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Composition of the Edible Portion of Raw (Fresh or Frozen) Crustaceans, Finfish, and Mollusks. I. Protein, Fat, Moisture, Ash, Carbohydrate, Energy Value, and Cholesterol

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ABSTRACT

This report summarizes the data on protein, fat, moisture, ash, carbohydrate, energy (calories) and cholesterol from 155 references on 154 commonly eaten fish flesh.

INTRODUCTION

Considerable data have been published on many aspects of the chemical and nutritional values of fish and fishery products, but at no time have appreciable amounts of these data been assembled in a tabular form. If the data were so assembled and characterized, then industry, medical services, and the general public would have a good reliable source of information on the composition of fish. For example, industry will need these data for putting nutritional information on labels of canned fish or fishery products. Today, doctors and dietitians are especially interested in the content of the various lipid materials in foods since these fat-like substances of an individual's diet may be involved in the degeneration of the vascular system. There are indications that certain highly unsaturated fatty components in fish may be beneficial in the treatment of the disorder. In order to recommend the inclusion of fish in the patient's diet, however, the doctor must know not only the fat content but also the fatty acid composition including degree of unsaturation, and the amount of steroid material, like cholesterol.

The best compilation on the nutritive composition of foods in general is the U.S. Department of Agriculture, Handbook 8, *Composition of Foods* by B. K. Watts and A. L. Merrill. For fish and fishery products, however, the data are limited, particularly for minerals and vitamins.

This paper is an interim report on protein, fat, moisture, ash, carbohydrate, energy value, and cholesterol. Other interim reports will deal with the vitamins, minerals, fatty acids, and amino acids. The need for these data is so urgent that we prefer not to wait until the review of literature is completed.

Our primary objectives are: (1) to develop a comprehensive data bank on the chemical and nutritional composition of fish and fishery products; (2) to publish, as completely as possible, information on the nutrients found in fishery products; and (3) to point out areas in the chemical composition of fish needing further investigations.

At first we planned to review only the literature reporting the work done in the western hemisphere. Subsequently, we decided to enlarge our scope into a review of literature published anywhere in the world, because over 60 percent of the fishery products eaten by the Americans are imported from many nations throughout the world.

The title of the article reviewed, name of the author, and publication were obtained from bibliographies or abstracts. Copies of the original article were obtained from the National Agricultural Library, U.S. Department of Agriculture; the National Library of Medicine, U.S. Department of Health, Education and Welfare; the Natural Resources Library, U.S. Department of the Interior; or from universities and other research libraries.

No data are put in the bank unless we have a copy of the original article on file. The data in each article are carefully scrutinized before they are transcribed onto the appropriate sheets. There is a sheet for each of the following: proximates, vitamins, minerals, fatty acids, and amino acids. At this time, if necessary, the values are recalculated into the units set up in the guidelines, i.e. milligrams per 100

