna maxima
Locality		0.72337	0.04051	0.00959	0.06184	0.01736	0.01447	0.00087	0.01784	0.00022	0.00181
Year											
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	14.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.47	0.17	22.33	32.33	0.95	0.00	0.00	51.80	0.00	0.00
19	Coastal predators	0.00	0.17	5.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	*Small offshore pelagics										
21	Small coastal pelagics	1.80	4.87	27.60	13.60	13.55	1.24	1.17	21.60	11.64	9.00
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Leatherback turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	69.53	13.47	3.52	32.03	0.05	0.27	20.33	11.00	0.11	0.00
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	0.77	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	Large zooplankton	0.53	0.23	0.00	0.00	7.85	0.24	15.02	0.00	5.87	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	5.80	0.97	0.00	0.60	57.15	14.29	0.00	0.00	16.85	0.00
	Unidentified fish	18.40	79.93	40.97	21.43	19.40	82.77	11.67	15.60	64.40	91.00
	Unidentified	2.70	0.00	0.00	0.00	3.05	0.00	51.82	0.00	0.24	0.00

Table 3. Diet composition calculations for seabirds (continued)

Seabirds						Small pelagics split between coastal and offshore	Final DC
Species relative weight (from consumption)		Sterna sandivensis acufflava	Frigata magnificens	Pelecanus occidentalis	Weighted average		Unid. fish distributed proportionally over non-mesopelagic fish groups
		0.00738	0.05455	0.05021			
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.14	0.14	0.14
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	3.50	3.50	8.26
19	Coastal predators	0.00	0.00	10.00	0.56	0.56	1.33
20	*Small offshore pelagics				0.00	7.62	17.99
21	Small coastal pelagics	12.00	0.00	90.00	7.87	0.25	0.59
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00
24	Leatherback turtles	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	0.50	2.30	0.00	53.21	53.21	54.32
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	0.00	0.00	0.00	0.56	0.56	0.57
29	Large zooplankton	0.50	0.90	0.00	0.60	0.60	0.61
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	31.00	22.20	0.00	6.91	6.91	16.33
	Unidentified fish	56.00	74.60	0.00	24.75		
	Unidentified	0.00	0.00	0.00	2.05		

Table 4. Diet studies for swordfish and derived diet composition

Swordfish		Swordfish (<i>Xiphias gladius</i>)										Sample size weighted average	Small pelagics split between coastal and offshore	Scombridae distributed equally to FG8-FG15	Final DC Unid. distributed proportionally over all fish groups
Source	Locality	Satoh et al. 2004	Sabatie et al. 2003	Bowman et al. 2000	Velasco & Quintans 2000	Junior 2000	Barreto et al. 1996	Stillwell & Kohler 1985	Ribeiro & Andrade 2000 Azores (females)	Ribeiro & Andrade 2000 Azores (males)	Potier et al. 2007 WC Indian Ocean				
		N & C Atl	EC Atl	NW Atl	EC Atl	Brazil	Venezuela	NW Atl							
	Sample size	32	4	168	142	193	114	168	51	22	130				
1	Seabirds	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
2	Baleen whales	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
4	Killer whales	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
6	Swordfish	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
7	Other billfishes	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
9	Skipjack tuna	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
10	Albacore	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
11	Bigeye tuna	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
12	Blackfin tuna	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
13	Other offshore predators	0	0	0	0	0	0	0	0	0	0.05	0.01	0.01	0.12	0.17
14	Mackerels	0	0	0	0	0	0	5.41	13.4	16.7	0	1.91	1.91	2.03	2.69
15	Wahoo	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.12	0.16
16	Dolphinfish	0	0	0	0	0.13	0	0	0	0	0.7	0.11	0.11	0.11	0.15
17	Pelagic sharks	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
18	Flyingfish	0	0	0	0	1.07	0	0	0	0	0.29	0.24	0.24	0.24	0.32
19	Coastal predators	0	0	4	13.66	8.83	4.97	6.42	29.9	26.7	3.12	8.28	8.28	8.28	10.97
20	*Small offshore pelagics												8.95	8.95	11.86
21	Small coastal pelagics	4.1	0	2.8	2.12	20.33	5.45	2.83	1.6	5.7	25.65	9.24	0.30	0.30	0.39
22	Small mesopelagics	66.8	0	0	0.66	0.03	0	0.1	0.62	2.1	3.18	2.68	2.68	2.68	3.55
23	Large mesopelagics	5.2	0	0.7	15.96	25.44	10.47	0.72	0	0	6.02	9.33	9.33	9.33	12.37
24	Leatherback turtle	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
25	Other turtles	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
26	Small squids	0	61.5	72.4	52.14	11.59	20.85	66.93	15.2	8.9	27.69	39.30	39.30	39.30	39.30
27	Large squids	0	0	0	0	1.18	0	0.4	20.1	0	8.02	2.31	2.31	2.31	2.31
28	Small zooplankton	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
29	Large zooplankton	0	0.67	0	2.58	0.96	6.16	0	0	0	4.13	1.75	1.75	1.75	1.75
30	Phytoplankton	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
31	Detritus	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
	Imports	1.3	0	14.9	3.21	0.81	8.81	12.88	13.2	28.6	16.34	9.52	9.52	9.52	12.62
	Unidentified	22.1	37.8	4.7	9.66	26	42.7	4.16	0	0	3.59	13.74			
	Scombridae	0.6	0	0	0	3.69	0.71	0	0	0	1.22	0.95			

* All small pelagics in diet data are initially included as small coastal pelagics

Table 5. Diet studies for billfish and derived diet composition

Billfishes		Sailfish (<i>Istiophorus platypterus</i>)									Atlantic white marlin (<i>Tetrapturus albidus</i>)			
Source	Locality	Satoh et al. 2004 N & C Atl	Pimenta et al. 2001 Brazil	Junior et al. 2004 Brazil	Sabatie et al. 2003 EC Atl	Pimenta et al. 2001 Brazil	Pimenta et al. 2005 Brazil	Bachok et al. 2004 Malaysia	LAPE	Sample size weighted average	LAPE	Satoh et al. 2004 N & C Atl	Junior et al. 2004 Brazil	Sample size weighted average
Sample size		42	21	98	47	21	203	13	20		20	32	120	
1	Seabirds	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
2	Baleen whales	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
4	Killer whales	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
6	Swordfish	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
7	Other billfishes	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
9	Skipjack tuna	0	0	0	0	0	0	0	2.9	0.12	40.2	0	0	4.67
10	Albacore	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
11	Bigeye tuna	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
12	Blackfin tuna	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
13	Other offshore predators	0	0	2.9	0	0	13	0	18.7	7.09	36.1	28.5	0	9.50
14	Mackerels	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
15	Wahoo	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
16	Dolphinfish	0	0	0.7	0	0	0	0	0	0.15	0	0	2.86	2.00
17	Pelagic sharks	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
18	Flyingfish	1.2	26	0.7	0	26	3.7	0	0.00	4.22	0	0	4.07	2.84
19	Coastal predators	6.5	20	9.9	0	20	16.4	0	0.9	11.68	2.5	1.8	6.18	4.94
20	*Small offshore pelagics													
21	Small coastal pelagics	0	7.4	9.3	0	7.4	54.22	83.4	5.3	28.86	0	0	0.84	0.59
22	Small mesopelagics	0	0	0.3	0	0	0	0	0	0.06	0	0	0	0.00
23	Large mesopelagics	18.7	0	25.6	0	0	0	0	2.7	7.20	3.5	16.2	30.93	25.00
24	Leatherback turtle	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
25	Other turtles	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
26	Small squids	0	0	21.4	8.8	0	0.8	5.4	8.1	6.25	7	0	26.87	19.56
27	Large squids	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
28	Small zooplankton	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
29	Large zooplankton	0	0	0	0	0	0	0	0	0.00	0	0	0.37	0.26
30	Phytoplankton	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
31	Detritus	0	0	0	0	0	0	0	0	0.00	0	0	0	0.00
	Imports	8.2	46.6	4.6	0	46.6	12.6	11.2	29.5	13.00	10.7	0.1	3.53	3.73
	Unidentified	49.9	0	17.3	91.2	0	0	0	31.9	18.74	0	53.4	19	23.19
	Scombridae	15.5	0	7.3	0	0	0	0	0	2.94	0	0	5.35	3.73

* All small pelagics in diet data are initially included as small coastal pelagics

Table 5. Diet studies for billfish (continued)

Billfishes		Atlantic blue marlin (<i>Makaira nigricans</i>)					Black marlin (<i>Makaira indica</i>)	Longbill spearfish (<i>Tetrapturus pfluegeri</i>)		
Source	Locality	LAPE	Satoh et al. 2004 N & C Atl	Pimenta et al. 2001 Brazil	Junior et al. 2004 Brazil	Sample size weighted average	Bachok et al. 2004 Malaysia	Satoh et al. 2004 N & C Atl	Junior et al. 2004 Brazil	Sample size weighted average
Sample size		23	17	69	35		32.00	53	37	
1	Seabirds	0	0	0	0	0.00	0	0	0	0.00
2	Baleen whales	0	0	0	0	0.00	0	0	0	0.00
3	Deep-diving whales	0	0	0	0	0.00	0	0	0	0.00
4	Killer whales	0	0	0	0	0.00	0	0	0	0.00
5	Small cetaceans	0	0	0	0	0.00	0	0	0	0.00
6	Swordfish	0	0	0	0	0.00	0	0	0	0.00
7	Other billfishes	0	0	0	0	0.00	0	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0.00	0	0	0	0.00
9	Skipjack tuna	59.85	0	19	0	18.66	0	0	0	0.00
10	Albacore	0	0	0	0	0.00	0	0	0	0.00
11	Bigeye tuna	0	0	5	0	2.40	0	0	0	0.00
12	Blackfin tuna	0	0	0	0	0.00	0	0	0	0.00
13	Other offshore predators	34.15	0	61	0	34.68	0	0	0	0.00
14	Mackerels	0	0	0	0	0.00	0	0	0	0.00
15	Wahoo	0	0	0	0	0.00	0	0	0	0.00
16	Dolphinfish	0	0	10	0	4.79	0	12.2	0	7.18
17	Pelagic sharks	0	0	0	0	0.00	0	0	0	0.00
18	Flyingfish	0	10.3	5	0	3.61	16.7	19.7	1.34	12.15
19	Coastal predators	3.06	0	0	0	0.49	0	1.2	0.27	0.82
20	*Small offshore pelagics									
21	Small coastal pelagics	0	0	0	21.4	5.20	81	0	0	0.00
22	Small mesopelagics	0	0	0	0	0.00	0	0	0	0.00
23	Large mesopelagics	0.37	8.8	0	13.43	4.36	0	10.6	30.5	18.78
24	Leatherback turtle	0	0	0	0	0.00	0	0	0	0.00
25	Other turtles	0	0	0	0	0.00	0	0	0	0.00
26	Small squids	2.57	0	0	27.19	7.02	2.3	0	26.81	11.02
27	Large squids	0	0	0	0.44	0.11	0	0	0	0.00
28	Small zooplankton	0	0	0	0	0.00	0	0	0	0.00
29	Large zooplankton	0	0	0	0	0.00	0	0	0	0.00
30	Phytoplankton	0	0	0	0	0.00	0	0	0	0.00
31	Detritus	0	0	0	0	0.00	0	0	0	0.00
	Imports	0	1.3	0	1.04	0.41	0	1.6	7.08	3.85
	Unidentified	0	61.6	0	21.1	12.40	0	28.3	34	30.64
	Scombridae	0	18	0	15.4	5.87	0	26.3	0	15.49

Table 5. Diet composition calculations for billfish

Billfishes		Istiophorus platypterus	Makaira nigricans	Tetrapturus albidus	Makaira indica	Tetrapturus pfluegeri	Weighted average	Scombridae distributed equally to FG8-FG15	Small pelagics split between coastal and offshore	Final DC
Species relative weight (from consumption)		0.2887	0.3981	0.2816	0.0085	0.0230				Unid. distributed proportionally over all identified groups
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.70
9	Skipjack tuna	0.12	18.66	4.67	0.00	0.00	8.78	9.36	9.36	11.35
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.70
11	Bigeye tuna	0.00	2.40	0.00	0.00	0.00	0.95	1.53	1.53	1.85
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.70
13	Other offshore predators	7.09	34.68	9.50	0.00	0.00	18.53	19.10	19.10	23.17
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.70
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.57	0.70
16	Dolphinfish	0.15	4.79	2.00	0.00	7.18	2.68	2.68	2.68	3.25
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	4.22	3.61	2.84	16.70	12.15	3.88	3.88	3.88	4.70
19	Coastal predators	11.68	0.49	4.94	0.00	0.82	4.98	4.98	4.98	6.04
20	*Small offshore pelagics								10.90	13.22
21	Small coastal pelagics	28.86	5.20	0.59	81.00	0.00	11.26	11.26	0.36	0.44
22	Small mesopelagics	0.06	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02
23	Large mesopelagics	7.20	4.36	25.00	0.00	18.78	11.29	11.29	11.29	13.70
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	6.25	7.02	19.56	2.30	11.02	10.38	10.38	10.38	12.59
27	Large squids	0.00	0.11	0.00	0.00	0.00	0.04	0.04	0.04	0.05
28	Small zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	Large zooplankton	0.00	0.00	0.26	0.00	0.00	0.07	0.07	0.07	0.09
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	13.00	0.41	3.73	0.00	3.85	5.05	5.05	5.05	6.13
	Unidentified	18.74	12.40	23.19	0.00	30.64	17.59			
	Scombridae	2.94	5.87	3.73	0.00	15.49	4.59			

Table 6. Diet studies for yellowfin tuna and derived diet composition

Yellowfin tuna		Yellowfin tuna (<i>Thunnus albacares</i>)								Small pelagics split between coastal and offshore	Scombridae distributed equally to FG8-FG15 (excl. 8)	Final DC Unid. distributed proportionally over all fish groups
Source	Locality	Menard et al. 2000	Satoh et al. 2004	Dragovich 1970	Pimenta et al. 2001	Junior 2000	Potier et al. 2007	LAPE	Sample size weighted average			
		E. Tropical Atl	N & C Atl	E & W Atl	Brazil	Brazil	W Indian Ocean					
	Sample size	36	47	39	14	116	111	138				
1	Seabirds	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
2	Baleen whales	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
4	Killer whales	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
6	Swordfish	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
7	Other billfishes	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
9	Skipjack tuna	37	0	0	22.18	0	0	11.55	6.46	6.46	7.33	9.29
10	Albacore	0	0	0	0	0	0	0	0.00	0.00	0.87	1.11
11	Bigeye tuna	0	0	0	0	0	0	0	0.00	0.00	0.87	1.11
12	Blackfin tuna	0	0	0	0	0	0	0	0.00	0.00	0.87	1.11
13	Other offshore predators	38	0	0.7	55.64	0	3.18	26.67	12.39	12.39	13.26	16.81
14	Mackerels	0	0	0	0	0	0	0	0.00	0.00	0.87	1.11
15	Wahoo	0	0	0	0	0	0	0	0.00	0.00	0.87	1.11
16	Dolphinfish	0	0	0.7	0	0.59	1.47	0	0.52	0.52	0.52	0.65
17	Pelagic sharks	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
18	Flyingfish	0	2.3	0	0	2.69	1.14	0.15	1.13	1.13	1.13	1.44
19	Coastal predators	0	48.7	4.3	22.18	2.58	0.9	1.62	6.77	6.77	6.77	8.57
20	*Small offshore pelagics									3.72	3.72	4.71
21	Small coastal pelagics	9	0	4.4	0	4.61	7.44	0.5	3.84	0.12	0.12	0.16
22	Small mesopelagics	0	0.2	0	0	0.34	4.48	0	1.09	1.09	1.09	1.38
23	Large mesopelagics	0	2.6	0.9	0	28.16	7.43	7.32	10.50	10.50	10.50	13.30
24	Leatherback turtle	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
25	Other turtles	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
26	Small squids	0	0	4.5	0	14.92	25.96	26.21	16.78	16.78	16.78	16.78
27	Large squids	0	0	0	0	0.37	0.87	0	0.28	0.28	0.28	0.28
28	Small zooplankton	0	0	0	0	0	0	0.75	0.21	0.21	0.21	0.21
29	Large zooplankton	0	0	1.1	0	1.36	28.8	0.002	6.78	6.78	6.78	6.78
30	Phytoplankton	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
31	Detritus	0	0	0	0	0	0	0	0.00	0.00	0.00	0.00
	Imports	0	0.6	60.7	0	10.58	6.11	9.26	11.14	11.14	11.14	14.11
	Unidentified	16	29.3	20.3	0	23.3	3.37	15.97	16.02			
	Scombridae	0	16.3	2.4	0	10.5	8.85	0	6.11			

* All small pelagics in diet data are initially included as small coastal pelagics

Table 7. Diet studies for skipjack tuna and derived diet composition

Skipjack tuna		Skipjack tuna (<i>Katsuwonus pelamis</i>)					Sample size weighted average	Small pelagics split between coastal and offshore	Scombridae distributed equally to FG8-FG15 (excl. 9)	Final DC Unid. distributed proportionally over all fish groups
Source	Locality	Sierra et al. 1994	Menard et al. 2000 E. Tropical Atl	Dragovich 1970 WC Atl	Batts 1972 N Carolina	LAPE				
		Cuba	Atl	WC Atl	N Carolina					
	Sample size	126	115	347	193	97				
1	Seabirds	0	0	0	0	0	0.00	0.00	0.00	0.00
2	Baleen whales	0	0	0	0	0	0.00	0.00	0.00	0.00
3	Deep-diving whales	0	0	0	0	0	0.00	0.00	0.00	0.00
4	Killer whales	0	0	0	0	0	0.00	0.00	0.00	0.00
5	Small cetaceans	0	0	0	0	0	0.00	0.00	0.00	0.00
6	Swordfish	0	0	0	0	0	0.00	0.00	0.00	0.00
7	Other billfishes	0	0	0	0.54	0	0.12	0.12	0.12	0.17
8	Yellowfin tuna	0	0	0	0	0	0.00	0.00	0.55	0.80
9	Skipjack tuna	0	0	1.6	0	0	0.63	0.63	0.63	0.92
10	Albacore	0	0	0	0	0	0.00	0.00	0.55	0.80
11	Bigeye tuna	0	0	0.2	0	0	0.08	0.08	0.63	0.91
12	Blackfin tuna	0	0	0	0	0	0.00	0.00	0.55	0.80
13	Other offshore predators	0	0	13.9	4.00	0	6.37	6.37	6.92	10.07
14	Mackerels	0	0	0	0	0	0.00	0.00	0.55	0.80
15	Wahoo	0	0	0	0	0	0.00	0.00	0.55	0.80
16	Dolphinfish	0	0	0	0.25	0	0.05	0.05	0.05	0.08
17	Pelagic sharks	0	0	0	0	0	0.00	0.00	0.00	0.00
18	Flyingfish	0	0	2.1	5	0	1.93	1.93	1.93	2.81
19	Coastal predators	0	0	7.6	0.89	0	3.20	3.20	3.20	4.65
20	*Small offshore pelagics							13.19	13.19	19.18
20	Small coastal pelagics	0	0	4.2	51.1	6.6	13.62	0.44	0.44	0.63
21	Small mesopelagics	0	47.00	0	0	0	6.16	6.16	6.16	8.96
23	Large mesopelagics	0	0	3.5	3.66	86.1	11.70	11.70	11.70	17.02
24	Leatherback turtle	0	0	0	0	0	0.00	0.00	0.00	0.00
25	Other turtles	0	0	0	0	0	0.00	0.00	0.00	0.00
26	Small squids	0	0	18.5	7.00	1.8	9.05	9.05	9.05	9.05
27	Large squids	0	0	0	0	0	0.00	0.00	0.00	0.00
28	Small zooplankton	0	0	0	0	0.7	0.08	0.08	0.08	0.08
29	Large zooplankton	0	10.00	0.2	2.66	0	1.97	1.97	1.97	1.97
30	Phytoplankton	0	0	0	0	0	0.00	0.00	0.00	0.00
31	Detritus	0	0	0	0	0	0.00	0.00	0.00	0.00
	Imports	16.4	0	26.5	0.17	4.8	13.39	13.39	13.39	19.49
	Unidentified	83.6	29.00	16.60	24.73	0	27.79			
	Scombridae	0	14.00	5.1	0	0	3.85			

* All small pelagics in diet data are initially included as small coastal pelagics

Table 8. Diet studies for albacore tuna and derived diet composition

Albacore tuna		Albacore (<i>Thunnus alalunga</i>)			Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all fish groups
Source	Locality	Satoh et al. 2004 N & C Atl	Junior et al. 2004 Brazil	Sample size weighted average		
Sample size		19	26			
1	Seabirds	0	0	0.00	0.00	0.00
2	Baleen whales	0	0	0.00	0.00	0.00
3	Deep-diving whales	0	0	0.00	0.00	0.00
4	Killer whales	0	0	0.00	0.00	0.00
5	Small cetaceans	0	0	0.00	0.00	0.00
6	Swordfish	0	0	0.00	0.00	0.00
7	Other billfishes	0	0	0.00	0.00	0.00
8	Yellowfin tuna	0	0	0.00	0.00	0.00
9	Skipjack tuna	0	0	0.00	0.00	0.00
10	Albacore	0	0	0.00	0.00	0.00
11	Bigeye tuna	0	0	0.00	0.00	0.00
12	Blackfin tuna	0	0	0.00	0.00	0.00
13	Other offshore predators	0	0	0.00	0.00	0.00
14	Mackerels	0	0	0.00	0.00	0.00
15	Wahoo	0	0	0.00	0.00	0.00
16	Dolphinfish	0	0	0.00	0.00	0.00
17	Pelagic sharks	0	0	0.00	0.00	0.00
18	Flyingfish	0	0	0.00	0.00	0.00
19	Coastal predators	0	0.11	0.06	0.06	0.12
20	*Small offshore pelagics				0.41	0.75
21	Small coastal pelagics	1	0	0.42	0.01	0.02
22	Small mesopelagics	0.9	7.64	4.79	4.79	8.80
23	Large mesopelagics	55.9	4.31	26.09	26.09	47.88
24	Leatherback turtle	0	0	0.00	0.00	0.00
25	Other turtles	0	0	0.00	0.00	0.00
26	Small squids	0	15.59	9.01	9.01	9.01
27	Large squids	0	1.78	1.03	1.03	1.03
28	Small zooplankton	0	0	0.00	0.00	0.00
29	Large zooplankton	0	5.29	3.06	3.06	3.06
30	Phytoplankton	0	0	0.00	0.00	0.00
31	Detritus	0	0	0.00	0.00	0.00
	Imports	12.3	18.68	15.99	15.99	29.34
	Unidentified	29.9	46.6	39.55		

* All small pelagics in diet data are initially included as small coastal pelagics

Table 9. Diet studies for bigeye tuna and derived diet composition

Bigeye tuna		Bigeye tuna (<i>Thunnus obesus</i>)				Sample size weighted average	Small pelagics split between coastal and offshore	Meso-pelagics split : small (25%) and large (75%)	Scombridae distributed equally to FG8-FG15 (excl. 11)	Final DC Unid. distributed proportionally over all identified groups
Source	Locality	Satoh et al. 2004	Menard et al. 2000	Junior 2000	Sabatie et al. 2003					
		N & C Atl	Atl	Brazil	EC Atl					
	Sample size	77	32	29	13					
1	Seabirds	0	0	0	0	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0	0	0	0	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0	0	0	0	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0	0	0	0	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0	0	0	0	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0	0	0	0	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0	0	0	0	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0	0	0	0	0.00	0.00	0.00	0.75	1.20
9	Skipjack tuna	0	0	0	0	0.00	0.00	0.00	0.75	1.20
10	Albacore	0	0	0	0	0.00	0.00	0.00	0.75	1.20
11	Bigeye tuna	0	0	0	0	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0	0	0	0	0.00	0.00	0.00	0.75	1.20
13	Other offshore predators	0	0	0	0	0.00	0.00	0.00	0.75	1.20
14	Mackerels	0	0	0	0	0.00	0.00	0.00	0.75	1.20
15	Wahoo	0	0	0	0	0.00	0.00	0.00	0.75	1.20
16	Dolphinfish	3.3	0	0	0	1.68	1.68	1.68	1.68	2.69
17	Pelagic sharks	0	0	0	0	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.5	0	80.15	0	15.65	15.65	15.65	15.65	25.00
19	Coastal predators	0.3	0	0.11	0	0.17	0.17	0.17	0.17	0.28
20	*Small offshore pelagics						1.55	1.55	1.55	2.48
21	Small coastal pelagics	3.1	0	0.11	0	1.60	0.05	0.05	0.05	0.08
22	Small mesopelagics	6.2	0	0	0	3.16	3.16	6.76	6.76	10.81
23	Large mesopelagics	26.9	0	0.9	0	13.89	13.89	24.70	24.70	39.46
24	Leatherback turtle	0	0	0	0	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0	0	0	0	0.00	0.00	0.00	0.00	0.00
26	Small squids	0	0	1.89	12.2	1.41	1.41	1.41	1.41	2.26
27	Large squids	0	0	0	0	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	0	0	0	0	0.00	0.00	0.00	0.00	0.00
29	Large zooplankton	0	10	0.15	1.1	2.24	2.24	2.24	2.24	3.58
30	Phytoplankton	0	0	0	0	0.00	0.00	0.00	0.00	0.00
31	Detritus	0	0	0	0	0.00	0.00	0.00	0.00	0.00
	Imports	3.9	0	5.89	0	3.12	3.12	3.12	3.12	4.98
	Unidentified	53	4	10.8	86.7	37.41				
	Mesopelagics	0	68	0	0	14.41				
	Scombridae	2.8	18	0	0	5.24				