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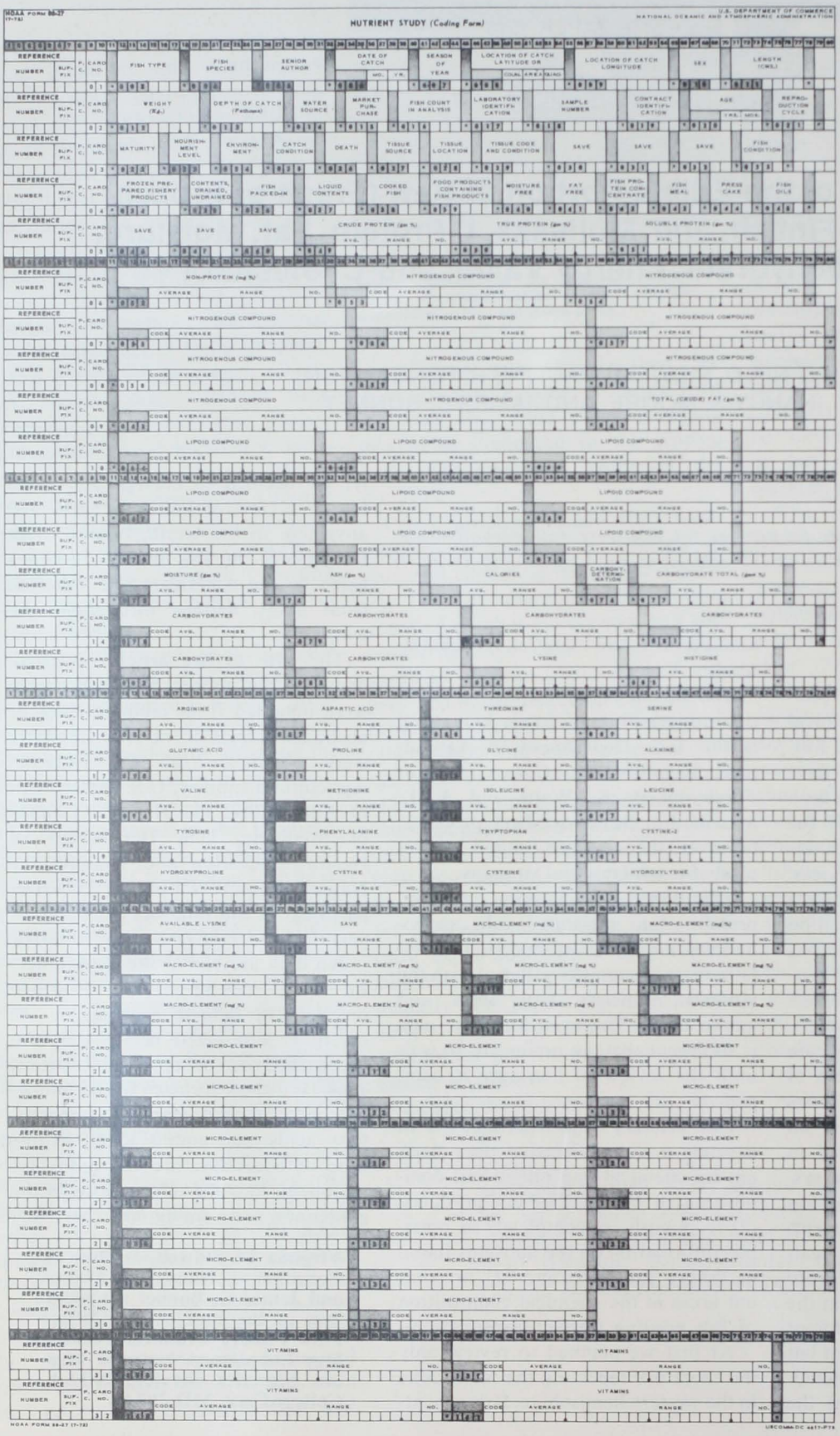