* All small pelagics in diet data are initially included as small coastal pelagics

Table 10. Diet studies for blackfin tuna and derived diet composition

Blackfin tuna		Blackfin tuna (<i>Thunnus atlanticus</i>)			Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all identified groups
Source	Locality	Sierra et al. 1994	LAPE	Sample size weighted average		
	Sample size	Cuba 154	302			
1	Seabirds	0	0	0.00	0.00	0.00
2	Baleen whales	0	0	0.00	0.00	0.00
3	Deep-diving whales	0	0	0.00	0.00	0.00
4	Killer whales	0	0	0.00	0.00	0.00
5	Small cetaceans	0	0	0.00	0.00	0.00
6	Swordfish	0	0	0.00	0.00	0.00
7	Other billfishes	0	0.37	0.25	0.25	0.39
8	Yellowfin tuna	0	0	0.00	0.00	0.00
9	Skipjack tuna	0	0	0.00	0.00	0.00
10	Albacore	0	0	0.00	0.00	0.00
11	Bigeye tuna	0	0	0.00	0.00	0.00
12	Blackfin tuna	0	0	0.00	0.00	0.00
13	Other offshore predators	0	0	0.00	0.00	0.00
14	Mackerels	0	0	0.00	0.00	0.00
15	Wahoo	0	0	0.00	0.00	0.00
16	Dolphinfish	0	0	0.00	0.00	0.00
17	Pelagic sharks	0	0	0.00	0.00	0.00
18	Flyingfish	0	3.95	2.62	2.62	4.15
19	Coastal predators	0	15.11	10.01	10.01	15.86
20	*Small offshore pelagics				31.36	49.71
21	Small coastal pelagics	0	48.92	32.40	1.04	1.64
22	Small mesopelagics	0	0	0.00	0.00	0.00
23	Large mesopelagics	0	2.12	1.40	1.40	2.23
24	Leatherback turtle	0	0	0.00	0.00	0.00
25	Other turtles	0	0	0.00	0.00	0.00
26	Small squids	0	6.5	4.30	4.30	6.82
27	Large squids	0	0	0.00	0.00	0.00
28	Small zooplankton	0	8.69	5.76	5.76	9.12
29	Large zooplankton	0	0	0.00	0.00	0.00
30	Phytoplankton	0	0	0.00	0.00	0.00
31	Detritus	0	0	0.00	0.00	0.00
	Imports	16.9	6.6	10.08	10.08	10.08
	Unidentified	83.1	7.74	33.19		

* All small pelagics in diet data are initially included as small coastal pelagics

Table 11. Diet studies for other offshore predators and derived diet composition

Other offshore predators		Bullet tuna <i>Auxis rochei</i>	Frigate tuna <i>Auxis thazard</i>				Ocean triggerfish <i>Canthidermis sufflamen</i>			Spotted ocean triggerfish <i>C. maculatus</i>	Little tunny <i>Euthynnus alletteratus</i>	Atlantic bonito <i>Sarda sarda</i>
Source		Kumaran 1964	Blaber et al. 1990	Bachok et al. 2004	LAPE	Sample size weighted average	Randall 1967	Sierra et al. 1994	Sample size weighted average	LAPE	Randall 1967	Bowman et al. 2000
Locality		Indian Ocean	Solomon Is	Malaysia			P. Rico & U ¹ Cuba				P. Rico & USVI	NW Atl
Sample size		31	2	47	2		5	5		31	15	3
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Coastal predators	0.00	2.20	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	15.00	2.20	40.80	36.40	39.11	0.00	0.00	0.00	0.00	0.00	0.00
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	90.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	25.40	21.50	59.20	0.00	55.40	0.00	0.00	0.00	1.80	36.60	19.30
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	23.50	9.40	0.00	12.70	0.87	42.70	0.00	21.35	98.20	0.00	0.00
29	Large zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	9.70	6.30	0.00	0.00	0.25	57.30	100.00	78.65	0.00	6.70	0.00
	Unidentified fish	26.40	58.40	0.00	50.90	4.29	0.00	0.00	0.00	0.00	56.70	80.70

* All small pelagics in diet data are initially included as small coastal pelagics

Table 11. Diet composition calculations for other offshore predators

								Small pelagics split between coastal and offshore	Final DC
Other offshore predators	Bullet tuna	Frigate tuna	Ocean triggerfish	Spotted ocean triggerfish	Little tunny	Atlantic bonito	consumption weighted average		Unid. distributed proportionally over all identified groups
	Species relative weight (from consumption)	0.0349	0.0349	0.0021	0.0310	0.3657	0.5313		
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Coastal predators	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.01
20	*Small offshore pelagics							1.83	5.18
21	Small coastal pelagics	15.00	39.11	0.00	0.00	0.00	1.89	0.06	0.17
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	25.40	55.40	0.00	1.80	36.60	19.30	26.52	75.09
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	23.50	0.87	21.35	98.20	0.00	0.00	3.94	11.16
29	Large zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	9.70	0.25	78.65	0.00	6.70	0.00	2.96	8.39
	Unidentified fish	26.40	4.29	0.00	0.00	56.70	80.70	64.69	

Table 12. Diet studies for mackerels and derived diet composition

Mackerels		King mackerel (<i>Scomberomorus cavalla</i>)										Carite (<i>S. brasiliensis</i>)
Source		Salomon & Naughton 1983									Sample size weighted average	LAPE
Locality		SE USA	N & S Carolina	Georgia	EC Florida	S Florida	NW Florida	Louisiana	Texas			
Sample size		178	468	243	210	518	2784	707	1052	66		63
1	Seabirds	0	0	0	0	0	0	0	0	0	0.00	0
2	Baleen whales	0	0	0	0	0	0	0	0	0	0.00	0
3	Deep-diving whales	0	0	0	0	0	0	0	0	0	0.00	0
4	Killer whales	0	0	0	0	0	0	0	0	0	0.00	0
5	Small cetaceans	0	0	0	0	0	0	0	0	0	0.00	0
6	Swordfish	0	0	0	0	0	0	0	0	0	0.00	0
7	Other billfishes	0	0	0	0	0	0	0	0	0	0.00	0
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0	0.00	0
9	Skipjack tuna	0	0	0	0	0	0	0	0	0	0.00	0
10	Albacore	0	0	0	0	0	0	0	0	0	0.00	0
11	Bigeye tuna	0	0	0	0	0	0	0	0	0	0.00	0
12	Blackfin tuna	0	0	0	0	0	0	0	0	0	0.00	0
13	Other offshore predators	0	0	0	0	3.3	0	0	0	0	0.27	0
14	Mackerels	0	0.5	0	0	0	0	2.3	1.8	0	0.60	0
15	Wahoo	0	0	0	0	0	0	0	0	0	0.00	0
16	Dolphinfish	0	0	0	0	0	0	0	0	0	0.00	0
17	Pelagic sharks	0	0	0	0	0	0	0	0	0	0.00	0
18	Flyingfish	0	2.3	4.4	6	34.6	0	0	0	12	3.55	0
19	Coastal predators	0	11.4	10.5	5	0	31.8	19.4	26.3	0	22.30	0
20	*Small offshore pelagics											
21	Small coastal pelagics	65.6	43.8	43.8	78.4	5.1	33.4	46.5	23.5	79.5	34.98	100
22	Small mesopelagics	0	0	0	0	0	0	0	0	0	0.00	0
23	Large mesopelagics	0	0	0	0	0	0	0	0	2	0.02	0
24	Leatherback turtle	0	0	0	0	0	0	0	0	0	0.00	0
25	Other turtles	0	0	0	0	0	0	0	0	0	0.00	0
26	Small squids	5.5	7.6	8.9	1.8	0.2	17.3	0.0	2.9	0	9.38	0
27	Large squids	0	0	0	0	0	0	0	0	0	0.00	0
28	Small zooplankton	0	6.4	9.1	2.2	20.6	15.6	0	3.1	0	10.12	0
29	Large zooplankton	0	0.7	0.9	0.3	19.3	1	0.5	0	0.4	2.21	0
30	Phytoplankton	0	0	0	0	0	0	0	0	0	0.00	0
31	Detritus	0	0	0	0	0	0	0	0	0	0.00	0
	Imports	0	14.3	19.9	6.3	13.2	0	28.2	4.7	0	7.16	0
	Unidentified	28.9	7	0	0	0	0	0	34.2	6.1	7.20	0
	Scombridae	0	6.2	2.5		3.7	0.9	3.1	0	0	1.63	0

* All small pelagics in diet data are initially included as small coastal pelagics

Table 12. Diet studies for mackerels (continued)

Mackerels		Spanish mackerel (<i>Scomberomorus maculatus</i>)								Cero mackerel (<i>S. regalis</i>)		
Source	Locality	Bowman et al. 2000	N & S	E. C.	Salomon & Naughton 1983		Finucane et al. 1990		Sample size weighted average	Randall 1967	LAPE	Sample size weighted average
		NW Atl	Carolina	Florida	Florida	Louisiana	Texas	SE USA		P. Rico & USVI		
	Sample size	12	757	312	850	421	177	155		85	2	
1	Seabirds	0	0	0	0	0	0	0	0.00	0	0	0.00
2	Baleen whales	0	0	0	0	0	0	0	0.00	0	0	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0.00	0	0	0.00
4	Killer whales	0	0	0	0	0	0	0	0.00	0	0	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0.00	0	0	0.00
6	Swordfish	0	0	0	0	0	0	0	0.00	0	0	0.00
7	Other billfishes	0	0	0	0	0	0	0	0.00	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0.00	0	0	0.00
9	Skipjack tuna	0	0	0	0	0	0	0	0.00	0	0	0.00
10	Albacore	0	0	0	0	0	0	0	0.00	0	0	0.00
11	Bigeye tuna	0	0	0	0	0	0	0	0.00	0	0	0.00
12	Blackfin tuna	0	0	0	0	0	0	0	0.00	0	0	0.00
13	Other offshore predators	0	0	0	0	0	0	0	0.00	0	0	0.00
14	Mackerels	0	0.5	0.3	0	0	0	0	0.18	0	0	0.00
15	Wahoo	0	0	0	0	0	0	0	0.00	0	0	0.00
16	Dolphinfish	0	0	0	0	0	0	0	0.00	0	0	0.00
17	Pelagic sharks	0	0	0	0	0	0	0	0.00	0	0	0.00
18	Flyingfish	0	0	0	0	0	0	0	0.00	0	0	0.00
19	Coastal predators	0	0	0.5	1.4	0.2	9	2.8	1.29	0	0	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	66.6	19.7	59.8	26.2	33.5	45.3	85.4	34.28	96.1	0	93.89
22	Small mesopelagics	0	0	0	0	0	0	0	0.00	0	0	0.00
23	Large mesopelagics	0	0	0	0	0	0	0	0.00	0	0	0.00
24	Leatherback turtle	0	0	0	0	0	0	0	0.00	0	0	0.00
25	Other turtles	0	0	0	0	0	0	0	0.00	0	0	0.00
26	Small squids	16.5	1.6	0.6	2.4	0.4	2.4	0.6	1.61	2.3	0	2.25
27	Large squids	0	0	0	0	0	0	0	0.00	0	0	0.00
28	Small zooplankton	0	2.1	0	0	0	0	0	0.59	0	0	0.00
29	Large zooplankton	0.4	0.6	0.1	0.2	2.1	2.0	0	0.71	0	0	0.00
30	Phytoplankton	0	0	0	0	0	0	0	0.00	0	0	0.00
31	Detritus	0	0	0	0	0	0	0	0.00	0	0	0.00
	Imports	0.8	0	0.1	5.8	7.8	7.5	1.6	3.66	1.6	27.59	2.20
	Unidentified	15.7	75.5	38.6	64	56	33.8	9.6	57.69		72.41	1.66
	Scombridae		0						0.00			0.00

* All small pelagics in diet data are initially included as small coastal pelagics

Table 12. Diet composition calculations for mackerels

Mackerels		S. cavalla	S. brasiliensis	S. maculatus	S. regalis	Weighted average	Scombridae distributed equally to FG12-FG15	Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all fish groups
Species relative weight (from consumption)		0.1301	0.6777	0.1921	0.0002				
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.06
13	Other offshore predators	0.27	0.00	0.00	0.00	0.04	0.09	0.09	0.10
14	Mackerels	0.60	0.00	0.18	0.00	0.11	0.17	0.17	0.19
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.06
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	3.55	0.00	0.00	0.00	0.46	0.46	0.46	0.53
19	Coastal predators	22.30	0.00	1.29	0.00	3.15	3.15	3.15	3.60
20	*Small offshore pelagics							76.40	87.26
21	Small coastal pelagics	34.98	100.00	34.28	93.89	78.92	78.92	2.52	2.88
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	9.38	0.00	1.61	2.25	1.53	1.53	1.53	1.53
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	10.12	0.00	0.59	0.00	1.43	1.43	1.43	1.43
29	Large zooplankton	2.21	0.00	0.71	0.00	0.42	0.42	0.42	0.42
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	7.16	0.00	3.66	2.20	1.64	1.64	1.64	1.87
	Unidentified	7.20	0.00	57.69	1.66	12.02			
	Scombridae	1.63	0.00	0.00	0.00	0.21			

Table 13. Diet studies for wahoo and derived diet composition

Wahoo		Wahoo (<i>Acanthocybium solandri</i>)				Small pelagics split between coastal and offshore	Scombridae distributed equally to FG13- FG15	Final DC Unid. distributed proportionally over all fish groups
Source	Locality	Sato et al. 2004	Junior 2000	LAPE	Sample size weighted average			
		N & C Atl	Brazil					
	Sample size	21	63	179				
1	Seabirds	0	0	0	0.00	0.00	0.00	0.00
2	Baleen whales	0	0	0	0.00	0.00	0.00	0.00
3	Deep-diving whales	0	0	0	0.00	0.00	0.00	0.00
4	Killer whales	0	0	0	0.00	0.00	0.00	0.00
5	Small cetaceans	0	0	0	0.00	0.00	0.00	0.00
6	Swordfish	0	0	0	0.00	0.00	0.00	0.00
7	Other billfishes	0	0	0	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0	0	0	0.00	0.00	0.00	0.00
9	Skipjack tuna	0	0	0	0.00	0.00	0.00	0.00
10	Albacore	0	0	0	0.00	0.00	0.00	0.00
11	Bigeye tuna	0	0	0	0.00	0.00	0.00	0.00
12	Blackfin tuna	0	0	0	0.00	0.00	0.00	0.00
13	Other offshore predators	0	0	32.1	21.85	21.85	21.88	26.98
14	Mackerels	0	0	0	0.00	0.00	0.03	0.04
15	Wahoo	0	0	0	0.00	0.00	0.03	0.04
16	Dolphinfish	0	0	0	0.00	0.00	0.00	0.00
17	Pelagic sharks	0	0	0	0.00	0.00	0.00	0.00
18	Flyingfish	0	4.53	2.1	2.51	2.51	2.51	3.10
19	Coastal predators	0	6.19	0	1.48	1.48	1.48	1.83
20	*Small offshore pelagics					11.73	11.73	14.47
21	Small coastal pelagics	0	0	17.8	12.11	0.39	0.39	0.48
22	Small mesopelagics	0	0.1	0.1	0.09	0.09	0.09	0.11
23	Large mesopelagics	45.6	20.27	6.9	13.19	13.19	13.19	16.27
24	Leatherback turtle	0	0	0	0.00	0.00	0.00	0.00
25	Other turtles	0	0	0	0.00	0.00	0.00	0.00
26	Small squids	0	0.65	21.2	14.58	14.58	14.58	14.58
27	Large squids	0	1.16	0	0.28	0.28	0.28	0.28
28	Small zooplankton	0	0	0.4	0.27	0.27	0.27	0.27
29	Large zooplankton	0	0	0	0.00	0.00	0.00	0.00
30	Phytoplankton	0	0	0	0.00	0.00	0.00	0.00
31	Detritus	0	0	0	0.00	0.00	0.00	0.00
	Imports	29.2	9.5	18.9	17.47	17.47	17.47	21.55
	Unidentified	24.1	57.6	0.5	16.06			
	Scombridae	1.1	0	0	0.09			

* All small pelagics in diet data are initially included as small coastal pelagics

Table 14. Diet studies for dolphinfish and derived diet composition

Dolphinfish		Pompano dolphinfish (<i>Coryphaena equiselis</i>)	Common dolphinfish (<i>Coryphaena hippurus</i>)							Sample size weighted average
Source	Locality		Bachok et al. 2004	Oxenford & Hunte 1998 E	Manooch et al. 1983 S USA & GoM	Rose 1966 N. Carolina	Junior 2000 Brazil	Satoh et al. 2004 N & C Atl	Pimenta et al. 2001 Brazil	
	P. Rico & USVI		Malaysia	Caribbean						
	Sample size		171	352	2219	373	118	27	14	
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	9.70	0.00	0.00	0.00	0.00	0.00	1.04
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.50	0.06
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	1.85	0.11	0.00	0.00	0.00	0.00	0.00	0.11
14	Mackerels	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.01
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	20.39	20.40	5.00	15.70	45.60	0.00	17.53
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	40.91	13.50	24.00	24.30	22.80	15.50	17.41
19	Coastal predators	0.00	20.91	9.90	21.50	22.00	4.95	3.70	53.10	19.67
20	*Small offshore pelagics									0.00
21	Small coastal pelagics	0.00	69.96	0.95	3.60	0.00	0.73	2.90	8.60	6.28
22	Small mesopelagics	0.00	0.00	1.12	0.00	0.00	0.04	0.00	0.00	0.12
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	5.76	4.60	0.00	0.25
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	50.00	0.03	0.00	4.30	0.00	3.58	0.00	0.00	3.04
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	25.00	0.00	0.64	0.50	0.00	1.42	0.00	0.00	0.46
29	Large zooplankton	0.00	0.00	0.00	2.70	12.00	0.00	0.00	0.00	3.20
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	0.00	1.32	12.93	8.10	0.00	32.10	0.50	9.30	8.15
	Unidentified	25.00	0.00	3.77	22.50	15.00	10.60	20.10	0.00	17.91
	Scombridae	0.00	5.90	0.00	2.40	22.00	0.53	0.00	0.00	4.46

* All small pelagics in diet data are initially included as small coastal pelagics

Table 14. Diet composition calculations for dolphinfish

Dolphinfish		C. equiselis	C. hippurus	Weighted average	Scombridae distributed equally to FG12-FG16	Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all fish groups
Species relative weight (assumed proportion)		0.1000	0.9000				
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	1.04	0.94	0.94	0.94	1.20
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.06	0.05	0.05	0.05	0.07
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.80	0.80	1.02
13	Other offshore predators	0.00	0.11	0.10	0.90	0.90	1.15
14	Mackerels	0.00	0.01	0.01	0.81	0.81	1.03
15	Wahoo	0.00	0.00	0.00	0.80	0.80	1.02
16	Dolphinfish	0.00	17.53	15.78	16.58	16.58	21.15
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	17.41	15.67	15.67	15.67	19.99
19	Coastal predators	0.00	19.67	17.70	17.70	17.70	22.58
20	*Small offshore pelagics					5.47	6.98
21	Small coastal pelagics	0.00	6.28	5.66	5.66	0.18	0.23
22	Small mesopelagics	0.00	0.12	0.11	0.11	0.11	0.14
23	Large mesopelagics	0.00	0.25	0.22	0.22	0.22	0.28
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0	0.00	0.00	0.00	0.00	0.00
26	Small squids	50.00	3.04	7.74	7.74	7.74	7.74
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	25.00	0.46	2.91	2.91	2.91	2.91
29	Large zooplankton	0.00	3.20	2.88	2.88	2.88	2.88
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	0.00	8.15	7.33	7.33	7.33	9.36
	Unidentified	25.00	17.91	18.62			
	Scombridae	0.00	4.46	4.01			

Table 15. Diet studies for pelagic sharks and derived diet composition

Pelagic sharks	Tiger shark (<i>Galeocerdo cuvier</i>)	Blacktip shark (<i>Carcharhinus limbatus</i>)				Blue shark (<i>Prionace glauca</i>)				Porbeagle (<i>Lamna nasus</i>)			Longfin mako (<i>Isurus paucus</i>)
Source	Bowman et al. 2000	Cortes 1999	Dudley and Cliff 1993	LAPE	Sample size weighted average	Clarke and Stevens 1974	Junior 2000	Bowman et al. 2000	Sample size weighted average	Bowman et al. 2000	Joyce et al. 2000	Sample size weighted average	Bowman et al. 2000
Locality	NW Atl		South Africa			Bay Biscay	Brazil	NW Atl		NW Atl	NW Atl		NW Atl
Sample size	52	1180	1290	3		151	84	1199		6	1022		10
1 Seabirds	0.20	0	0	0	0.00	0	10.10	0.40	0.93	0	0	0.00	0
2 Baleen whales	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
3 Deep-diving whales	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
4 Killer whales	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
5 Small cetaceans	30.10	0	1.70	0	0.89	0	2.97	0.80	0.84	0	0	0.00	0
6 Swordfish	0	0	0	0	0.00	0	0.64	0	0.04	0	0	0.00	0.40
7 Other billfishes	0	0	0	0	0.00	0	31.80	0	1.86	0	0	0.00	0
8 Yellowfin tuna	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
9 Skipjack tuna	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
10 Albacore	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
11 Bigeye tuna	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
12 Blackfin tuna	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
13 Other offshore predators	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
14 Mackerels	0.30	0	0	0	0.00	0	0	2.50	2.09	0	3.11	3.09	0
15 Wahoo	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
16 Dolphinfin	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
17 Pelagic sharks	17.70	4.50	13.74	0	9.31	0	0	0.50	0.42	0	0	0.00	12.10
18 Flyingfish	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
19 Coastal predators	6.70	0	14.91	97.50	7.90	0	0.69	19.00	15.93	0	4.78	4.75	6.20
20 *Small offshore pelagics													
21 Small coastal pelagics	0	0	7.75	0	4.04	0	0	3.70	3.09	0	6.20	6.16	0.00
22 Small mesopelagics	0	0	2.58	0	1.35	0	0.02	0	0.00	0	0	0.00	0
23 Large mesopelagics	0	0	0	2.30	0.00	0	12.09	8.90	8.15	0	16.47	16.37	0
24 Leatherback turtle	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
25 Other turtles	7.60	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
26 Small squids	0.30	4.10	2.70	0	3.36	100.00	30.65	12.40	22.69	99.30	5.41	5.96	4.90
27 Large squids	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
28 Small zooplankton	0	0	0	0.10	0.00	0	0	0	0.00	0	0	0.00	0
29 Large zooplankton	0	0	0	0	0.00	0	0	0	0.00	0	0.32	0.32	0
30 Phytoplankton	0	0	0	0	0.00	0	0	0	0.00	0	0	0.00	0
31 Detritus	4.20	0	0	0	0.00	0	0	0.00	0.00	0	0	0.00	0.00
Imports	31.80	2.50	54.04	0	29.38	0	0.73	39.90	33.40	0	42.44	42.19	0
Unidentified	1.10	88.90	0.00	0.00	42.42	0.00	10.20	11.70	10.38	0.70	21.00	20.88	3.20
Scombridae	0.00	0	0	0	0.00	0	0	0	0.00	0	0	0.00	73.2

* All small pelagics in diet data are initially included as small coastal pelagics

Table 15. Diet studies for pelagic sharks (continued)