Figure 1. — Page 1 of the Coding Form

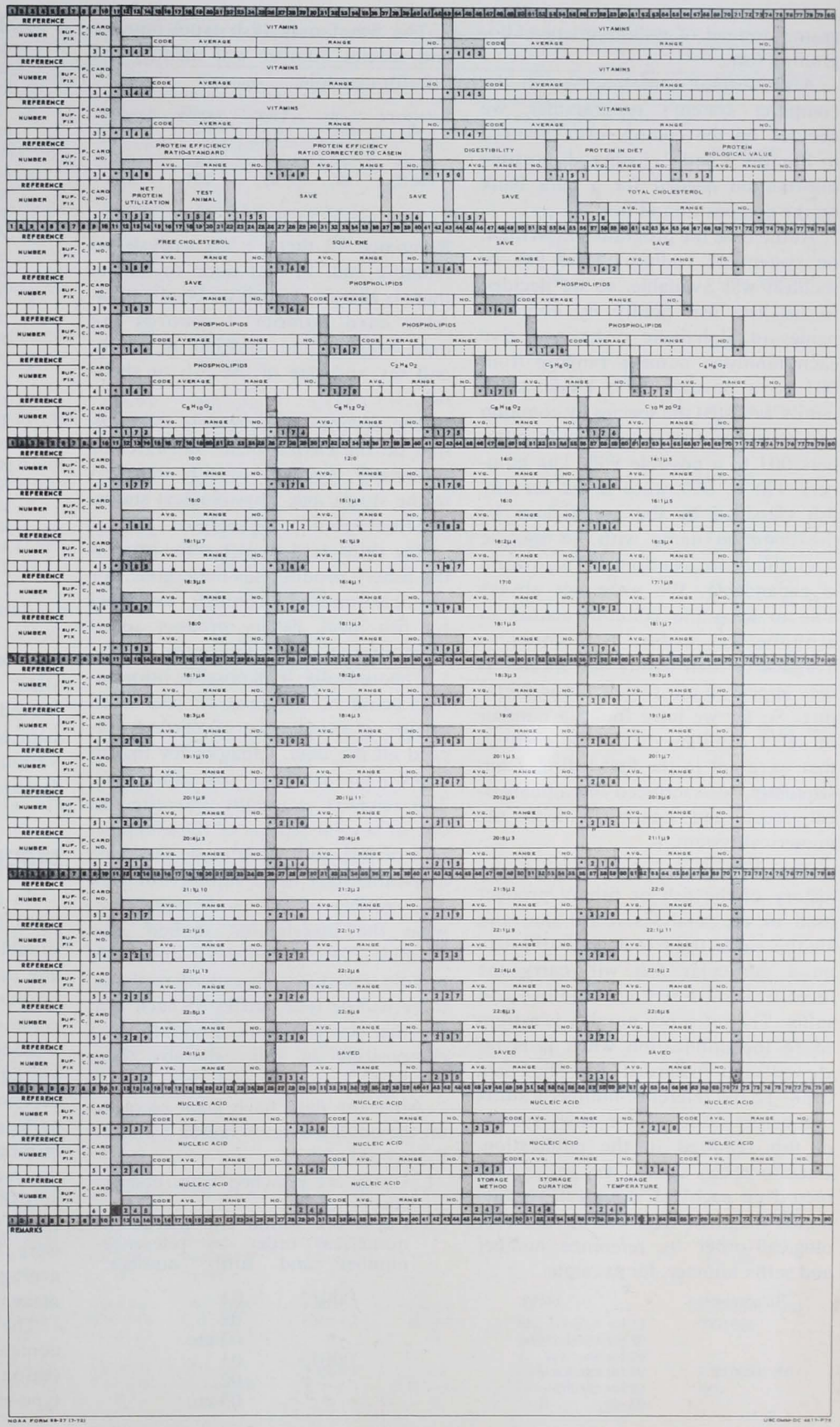

Figure 2. — Page 2 of the coding form.

grams, instead of milligrams per kilogram of fish.

After several conferences with the computer system's programmer, we decided on the coding form pictured in Figures 1 and 2, listing all possible information needed for a data bank on the composition of fish.

At the time the program was written, no systematic coding of the fish or shellfish was available, so we decided to list the fish family by common names in alphabetic order and give each family a number ranging from 001 to a possible 999. Under each family we listed the species by common and scientific names again with numbers 001 to a possible 989. The numbers 990 to 999 were saved for any fish classified by the investigator by the common name with no specific scientific name mentioned. This system is expandable. We were not always able to keep the common names in alphabetical order. A number is assigned to each family and species as they appear in our review of the literature. So far we have found a number of other families of fish or shellfish that were not in the first listing. Consequently, we sacrificed the alphabetical order and continued with the numerical system.

The first three cards record the history of the fish or fishery product used in the analyses. Card one and all the cards used to record the data on a particular fish will carry the identification-reference number and suffix. The reference number is assigned to the publication when it is reviewed and recorded for the data bank. To the reference number a suffix number is attached for each species of fish reported in the publication. Therefore, this system will make each record on each fish unique. The data on the magnetic tape will be in chronological order by reference number and suffix number, for example:

Reference No.	Suffix
00012	01 for Atlantic cod
	02 for bluefin tuna
	03 for anchovy
00013	01 for mackerel
	02 for shrimp
	03 etc.

The fish family (fish type) number and species number will identify the fish, for example:

Reference No.	Suffix No.	Card No.	Family No.	Species No.
00012	01	01	033	008
00012	02	01	091	023

That series of figures shows that in Reference 12 there is an analysis on Atlantic cod. In that same reference, there is also an analysis on bluefin tuna. Also card number 1 records the date, season, and location of catch, and sex and size of the fish or shellfish.

The second card presents information on the environment, saltwater or freshwater, number of fish involved in the study, age, physiological status, and tissue used in the analyses.

The third card describes the process the fishery product has undergone, for example cooked, canned, extracted for fish meal, fishery product added to another product, as in soups.