Pelagic sharks		Shortfin mako (<i>Isurus oxyrinchus</i>)						Bigeye thresher (<i>Alopias superciliosus</i>)	Thintail thresher (<i>Alopias vulpinus</i>)	Sandbar shark (<i>Carcharhinus plumbeus</i>)	Oceanic whitetip (<i>Carcharhinus longimanus</i>)	
Source	Locality	Cortes 1999	Maia et al. 2006	Bowman et al. 2000	Stillwell & Kohler 1982 NW Atl	Wood et al. 2004 (current) NE USA	Wood et al. 2004 (historical) NE USA	Sample size weighted average	Bowman et al. 2000 NW Atl	Bowman et al. 2000 NW Atl	Stillwell & Kohler 1993 NW Atl	Junior 2000 Brazil
Sample size		453	112	399	399	120	120		24	19	321	65
1	Seabirds	0	0	0	0	0	0	0.00	0	0	0	0.71
2	Baleen whales	0	0	0	0	0	0	0.00	0	0	0	0
3	Deep-diving whales	0	0	0	0	0	0	0.00	0	0	0	0
4	Killer whales	0	0	0	0	0	0	0.00	0	0	0	0
5	Small cetaceans	0.40	0	0	0	0	0.14	0.12	0	0	0	0
6	Swordfish	0	38.20	12.40	12.40	0	2.58	9.04	0	0	0	2.30
7	Other billfishes	0	0	0	0	0	0	0.00	0	0	0	0
8	Yellowfin tuna	0	0	0	0	2.51	0.63	0.24	0	0	0	17.70
9	Skipjack tuna	0	0	0	0	0	0	0.00	0	0	0	1.70
10	Albacore	0	0	0	0	0	0	0.00	0	0	0	0
11	Bigeye tuna	0	0	0	0	0	0	0.00	0	0	0	0
12	Blackfin tuna	0	0	0	0	0	0	0.00	0	0	0	0
13	Other offshore predators	0	0	0.90	0.40	0.81	0.51	0.42	0	0	0	22.90
14	Mackerels	0	0	0.60	0.60	0.93	0.68	0.42	1.50	0	3.08	0
15	Wahoo	0	0	0	0	0	0	0.00	0	0	0	0
16	Dolphinfish	0	0	0	0	0	0	0.00	0	0	0	0
17	Pelagic sharks	13.60	7.00	0.20	0.20	0	0.19	4.45	0	0	5.17	0
18	Flyingfish	0	0	0	0	0	0	0.00	0	1.8	0	1.53
19	Coastal predators	0	22.60	78.10	80.20	93.17	87.03	54.47	0	25.60	35.32	10.00
20	*Small offshore pelagics											
21	Small coastal pelagics	0	9.40	0.50	0.10	1.03	0.11	0.89	1.70	0.00	0.17	0.00
22	Small mesopelagics	0	0	0	0	0	0	0.00	0	0	0	0
23	Large mesopelagics	0	7.70	0	0.30	0	0	0.61	0	0	0	0
24	Leatherback turtle	0.20	0	0	0	0	0	0.06	0	0	0	0
25	Other turtles	0.20	0	0	0	0	0	0.06	0	0	0	0
26	Small squids	7.20	0.20	1.40	1.40	0.56	5.70	3.21	15.10	2.90	0.74	3.66
27	Large squids	0	0.30	0	0	0	0	0.02	0	0	0	0
28	Small zooplankton	0	0	0	0	0	0	0.00	0	0	0	0
29	Large zooplankton	0	0.40	0	0	0.03	0.15	0.04	0	0	0	0
30	Phytoplankton	0	0	0	0	0	0	0.00	0	0	0	0
31	Detritus	0	0	0	0	0	0	0.00	0	0	0	0
	Imports	1.50	11.50	1.30	1.00	0.08	0.46	1.84	57.10	66.30	46.31	0
	Unidentified	77.10	2.50	2.20	0.00	0.00	0.00	22.51	16.40	0.70	9.10	39.50
	Scombridae	0	0	2.4	3.4	0.88	0	1.51	6.8	2.7	0.11	

* All small pelagics in diet data are initially included as small coastal pelagics

Table 15. Diet studies for pelagic sharks (continued)

Pelagic sharks		Silky shark (<i>Carcharhinus falciformis</i>)		Scalloped hammerhead (<i>Sphyrna lewini</i>)				Great hammerhead (<i>Sphyrna mokarran</i>)	Smooth hammerhead (<i>Sphyrna zygaena</i>)		
Source		Bowman et al. 2000	Junior 2000	Sample size weighted average	Cortes 1999	Junior 2000	LAPE	Sample size weighted average	Cortes 1999	Bowman et al. 2000	Sample size weighted average
Locality		NW Atl	Brazil			Brazil				NW Atl	
Sample size		54	15		1253	50	7		458	243	15
1	Seabirds	0	0	0.00	0	0	0	0.00	0	0	0
2	Baleen whales	0	0	0.00	0	0	0	0.00	0	0	0
3	Deep-diving whales	0	0	0.00	0	0	0	0.00	0	0	0
4	Killer whales	0	0	0.00	0	0	0	0.00	0	0	0
5	Small cetaceans	0	0	0.00	0	0	0	0.00	0	0	0
6	Swordfish	0	43.10	9.37	0	0	0	0.00	0	0	0
7	Other billfishes	0	0	0.00	0	0	0	0.00	0	0	0
8	Yellowfin tuna	0	0	0.00	0	0	0	0.00	0	0	0
9	Skipjack tuna	0	0	0.00	0	0	0	0.00	0	0	0
10	Albacore	0	0	0.00	0	0	0	0.00	0	0	0
11	Bigeye tuna	0	0	0.00	0	11.40	0	0.44	0	0	0
12	Blackfin tuna	0	0	0.00	0	0	0	0.00	0	0	0
13	Other offshore predators	0	0	0.00	0	0	0	0.00	0	0	0
14	Mackerels	0	0	0.00	0	0	0	0.00	0	0	0
15	Wahoo	0	0	0.00	0	0	0	0.00	0	0	0
16	Dolphinfish	0	0	0.00	0	0	0	0.00	0	63.80	3.71
17	Pelagic sharks	0	0	0.00	0.50	0	0	0.48	41.70	0.90	0
18	Flyingfish	0	0	0.00	0	0	0	0.00	0	0	0
19	Coastal predators	0.20	3.75	0.97	0	9.74	2.80	0.39	0	0	0.10
20	*Small offshore pelagics										
21	Small coastal pelagics	17.70	0	13.85	0	0	8.10	0.04	0	0	23.60
22	Small mesopelagics	0	0.11	0.02	0	0	0	0.00	0	0	0
23	Large mesopelagics	0	0	0.00	0	14.20	0	0.54	0	0	0
24	Leatherback turtle	0	0	0.00	0	0	0	0.00	0	0	0
25	Other turtles	0	0	0.00	0	0	0	0.00	0	0	0
26	Small squids	32.30	0	25.28	15.50	5.67	0	15.04	3.30	68.90	0
27	Large squids	0	0	0.00	0	0.45	0	0.02	0	0	0
28	Small zooplankton	0	0	0.00	0	0	0	0.00	0	0	0
29	Large zooplankton	0	4.74	1.03	0	0.17	0	0.01	0	0	0
30	Phytoplankton	0	0	0.00	0	0	0	0.00	0	0	0
31	Detritus	10	0	7.83	0	0	0	0.00	0	0	0
	Imports	0.40	14.70	3.51	22.10	47.33	0	22.94	11.40	0.40	5.90
	Unidentified	39.40	33.60	38.14	61.90	6.90	89.10	59.95	43.60	29.80	6.60
	Scombridae	0	0	0.00	0	4.14	0	0.16			

* All small pelagics in diet data are initially included as small coastal pelagics

Table 15. Diet composition calculations for pelagic sharks

Pelagic sharks		Galeocerdo	Carcharhinus	Prionace	Lamna	Isurus	Isurus	Alopias	Alopias	Carcharhinus
Species relative weight (from consumption)		cuvier	limbatus	glauca	nasus	paucus	oxyrinchus	supercilios us	vulpinus	plumbeus
		0.0071	0.2432	0.5932	0.0005	0.0014	0.0789	0.0021	0.0021	0.0007
1	Seabirds	0.20	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	30.10	0.89	0.84	0.00	0.00	0.12	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.04	0.00	0.40	9.04	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	1.86	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00
14	Mackerels	0.30	0.00	2.09	3.09	0.00	0.42	1.50	0.00	3.08
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	17.70	9.31	0.42	0.00	12.10	4.45	0.00	0.00	5.17
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	0.00
19	Coastal predators	6.70	7.90	15.93	4.75	6.20	54.47	0.00	25.60	35.32
20	*Small offshore pelagics									
21	Small coastal pelagics	0.00	4.04	3.09	6.16	0.00	0.89	1.70	0.00	0.17
22	Small mesopelagics	0.00	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	8.15	16.37	0.00	0.61	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
25	Other turtles	7.60	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
26	Small squids	0.30	3.36	22.69	5.96	4.90	3.21	15.10	2.90	0.74
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
28	Small zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	Large zooplankton	0.00	0.00	0.00	0.32	0.00	0.04	0.00	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	4.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	31.80	29.38	33.40	42.19	0.00	1.84	57.10	66.30	46.31
	Unidentified	1.10	42.42	10.38	20.88	3.20	22.51	16.40	0.70	9.10
	Scombridae	0.00	0.00	0.00	0.00	73.20	1.51	6.80	2.70	0.11

Table 15. Diet composition calculations for pelagic sharks (continued)

Pelagic sharks								Scombridae distributed equally to FG8-FG15	Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all fish groups
Species relative weight (from consumption)		Carcharhinus longimanus	Carcharhinus falciformis	Sphyrna lewini	Sphyrna mokarran	Sphyrna zygaena	Weighted average			
1	Seabirds	0.71	0.00	0.00	0.00	0.00	0.55	0.55	0.55	0.55
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.94	0.94	0.94	0.94
6	Swordfish	2.30	9.37	0.00	0.00	0.00	1.23	1.23	1.23	1.66
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	1.10	1.10	1.10	1.49
8	Yellowfin tuna	17.70	0.00	0.00	0.00	0.00	0.03	0.06	0.06	0.08
9	Skipjack tuna	1.70	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04
11	Bigeye tuna	0.00	0.00	0.44	0.00	0.00	0.00	0.03	0.03	0.04
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04
13	Other offshore predators	22.90	0.00	0.00	0.00	0.00	0.05	0.08	0.08	0.11
14	Mackerels	0.00	0.00	0.00	0.00	0.00	1.28	1.31	1.31	1.77
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.04
16	Dolphinfish	0.00	0.00	0.00	0.00	3.71	0.02	0.02	0.02	0.03
17	Pelagic sharks	0.00	0.00	0.48	41.70	0.85	3.23	3.23	3.23	4.37
18	Flyingfish	1.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	Coastal predators	10.00	0.97	0.39	0.00	0.01	15.86	15.86	15.86	21.43
20	*Small offshore pelagics						0.00		3.52	4.75
21	Small coastal pelagics	0.00	13.85	0.04	0.00	1.37	3.63	3.63	0.12	0.16
22	Small mesopelagics	0.00	0.02	0.00	0.00	0.00	0.33	0.33	0.33	0.45
23	Large mesopelagics	0.00	0.00	0.54	0.00	0.00	4.89	4.89	4.89	6.61
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.06	0.06
26	Small squids	3.66	25.28	15.04	3.30	64.89	16.35	16.35	16.35	16.35
27	Large squids	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	Large zooplankton	0.00	1.03	0.01	0.00	0.00	0.06	0.06	0.06	0.06
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	7.83	0.00	0.00	0.00	0.44	0.44	0.44	0.44
	Imports	0.00	3.51	22.94	11.40	0.72	28.01	28.01	28.01	37.84
	Unidentified	39.50	38.14	59.95	43.60	28.45	21.04			
	Scombridae	0.00	0.00	0.16	0.00	0.00	0.24			

Table 16. Diet studies for coastal predators and derived diet composition

Coastal Predators		Keeltail needlefish <i>Platybelone argalus argalus</i>	Redfin needlefish <i>Strongylura notata notata</i>	Timucu <i>Strongylura timucu</i>	Hound needlefish <i>Ocyurus chrysurus</i>	Yellowtail snapper <i>Ocyurus chrysurus</i>	Yellow jack <i>Carangoides bartholomaei</i>	Blue runner <i>Caranx crysos</i>	Creville jack (<i>Caranx hippos</i>)			
Source	Locality	P. Rico & USVI	Cuba	P. Rico & USVI	Cuba	P. Rico & USVI	P. Rico & USVI	P. Rico & USVI	Sierra et al. 1994	LAPE	Salomon & Naughton 1984	Sample size weighted average
Sample size		100	100	100	11	42	7	44	100	9	100	
1	Seabirds	0	0	0	0	0	0	0	0	0	0	0.00
2	Baleen whales	0	0	0	0	0	0	0	0	0	0	0.00
3	Deep-diving whales	0	0	0	0	0	0	0	0	0	0	0.00
4	Killer whales	0	0	0	0	0	0	0	0	0	0	0.00
5	Small cetaceans	0	0	0	0	0	0	0	0	0	0	0.00
6	Swordfish	0	0	0	0	0	0	0	0	0	0	0.00
7	Other billfishes	0	0	0	0	0	0	0	0	0	0	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0	0	0.00
9	Skipjack tuna	0	0	0	0	0	0	0	0	0	0	0.00
10	Albacore	0	0	0	0	0	0	0	0	0	0	0.00
11	Bigeye tuna	0	0	0	0	0	0	0	0	0	0	0.00
12	Blackfin tuna	0	0	0	0	0	0	0	0	0	0	0.00
13	Other offshore predators	0	0	0	0	0	0	0	0	0	0.1	0.05
14	Mackerels	0	0	0	0	0	0	0	0	0	0.2	0.10
15	Wahoo	0	0	0	0	0	0	0	0	0	0	0.00
16	Dolphinfish	0	0	0	0	0	0	0	0	0	0	0.00
17	Pelagic sharks	0	0	0	0	0	0	0	0	0	0	0.00
18	Flyingfish	0	0	0	0	0	0	0	0	0	0	0.00
19	Coastal predators	0	0	0	0	0	0	0	0	0	28.7	13.73
20	*Small offshore pelagics											
21	Small coastal pelagics	0	0	0	0	0	0	0	0	20.1	60.3	29.72
22	Small mesopelagics	0	0	0	0	0	0	0	0	0	0.9	0.43
23	Large mesopelagics	0	0	0	0	0	0	0	0	0	0	0.00
24	Leatherback turtle	0	0	0	0	0	0	0	0	0	0	0.00
25	Other turtles	0	0	0	0	0	0	0	0	0	0	0.00
26	Small squids	0	0	0	0	0	0	0	0	0	0.1	0.05
27	Large squids	0	0	0	0	0	0	0	0	0	0	0.00
28	Small zooplankton	0	0	0	0	63.3	0	0.6	57.7	35.3	0	29.13
29	Large zooplankton	0	0	0	0	0	0	0	0	40.7	0	1.75
30	Phytoplankton	0	0	0	0	0	0	0	0	0	0	0.00
31	Detritus	0	0	0	0	2.5	0	1.1	0	0	0	0.00
	Imports	3.0	11.1	4	3.4	34.2	100	11.3	2.5	3.9	9.7	6.01
	Unidentified	97.0	88.9	96	96.6	0	0	87	39.8	0	0	19.04

* All small pelagics in diet data are initially included as small coastal pelagics

Table 16. Diet studies for coastal predators (continued)

Coastal Predators		Horse eye jack <i>Caranx latus</i>	Bar jack <i>Caranx ruber</i>	Greater amberjack <i>Seriola dumerili</i>	Great barracuda (<i>Sphyræna barracuda</i>)			Guaguanche <i>Sphyræna guachancho</i>	Southern sennet <i>Sphyræna picudilla</i>
Source					Randall 1967		Sample size weighted average	Sierra et al. 1994	Randall 1967
Locality		P. Rico & USVI	P. Rico & USVI	P. Rico & USVI	LAPE			Cuba	P. Rico & USVI
Sample size		22	96	8	58	11		25	7
1	Seabirds	0	0	0	0	0	0.00	0	0
2	Baleen whales	0	0	0	0	0	0.00	0	0
3	Deep-diving whales	0	0	0	0	0	0.00	0	0
4	Killer whales	0	0	0	0	0	0.00	0	0
5	Small cetaceans	0	0	0	0	0	0.00	0	0
6	Swordfish	0	0	0	0	0	0.00	0	0
7	Other billfishes	0	0	0	0	0	0.00	0	0
8	Yellowfin tuna	0	0	0	0	0	0.00	0	0
9	Skipjack tuna	0	0	0	0	0	0.00	0	0
10	Albacore	0	0	0	0	0	0.00	0	0
11	Bigeye tuna	0	0	0	0	0	0.00	0	0
12	Blackfin tuna	0	0	0	0	0	0.00	0	0
13	Other offshore predators	0	0	0	0	0	0.00	0	0
14	Mackerels	0	0	0	0	0	0.00	0	0
15	Wahoo	0	0	0	0	0	0.00	0	0
16	Dolphinfish	0	0	0	0	0	0.00	0	0
17	Pelagic sharks	0	0	0	0	0	0.00	0	0
18	Flyingfish	0	0	0	0	41.6	6.63	0	0
19	Coastal predators	0	16.6	45	0	0	0.00	0	0
20	*Small offshore pelagics								
21	Small coastal pelagics	0	41.5	9	0	5.2	0.83	0	0
22	Small mesopelagics	0	0	0	0	0	0.00	0	0
23	Large mesopelagics	0	0	0	0	0	0.00	0	0
24	Leatherback turtle	0	0	0	0	0	0.00	0	0
25	Other turtles	0	0	0	0	0	0.00	0	0
26	Small squids	0	1.4	10	0	0	0.00	0	17.9
27	Large squids	0	0	0	0	0	0.00	0	0
28	Small zooplankton	3.8	0	0	1.9	0	1.60	0	0
29	Large zooplankton	0	0	0	0	0	0.00	0	0
30	Phytoplankton	0	0	0	0	0	0.00	0	0
31	Detritus	0	0	0	0	0	0.00	0	0
	Imports	9.1	40.5	36	2.6	53.2	10.67	64.6	0
	Unidentified	87.1	0	0	95.5	0	80.28	35.4	82.1

* All small pelagics in diet data are initially included as small coastal pelagics

Table 16. Diet studies for coastal predators (continued)

Coastal Predators		Leatherjacket (<i>Oligoplites saurus</i>)				Common snook (<i>Centropomus undecimalis</i>)			Palometa <i>Trachinotus goodei</i>
Source	Locality	Randall 1967 P. Rico & USVI	Carr & Adams 1972 W. Florida	Duque- Nivia et al. 1996 Colombia C	Sample size weighted average	Sierra et al. 1994 Cuba	Austin & Austin 1971 P. Rico & US	Sample size weighted average	Randall 1967 P. Rico & USVI
Sample size		7	22	282		10	27		23
1	Seabirds	0	0	0	0.00	0	0	0.00	0
2	Baleen whales	0	0	0	0.00	0	0	0.00	0
3	Deep-diving whales	0	0	0	0.00	0	0	0.00	0
4	Killer whales	0	0	0	0.00	0	0	0.00	0
5	Small cetaceans	0	0	0	0.00	0	0	0.00	0
6	Swordfish	0	0	0	0.00	0	0	0.00	0
7	Other billfishes	0	0	0	0.00	0	0	0.00	0
8	Yellowfin tuna	0	0	0	0.00	0	0	0.00	0
9	Skipjack tuna	0	0	0	0.00	0	0	0.00	0
10	Albacore	0	0	0	0.00	0	0	0.00	0
11	Bigeye tuna	0	0	0	0.00	0	0	0.00	0
12	Blackfin tuna	0	0	0	0.00	0	0	0.00	0
13	Other offshore predators	0	0	0	0.00	0	0	0.00	0
14	Mackerels	0	0	0	0.00	0	0	0.00	0
15	Wahoo	0	0	0	0.00	0	0	0.00	0
16	Dolphinfish	0	0	0	0.00	0	0	0.00	0
17	Pelagic sharks	0	0	0	0.00	0	0	0.00	0
18	Flyingfish	0	0	0	0.00	0	0	0.00	0
19	Coastal predators	0	0	0	0.00	0	0	0.00	0
20	*Small offshore pelagics								
21	Small coastal pelagics	98.7	0	98.00	91.08	0	36.00	26.27	85.2
22	Small mesopelagics	0	0	0	0.00	0	0	0.00	0
23	Large mesopelagics	0	0	0	0.00	0	0	0.00	0
24	Leatherback turtle	0	0	0	0.00	0	0	0.00	0
25	Other turtles	0	0	0	0.00	0	0	0.00	0
26	Small squids	0	0	0	0.00	0	0	0.00	0
27	Large squids	0	0	0	0.00	0	0	0.00	0
28	Small zooplankton	1.3	55.6	0	3.96	0	0	0.00	0
29	Large zooplankton	0	0	0	0.00	0	0	0.00	0
30	Phytoplankton	0	0	0	0.00	0	0	0.00	0
31	Detritus	0	0	0	0.00	0	0	0.00	0
	Imports	0	0	2.00	1.81	9.7	64.00	49.32	14.8
	Unidentified	0	44.4	0	3.14	90.3	0	24.41	0

* All small pelagics in diet data are initially included as small coastal pelagics

Table 16. Diet composition calculations for coastal predators

Coastal Predators		Platybelone argalus argalus	Strongylura notata notata	Strongylura timucu	Tylosurus crocodilus crocodilus	Ocyurus chrysurus	Carangoides bartholomaei	Caranx crysos	Caranx hippos	Caranx latus	Caranx ruber
Species relative weight (from consumption)		0.0352	0.0352	0.0352	0.0352	0.0014	0.1138	0.1138	0.1138	0.1138	0.1138
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.048	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.096	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
19	Coastal predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.732	0.00	16.60
20	*Small offshore pelagics										
21	Small coastal pelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.717	0.00	41.50
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.431	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
26	Small squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.048	0.00	1.40
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
28	Small zooplankton	0.00	0.00	0.00	0.00	63.30	0.00	0.60	29.128	3.80	0.00
29	Large zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.753	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	2.50	0.00	1.10	0.000	0.00	0.00
	Imports	3.00	11.10	4.00	3.40	34.20	100.00	11.30	6.005	9.10	40.50
	Unidentified	97.00	88.90	96.00	96.60	0.00	0.00	87.00	19.043	87.10	0.00

Table 16. Diet composition calculations for coastal predators (continued)

Coastal Predators										Scombridae distributed equally to FG8-FG15	Small pelagics split between coastal and offshore	Final DC Unid. distributed proportionally over all fish groups
Species relative weight (from consumption)		Seriola dumerili	Sphyræna baracuda	Sphyræna guachancho	Sphyræna picudilla	Oligoplites saurus	Centropomus undecimalis	Trachinotus goodei				
		0.0010	0.0512	0.0512	0.0512	0.0801	0.0004	0.0533	Weighted average			
1	Seabirds	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
2	Baleen whales	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
4	Killer whales	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
5	Small cetaceans	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
6	Swordfish	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
7	Other billfishes	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
10	Albacore	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
13	Other offshore predators	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00545	0.01	0.01	0.01
14	Mackerels	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.01089	0.01	0.01	0.02
15	Wahoo	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
16	Dolphinfish	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
18	Flyingfish	0.00	6.6319	0.00	0.00	0.00	0.00	0.00	0.33950	0.34	0.34	0.66
19	Coastal predators	45.00	0.0000	0.00	0.00	0.00	0.00	0.00	3.49799	3.50	3.50	6.79
20	*Small offshore pelagics										19.37	37.61
21	Small coastal pelagics	9.00	0.8290	0.00	0.00	91.08	26.27	85.20	20.01090	20.01	0.64	1.24
22	Small mesopelagics	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.04902	0.05	0.05	0.10
23	Large mesopelagics	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
25	Other turtles	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
26	Small squids	10.00	0.0000	0.00	17.90	0.00	0.00	0.00	1.09117	1.09	1.09	1.09
27	Large squids	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
28	Small zooplankton	0.00	1.5971	0.00	0.00	3.96	0.00	0.00	4.30489	4.30	4.30	4.30
29	Large zooplankton	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.19951	0.20	0.20	0.20
30	Phytoplankton	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.00000	0.00	0.00	0.00
31	Detritus	0.00	0.0000	0.00	0.00	0.00	0.00	0.00	0.12873	0.13	0.13	0.13
	Imports	36.00	10.6667	64.60	0.00	1.81	49.32	14.80	24.64822	24.65	24.65	47.85
	Unidentified	0.00	80.2754	35.40	82.10	3.14	24.41	0.00	45.71373			