Theoretically, if all possible information could be obtained on one batch of fish, it would take 60 cards to record all the data. Chances for this to happen are small, in fact almost nil. The scientist is usually interested in one or several aspects of the composition of fish, so he will make the same determinations on a number of fish. The number of entries depends upon what the investigator studied. For example, if the scientist has done only protein, moisture, fat, and ash analyses, there will be four entries on each fish. Another scientist worked on fatty acid composition of fish, whereby there will be 62 entries for each fish.

After the data have been recorded on the coding sheet (Figures 1 and 2), the procedure is:

1. Cards are punched from coding sheet.
2. Cards are sorted and placed in numerical order by reference number and suffix number.

00012	01
	02
	03 etc.
00013	01
	02
	03 etc.

3. The data on the cards are printed, so these data can be easily checked against the coding sheet to catch punching errors.
4. The corrected "deck of cards" is edited for mechanical errors. For example, an asterisk has been left out, or placed in the wrong space, consequently the machine will not take the card.
5. As soon as the cards are acceptable to the machine, the data are put on magnetic tape for storage. At this time there is a printout of the data that were put on the tape.
6. Again the data are checked, this time against the original publication.
7. If, by chance, there is an error, a new card is punched with a special code number 1 in the space between the suffix number and card number. This automatically erases the data on the tape and replaces the new data from the correction card.

As may be noted, there are a number of checkpoints, so the final record will be as correct as is humanly possible. Since so many people are involved in the process of putting the data on the tape, checking the data at various points becomes an important factor.

DISCUSSION

So far, in our literature search we have located 155 articles containing suitable data for protein, fat, moisture, ash, carbohydrate, energy, and cholesterol values for 154 species of fish commonly eaten throughout the world.

Each investigator reported an average figure obtained either from several determinations on a composite of fish, or from a determination on each of a number of fish. In the latter instance, the scientist reported the average and the range of the results obtained from the analyses. These averages were used to calculate the overall average and the standard error of the mean.

The variability in fat and moisture content is due mainly to the natural season variation, but also age, size, and type of fish play an important role. The