Table 17. Diet studies for small pelagics and derived diet composition

Small pelagics	Atlantic bumper	Mackerel scad	Round scad (<i>Decapterus punctatus</i>)			Bigeye scad (<i>Selar crumenophthalmus</i>)			False herring	Redear herring
	<i>Chloroscombrus chrysurus</i>	<i>Decapterus macarellus</i>							<i>Harengula clupeola</i>	<i>Harengula humeralis</i>
Source	Reintjes 1979	Randall 1967	Hales 1987	Randall 1967	Sample size	Sierra et al. 1996	Randall 1967	Sample size	Sierra et al. 1994	Sierra et al. 1994
Locality		P. Rico & USVI	Florida	P. Rico & USVI	weighted average	Cuba	P. Rico & USVI	weighted average	Cuba	Cuba
Sample size	100	2	82	10		47	26		202	100
1 Seabirds	0	0	0	0	0.00	0	0	0.00	0	0
2 Baleen whales	0	0	0	0	0.00	0	0	0.00	0	0
3 Deep-diving whales	0	0	0	0	0.00	0	0	0.00	0	0
4 Killer whales	0	0	0	0	0.00	0	0	0.00	0	0
5 Small cetaceans	0	0	0	0	0.00	0	0	0.00	0	0
6 Swordfish	0	0	0	0	0.00	0	0	0.00	0	0
7 Other billfishes	0	0	0	0	0.00	0	0	0.00	0	0
8 Yellowfin tuna	0	0	0	0	0.00	0	0	0.00	0	0
9 Skipjack tuna	0	0	0	0	0.00	0	0	0.00	0	0
10 Albacore	0	0	0	0	0.00	0	0	0.00	0	0
11 Bigeye tuna	0	0	0	0	0.00	0	0	0.00	0	0
12 Blackfin tuna	0	0	0	0	0.00	0	0	0.00	0	0
13 Other offshore predators	0	0	0	0	0.00	0	0	0.00	0	0
14 Mackerels	0	0	0	0	0.00	0	0	0.00	0	0
15 Wahoo	0	0	0	0	0.00	0	0	0.00	0	0
16 Dolphinfin	0	0	0	0	0.00	0	0	0.00	0	0
17 Pelagic sharks	0	0	0	0	0.00	0	0	0.00	0	0
18 Flyingfish	0	0	0	0	0.00	0	0	0.00	0	0
19 Coastal predators	0	0	0	0	0.00	0	0	0.00	0	0
20 *Small offshore pelagics										
21 Small coastal pelagics	0	0	0	0	0.00	0	0	0.00	0	0
22 Small mesopelagics	0	0	0	0	0.00	0	0	0.00	0	0
23 Large mesopelagics	0	0	0	0	0.00	0	0	0.00	0	0
24 Leatherback turtle	0	0	0	0	0.00	0	0	0.00	0	0
25 Other turtles	0	0	0	0	0.00	0	0	0.00	0	0
26 Small squids	0	0	0	0	0.00	0	0	0.00	0	0
27 Large squids	0	0	0	0	0.00	0	0	0.00	0	0
28 Small zooplankton	90	99.25	54.6	94	58.88	0	75.1	26.75	98.7	58.7
29 Large zooplankton	0	0.5	0	0	0.00	0	0	0.00	0	0
30 Phytoplankton	0	0	0	0	0.00	0	0	0.00	0	0
31 Detritus	0	0	0	6	0.65	0	0	0.00	0	0
Imports	10	0.25	45.4	0	22.70	98.1	18.8	69.86	1.3	36.9
Unidentified	0	0	0	0	0.00	1.9	0	1.22	0	4.4

* All small pelagics in diet data are initially included as small coastal pelagics

Table 17. Diet studies for small pelagics (continued)

Small pelagics		Scaled herring (<i>Harengula jaguana</i>)			Dwarf round herring <i>Jenkinsia lamprotaenia</i>	Atlantic thread herring (<i>Opisthenema oglinum</i>)			American coastal pellona <i>Pellona harroweri</i>	Round sardinella <i>Sardinella aurita</i>	<i>Etremeus teres</i>
Source	Locality	Motta et al. 1995	Vega-Cendejas et al. 1994	Sample size weighted average	Sierra et al. 1994	Randall 1967	Vega-Cendejas et al. 1994	Sample size weighted average	Val et al. 1995	Ricon et al. 1995	Bowman et al. 2000
		Florida	GoM		Cuba	P. Rico & USVI	GoM		GoM	Venezuela	NW Atlantic
	Sample size	100	100		100	23	100		100	100	98
1	Seabirds	0	0	0.00	0	0	0	0.00	0	0	0
2	Baleen whales	0	0	0.00	0	0	0	0.00	0	0	0
3	Deep-diving whales	0	0	0.00	0	0	0	0.00	0	0	0
4	Killer whales	0	0	0.00	0	0	0	0.00	0	0	0
5	Small cetaceans	0	0	0.00	0	0	0	0.00	0	0	0
6	Swordfish	0	0	0.00	0	0	0	0.00	0	0	0
7	Other billfishes	0	0	0.00	0	0	0	0.00	0	0	0
8	Yellowfin tuna	0	0	0.00	0	0	0	0.00	0	0	0
9	Skipjack tuna	0	0	0.00	0	0	0	0.00	0	0	0
10	Albacore	0	0	0.00	0	0	0	0.00	0	0	0
11	Bigeye tuna	0	0	0.00	0	0	0	0.00	0	0	0
12	Blackfin tuna	0	0	0.00	0	0	0	0.00	0	0	0
13	Other offshore predators	0	0	0.00	0	0	0	0.00	0	0	0
14	Mackerels	0	0	0.00	0	0	0	0.00	0	0	0
15	Wahoo	0	0	0.00	0	0	0	0.00	0	0	0
16	Dolphinfish	0	0	0.00	0	0	0	0.00	0	0	0
17	Pelagic sharks	0	0	0.00	0	0	0	0.00	0	0	0
18	Flyingfish	0	0	0.00	0	0	0	0.00	0	0	0
19	Coastal predators	0	0	0.00	0	0	0	0.00	0	0	0
20	*Small offshore pelagics										
21	Small coastal pelagics	0	0	0.00	0	0	0	0.00	0	0	0
22	Small mesopelagics	0	0	0.00	0	0	0	0.00	0	0	0
23	Large mesopelagics	0	0	0.00	0	0	0	0.00	0	0	0
24	Leatherback turtle	0	0	0.00	0	0	0	0.00	0	0	0
25	Other turtles	0	0	0.00	0	0	0	0.00	0	0	0
26	Small squids	0	0	0.00	0	0	0	0.00	0	0	0
27	Large squids	0	0	0.00	0	0	0	0.00	0	0	0
28	Small zooplankton	27.7	0	13.85	98.7	43.4	4.1	11.45	40	33.5	69.4
29	Large zooplankton	0	0	0.00	0	0	0	0.00	0	0	0
30	Phytoplankton	0	0.8	0.40	0	0	0	0.00	0	33.5	0
31	Detritus	0	1.3	0.65	0	0	10	8.13	0	0	0
	Imports	72.3	57.9	65.10	1.3	30.2	74.7	66.38	0	33	1.7
	Unidentified	0	40	20.00	0	26.4	11.2	14.04	60	0	29.2

* All small pelagics in diet data are initially included as small coastal pelagics

Table 17. Diet studies for small pelagics (continued)

Small pelagics		Broad-striped anchovy (<i>Anchoa hepsetus</i>)				<i>Anchoa mitchelli</i>	Common halfbeak <i>Hyporhamphus unifasciatus</i>	Balao halfbeak <i>Hemiramphus balao</i>	Ballyhoo <i>Hemiramphus brasiliensis</i>	<i>Peprilus paru</i>
Source	Locality	Motta et al. 1995	Bowman et al. 2000	Sierra et al. 1994	Sample size weighted average	Allen et al. 1995	Sierra et al. 1994	Randall 1967	Sierra et al. 1994	Cargo & Schultz 1966
		Florida	NW Atl	Cuba			Cuba	P. Rico & USVI	Cuba	Chesapeake Bay
	Sample size	3	15	15		100	100	16	15	10
1	Seabirds	0	0	0	0.00	0	0	0	0	0
2	Baleen whales	0	0	0	0.00	0	0	0	0	0
3	Deep-diving whales	0	0	0	0.00	0	0	0	0	0
4	Killer whales	0	0	0	0.00	0	0	0	0	0
5	Small cetaceans	0	0	0	0.00	0	0	0	0	0
6	Swordfish	0	0	0	0.00	0	0	0	0	0
7	Other billfishes	0	0	0	0.00	0	0	0	0	0
8	Yellowfin tuna	0	0	0	0.00	0	0	0	0	0
9	Skipjack tuna	0	0	0	0.00	0	0	0	0	0
10	Albacore	0	0	0	0.00	0	0	0	0	0
11	Bigeye tuna	0	0	0	0.00	0	0	0	0	0
12	Blackfin tuna	0	0	0	0.00	0	0	0	0	0
13	Other offshore predators	0	0	0	0.00	0	0	0	0	0
14	Mackerels	0	0	0	0.00	0	0	0	0	0
15	Wahoo	0	0	0	0.00	0	0	0	0	0
16	Dolphinfish	0	0	0	0.00	0	0	0	0	0
17	Pelagic sharks	0	0	0	0.00	0	0	0	0	0
18	Flyingfish	0	0	0	0.00	0	0	0	0	0
19	Coastal predators	0	0	0	0.00	0	0	0	0	0
20	*Small offshore pelagics									
21	Small coastal pelagics	0	0	0	0.00	0	0	0	0	0
22	Small mesopelagics	0	0	0	0.00	0	0	0	0	0
23	Large mesopelagics	0	0	0	0.00	0	0	0	0	0
24	Leatherback turtle	0	0	0	0.00	0	0	0	0	0
25	Other turtles	0	0	0	0.00	0	0	0	0	0
26	Small squids	0	0	0	0.00	0	0	0	0	0
27	Large squids	0	0	0	0.00	0	0	0	0	0
28	Small zooplankton	34.4	82.7	100	86.17	100	50	54.3	0	100
29	Large zooplankton	0	0	0	0.00	0	0	0	0	0
30	Phytoplankton	0	0	0	0.00	0	50	0	0	0
31	Detritus	0	11.1	0	5.05	0	0	0	0	0
	Imports	65.6	5.9	0	8.65	0	0	45.7	100	0
	Unidentified	0	0.3	0	0.14	0	0	0	0	0

* All small pelagics in diet data are initially included as small coastal pelagics

Table 17. Diet composition calculations for small pelagics

Small pelagics		Chloroscombrus chrysurus	Decapterus macarellus	Decapterus punctatus	Selar crumenophthalmus	Harengula clupeola	Harengula humeralis	Harengula jaguana	Jenkinsia lamprotaenia	Opisthenema oglinum	Pellona harroweri	Sardinella aurita
Species relative weight (from consumption)		0.0303	0.2037	0.2037	0.3595	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0016
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
19	Coastal predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
26	Small squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
28	Small zooplankton	90.00	99.25	58.88	26.75	98.70	58.70	13.85	98.700	11.45	40.00	33.50
29	Large zooplankton	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.000	0.00	0.00	33.50
31	Detritus	0.00	0.00	0.65	0.00	0.00	0.00	0.65	0.000	8.13	0.00	0.00
	Imports	10.00	0.25	22.70	69.86	1.30	36.90	65.10	1.300	66.38	0.00	33.00
	Unidentified	0.00	0.00	0.00	1.22	0.00	4.40	20.00	0.000	14.04	60.00	0.00

Table 17. Diet composition calculations for small pelagics

										Final DC
Small pelagics		Etremeus teres	Anchoa hepsetus	Anchoa mitchelli	Hyporhamphus unifasciatus	Hemiramphus balao	Hemiramphus brasiliensis	Peprilus paru		Unid. assigned to diet import group
Species relative weight (from consumption)		0.0007	0.0003	0.0003	0.0414	0.0414	0.0414	0.0036	Weighted average	
1	Seabirds	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
2	Baleen whales	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
3	Deep-diving whales	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
4	Killer whales	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
5	Small cetaceans	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
6	Swordfish	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
7	Other billfishes	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
8	Yellowfin tuna	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
9	Skipjack tuna	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
10	Albacore	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
11	Bigeye tuna	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
12	Blackfin tuna	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
13	Other offshore predators	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
14	Mackerels	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
15	Wahoo	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
16	Dolphinfish	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
17	Pelagic sharks	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
18	Flyingfish	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
19	Coastal predators	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
20	*Small offshore pelagics									0.00
21	Small coastal pelagics	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
22	Small mesopelagics	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
23	Large mesopelagics	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
24	Leatherback turtle	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
25	Other turtles	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
26	Small squids	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
27	Large squids	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
28	Small zooplankton	69.4000	86.17	100.00	50.00	54.30	0.00	100.00	49.58413	55.87
29	Large zooplankton	0.0000	0.00	0.00	0.00	0.00	0.00	0.00	0.10184	0.11
30	Phytoplankton	0.0000	0.00	0.00	50.00	0.00	0.00	0.00	2.12214	2.39
31	Detritus	0.0000	5.05	0.00	0.00	0.00	0.00	0.00	0.13997	0.16
	Imports	1.7000	8.65	0.00	0.00	45.70	100.00	0.00	36.28425	41.47
	Unidentified	29.2000	0.14	0.00	0.00	0.00	0.00	0.00	0.52335	

Table 18. Diet studies for small mesopelagics and derived diet composition

Small mesopelagics		<i>Ceratoscopelus warmingi</i>										<i>Sternoptyx pseudobscura</i>	<i>Valenciennellus tripunctulatus</i>
		<i>Argyropelecus aculeatus</i>	<i>Argyropelecus affinis</i>	<i>Argyropelecus hemigymnus</i>	<i>Argyropelecus lychnus</i>	<i>Argyropelecus sladeni</i>	<i>Benthoosema suborbitale</i>	<i>Benthoosema glaciale</i>					
Source		Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins & Baird 1977	Kinzer 1977	Hopkins & Baird 1977	Pusch et al. 2004	Sample size weighted average	Hopkins & Baird 1977	Hopkins & Baird 1977
Locality		E GoM	E Gom	E GoM	E GoM	E GoM	E GoM	NW Africa	E GoM	NE Atl		E GoM	E GoM
Sample size		14	9	9	16	17	52	784	50	55		7	20
1	Seabirds	0	0	0	0	0	0	0	0	0	0.00	0	0
2	Baleen whales	0	0	0	0	0	0	0	0	0	0.00	0	0
3	Deep-diving whales	0	0	0	0	0	0	0	0	0	0.00	0	0
4	Killer whales	0	0	0	0	0	0	0	0	0	0.00	0	0
5	Small cetaceans	0	0	0	0	0	0	0	0	0	0.00	0	0
6	Swordfish	0	0	0	0	0	0	0	0	0	0.00	0	0
7	Other billfishes	0	0	0	0	0	0	0	0	0	0.00	0	0
8	Yellowfin tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
9	Skipjack tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
10	Albacore	0	0	0	0	0	0	0	0	0	0.00	0	0
11	Bigeye tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
12	Blackfin tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
13	Other offshore predators	0	0	0	0	0	0	0	0	0	0.00	0	0
14	Mackerels	0	0	0	0	0	0	0	0	0	0.00	0	0
15	Wahoo	0	0	0	0	0	0	0	0	0	0.00	0	0
16	Dolphinfish	0	0	0	0	0	0	0	0	0	0.00	0	0
17	Pelagic sharks	0	0	0	0	0	0	0	0	0	0.00	0	0
18	Flyingfish	0	0	0	0	0	0	0	0	0	0.00	0	0
19	Coastal predators	0	0	0	0	0	0	0	0	0	0.00	0	0
20	*Small offshore pelagics												
21	Small coastal pelagics	0	0	0	0	0	0	0	0	0	0.00	0	0
22	Small mesopelagics	0	0	0	0	0	0	0	0	0	0.00	0	0
23	Large mesopelagics	0	0	0	0	0	0	0	0	0	0.00	0	0
24	Leatherback turtle	0	0	0	0	0	0	0	0	0	0.00	0	0
25	Other turtles	0	0	0	0	0	0	0	0	0	0.00	0	0
26	Small squids	0	0	0	0	0	0	0	0	0	0.00	0	0
27	Large squids	0	0	0	0	0	0	0	0	0	0.00	0	0
28	Small zooplankton	98.5	100	100	94.4	100	97.6	100	93.1	100.0	96.70	99	100
29	Large zooplankton	0	0	0	0	0	0	0	0	0	0.00	0	0
30	Phytoplankton	0	0	0	0	0	0	0	0	0	0.00	0	0
31	Detritus	0	0	0	0	0	0	0	0	0	0.00	0	0
	Imports	0	0	0	1.4	0	0	0	0.2	0	0.10	0	0
	Unidentified	1.5	0	0	0	0	2.4	0	6.7	0	3.19	0	0
	Unidentified fish	0	0	0	4.2	0	0	0	0	0	0.00	1	0

* All small pelagics in diet data are initially included as small coastal pelagic:

Table 18. Diet studies for small mesopelagics (continued)

Small mesopelagics	<i>Diaphus dumerili</i>	<i>Diapterus taaningi</i>	<i>Gonostoma elongatum</i>	<i>Hygophum hygomii</i>	<i>Lobianchia dofleini</i>	<i>Lampanyctus alatus</i>	<i>Lepidophanes guentheri</i>	<i>Notolychnus valdiviae</i>			<i>Sternoptyx diaphana</i>	<i>Sternoptyx obscura</i>
Source	Hopkins & Baird 1977	Baird et al. 1975 Cariaco Trench	Hopkins & Baird 1977	Pusch et al. 2004	Pusch et al. 2004	Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins & Baird 1977	Hopkins et al. 1996	Sample size weighted average	Hopkins & Baird 1977	Hopkins & Baird 1977
Locality	E GoM		E GoM	NE Atl	NE Atl	E GoM	E GoM	E GoM	E GoM		E GoM	E GoM
Sample size	12	9	52	49	69	64	71	49	20	1322	14	17
1 Seabirds	0	0	0	0	0	0	0	0	0	0.00	0	0
2 Baleen whales	0	0	0	0	0	0	0	0	0	0.00	0	0
3 Deep-diving whales	0	0	0	0	0	0	0	0	0	0.00	0	0
4 Killer whales	0	0	0	0	0	0	0	0	0	0.00	0	0
5 Small cetaceans	0	0	0	0	0	0	0	0	0	0.00	0	0
6 Swordfish	0	0	0	0	0	0	0	0	0	0.00	0	0
7 Other billfishes	0	0	0	0	0	0	0	0	0	0.00	0	0
8 Yellowfin tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
9 Skipjack tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
10 Albacore	0	0	0	0	0	0	0	0	0	0.00	0	0
11 Bigeye tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
12 Blackfin tuna	0	0	0	0	0	0	0	0	0	0.00	0	0
13 Other offshore predators	0	0	0	0	0	0	0	0	0	0.00	0	0
14 Mackerels	0	0	0	0	0	0	0	0	0	0.00	0	0
15 Wahoo	0	0	0	0	0	0	0	0	0	0.00	0	0
16 Dolphinfish	0	0	0	0	0	0	0	0	0	0.00	0	0
17 Pelagic sharks	0	0	0	0	0	0	0	0	0	0.00	0	0
18 Flyingfish	0	0	0	0	0	0	0	0	0	0.00	0	0
19 Coastal predators	0	0	0	0	0	0	0	0	0	0.00	0	0
20 *Small offshore pelagics												
21 Small coastal pelagics	0	0	0	0	0	0	0	0	0	0.00	0	0
22 Small mesopelagics	0	0	1.8	0	0	0	0	0	0	0.00	0.7	0
23 Large mesopelagics	0	0	0	0	0	0	0	0	0	0.00	0	0
24 Leatherback turtle	0	0	0	0	0	0	0	0	0	0.00	0	0
25 Other turtles	0	0	0	0	0	0	0	0	0	0.00	0	0
26 Small squids	0	0	0	0	0	0	0	0	0	0.5	0	0
27 Large squids	0	0	0	0	0	0	0	0	0	0.00	0	0
28 Small zooplankton	95.4	100	95.7	100	100	99.3	99.2	100	100	94.8	95.06	97.4
29 Large zooplankton	0	0	0	0	0	0	0	0	0	0	0	0
30 Phytoplankton	0	0	0	0	0	0	0	0	0	0	0	0
31 Detritus	0	0	0	0	0	0	0	0	0	0	0	0
Imports	0	0	0	0	0	0	0	0	0	1	0.95	0
Unidentified	2.9	0	0	0	0	0	0.2	0	0	0.6	0.57	0.3
Unidentified fish	1.7	0	2.5	0	0	0	0.5	0.8	0	3.1	2.95	2.3

* All small pelagics in diet d * All small pelagics in diet data are initially included as small coastal pelagic:

Table 18. Diet composition calculations for small mesopelagics

Small mesopelagics		Argyropelecus aculeatus	Argyropelecus affinis	Argyropelecus hemigymnus	Argyropelecus lychnus	Argyropelecus sladeni	Benthoema suborbitale	Benthoema glaciale	Ceratoscopelus warmingi	Diaphus dumerili	Diapterus taaningi	Gonostoma elongatum
Species relative weight (from consumption)		0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Coastal predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	*Small offshore pelagics											
21	Small coastal pelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	Small squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	Small zooplankton	98.50	100.00	100.00	94.40	100.00	97.60	100.00	96.70	95.40	100.00	95.70
29	Large zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Imports	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.10	0.00	0.00	0.00
	Unidentified	1.50	0.00	0.00	0.00	0.00	2.40	0.00	3.19	2.90	0.00	0.00
	Unidentified fish	0.00	0.00	0.00	4.20	0.00	0.00	0.00	0.00	1.70	0.00	2.50

Table 18. Diet composition calculations for small mesopelagics (continued)

Small mesopelagics											Weighted average	Final DC Unid. fish were allocated to small mesopelagics and unid, was split between small zooplankton and small squids
		Hygophum hygomii	Lobianchia dofleini	Lampanyctus alatus	Lepidophanes guentheri	Notolychnus valdiviae	Sternoptyx diaphana	Sternoptyx obscura	Sternoptyx pseudobscura	Valenciennellus tripunctulatus		
	Species relative weight (from consumption)	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500		
1	Seabirds	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
2	Baleen whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
3	Deep-diving whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
4	Killer whales	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
5	Small cetaceans	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
6	Swordfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
7	Other billfishes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
8	Yellowfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
9	Skipjack tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
10	Albacore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
11	Bigeye tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
12	Blackfin tuna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
13	Other offshore predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
14	Mackerels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
15	Wahoo	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
16	Dolphinfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
17	Pelagic sharks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
18	Flyingfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
19	Coastal predators	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
20	*Small offshore pelagics											0.00
21	Small coastal pelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
22	Small mesopelagics	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.00	0.00	0.12500	0.96
23	Large mesopelagics	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
24	Leatherback turtle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
25	Other turtles	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
26	Small squids	0.00	0.00	0.00	0.00	0.48	0.00	0.00	0.00	0.00	0.02376	0.30
27	Large squids	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
28	Small zooplankton	100.00	100.00	99.30	99.20	95.06	98.60	97.40	99.00	100.00	98.34309	98.62
29	Large zooplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
30	Phytoplankton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
31	Detritus	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00000	0.00
	Imports	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.12228	0.12
	Unidentified	0.00	0.00	0.20	0.00	0.57	0.00	0.30	0.00	0.00	0.55304	
	Unidentified fish	0.00	0.00	0.50	0.80	2.95	0.70	2.30	1.00	0.00	0.83231	

Table 19. Diet studies for large mesopelagics and derived diet composition

Large mesopelagics		Snake mackerel	Shortnose lancetfish	Longnose lancetfish (<i>Alepisaurus ferox</i>)					Large mesopelagics					
		Gympylus serpens	Alepisaurus brevirostris						Species relative weight (from consumption)				Small pelagics split between coastal and offshore	Final DC
Source	Locality	Junior 2000	Satoh et al. 2004	Moteiki et al. 1993	Junior 2000	Potier et al. 2007 WC Indian Ocean	Sabatie et al. 2003	Sample size weighted average	Gympylus serpens	Alepisaurus brevirostris	Alepisaurus ferox	Weighted average		
	Sample size	36	168	24	84	139	23		0.3333	0.3333	0.3333			
1	Seabirds	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
2	Baleen whales	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
3	Deep-diving whales	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
4	Killer whales	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
5	Small cetaceans	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
6	Swordfish	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
7	Other billfishes	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
8	Yellowfin tuna	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
9	Skipjack tuna	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
10	Albacore	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
11	Bigeye tuna	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
12	Blackfin tuna	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
13	Other offshore predators	0	0	0	0	0.06	0	0.03	0.00	0.00	0.03	0.01030	0.01	0.01
14	Mackerels	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
15	Wahoo	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
16	Dolphinfish	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
17	Pelagic sharks	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
18	Flyingfish	40.26	0	0	0	0.18	0	0.09	40.26	0.00	0.09	13.45075	13.45	17.91
19	Coastal predators	0	2.6	0	0.64	0	0	0.20	0.00	2.60	0.20	0.93303	0.93	1.24
20	*Small offshore pelagics								0.00	2.60	0.20	0.93303	0.42	0.56
21	Small coastal pelagics	0	0.8	0	0	0.97	0	0.50	0.00	0.80	0.50	0.43312	0.01	0.02
22	Small mesopelagics	0	0.7	0	0	1.11	0	0.57	0.00	0.70	0.57	0.42381	0.42	0.56
23	Large mesopelagics	0	72.5	0	8.05	8.05	0	6.65	0.00	72.50	6.65	26.38264	26.38	35.13
24	Leatherback turtle	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
25	Other turtles	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
26	Small squids	21.64	0	27.77	3.79	8.04	0	7.79	21.64	0.00	7.79	9.80879	9.81	9.81
27	Large squids	0	0	0.37	0	2.86	0	1.51	0.00	0.00	1.51	0.50175	0.50	0.50
28	Small zooplankton	0	0	20.56	35.68	30.11	44.7	32.24	0.00	0.00	32.24	10.74551	10.75	10.75
29	Large zooplankton	0	0	0	9.62	35	0	21.01	0.00	0.00	21.01	7.00373	7.00	7.00
30	Phytoplankton	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
31	Detritus	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00000	0.00	0.00
	Imports	0.04	22.9	8.1	24.02	11.72	0	14.23	0.04	22.90	14.23	12.38872	12.39	16.50
	Unidentified fish	38.06	0.5	43.2	18.2	1.89	55.3	15.19	38.06	0.50	15.19	17.91514		

* All small pelagics in diet data are initially included as small coastal pelagic