Table 1.—Composition of the edible portion of raw (fresh or frozen) Crustacea, finfish and mollusks. I. Protein, fat, moisture, ash, carbohydrate, energy, and cholesterol.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
			gm per 100 gm			*cal/100 gm*	*mg/100 gm*	
Abalone *Haliotis kamtschatkana*	[1]14.9 ± 0.2 [2]10.4—18.2 [3]4	[1]0.5 ± 0.1 [2]0.3—0.7 [3]3	[1]76.9 ± 2.9 [2]72.6—82.4 [3]3	[1]1.8 ± 0.6 [2]1.0—3.0 [3]3				10, 65, 76, 122
Albacore *Thunnus alalunga*	24.2 ± 0.5 19.1—27.6 18	5.4 ± 0.9 0.7—18.2 19	70.2 ± 1.0 62.3—78.6 17	1.3 ± 0.1 1.2—2.4 18	[1]0.2 [3]1	[1]134 ± 17 [2]107—185 [3]5		10, 43, 68, 70, 102, 108, 133, 143
Amberjacks *Seriola* spp.	21.1 ± 0.7 20.1—22.5 3	1.6 ± 0.4 0.8—3.1 5	75.2 ± 1.2 73.4—77.5 3	1.2 1.1—1.3 2		96 1		61, 65, 106, 144
Anchovies *Engraulidae* spp	20.2 ± 0.7 18.4—21.8 4	2.4 ± 0.8 0.5—3.8 4	76.0 ± 1.1 73.4—81.0 4	1.8 ± 0.1 1.5—2.1 4		93 ± 5.3 73—103 3		3, 5, 11, 65, 68, 108, 121, 143
Anchovy, striped *Anchoa hepsetus*	17.4 ± 0.2 16.2—18.9 21	2.8 ± 0.2 1.6—4.6 21	76.6 ± 0.3 74.2—78.1 21	3.3 ± 0.1 2.6—4.1 21				80, 128, 129, 130, 132
Barracouta *Thyrsites atun*	22.0 ± 0.1 21.9—22.1 3	4.8 ± 1.2 2.6—6.7 3	71.0 ± 0.9 69.5—72.6 3	1.6 ± 0.2 1.3—1.8 3	0.7 1	132 1		68, 144
Barracudas *Sphyraenidae* spp	19.8 ± 0.2 18.4—22.1 39	3.2 ± 0.4 0.2—10.3 43	75.8 ± 0.4 69.1—79.5 40	1.7 ± 0.1 1.1—2.5 40	1.1 ± 0.3 0.1—2.2 6	94 ± 3.1 77—110 9		5, 9, 11, 60, 62, 65, 67, 121, 143
Basses *Percichthyidae* spp	18.1 ± 0.3 16.6—18.9 11	3.0 ± 0.6 0.1—6.7 9	77.4 ± 0.7 74.5—81.1 11	1.4 ± 0.2 1.0—2.9 11		113 ± 11.0 92—129 3		11, 14, 45, 54, 95, 102, 140, 144
Basses *Serranidae* spp	18.6 ± 0.3 17.3—20.1 7	1.6 ± 0.4 .1—3.0 7	78.6 ± 0.3 77.3—79.6 7	1.1 ± 0.1 0.9—1.2 7				14, 54, 80, 95
Bluefishes *Pomatomidae* spp	21.0 ± 0.4 20.4—21.6 3	3.8 ± 0.8 2.1—4.8 3	74.7 ± 1.7 69.0—81.4 6	1.3 ± 0.1 1.1—1.5 4				14, 15, 16, 84, 151
Bonita *Sarda* spp	24.7 ± 1.6 22.6—29.3 4	4.5 ± 2.0 1.5—10.2 4	71.3 ± 1.9 66.3—74.8 4	1.5 ± 0.1 1.4—1.7 4				11, 14, 43, 144
Bream *Pagellus* spp	17.9 ± 1.0 16.4—20.7 4	1.6 ± 0.4 0.5—2.3 5	74.8 ± 3.5 61.3—80.2 5	1.5 ± 0.4 1.4—1.6 5		82.3 ± 4.6 70—92 4		102, 144
Bream, lg-eyed *Monotaxes grandoculis*	18.4 ± 0.6 17.1—19.0 3	1.0 ± 0.4 0.6—1.8 3	78.2 ± 0.6 77.0—79.2 3	1.2 ± 0.2 0.8—1.4 3	1.6 1	90.5 89—92 2		65, 121
Burbot *Lota lota*	18.0 ± 0.7 16.8—19.2 3	0.8 ± 0.2 0.6—1.2 3	80.3 ± 0.2 80.1—80.6 3	1.3 ± 0.3 1.0—1.9 3				45, 140
Butterfishes *Stromateidae* spp	17.7 ± 0.4 15.0—20.7 13	7.2 ± 1.9 0.9—24.5 13	74.3 ± 1.7 56.5—80.4 13	1.4 ± 0.4 0.9—2.5 13	1.3 ± 0.6 0.3—2.6 4	95 95—95 2		1, 5, 6, 10, 14, 16, 65, 95, 108, 118, 121, 143
Carp *Barbus* spp	20.6 16.0—25.2 2	2.7 2.3—3.1 2	74.7 70.3—79.1 2	1.4 1.2—1.5 2				101, 105
Carp *Cirrhina mrigala*	18.9 ± 0.2 18.1—19.6 10	0.9 ± 0.5 0.2—4.0 8	78.0 ± 0.4 75.0—79.8 10	1.4 ± 2.1 1.0—1.6 8	1.4 ± 0.2 0.6—2.0 7	86.7 ± 0.9 84.0—90.0 7		100, 104
Carp *Cyrpinus carpio*	18.0 ± 0.2 17.4—19.3 9	6.2 ± 1.2 3.3—14.8 9	75.6 ± 1.1 66.2—79.8 14	1.1 ± 0.03 1.0—1.2 7				10, 22, 27, 45, 73, 115, 140
Carp, Indian *Labeo* spp	16.8 ± 0.4 14.3—19.1 12	4.6 ± 2.9 0.5—24.5 8	79.7 ± 0.8 72.5—82.1 12	1.3 ± 0.1 0.9—1.4 8	0.4 ± 0.1 0.3—0.4 2			1, 100, 101, 104 105
Catfishes, air-breathing *Clariidae* spp	17.3 ± 0.8 15.0—19.7 5	2.5 ± 1.0 0.4—4.8 5	77.6 ± 0.7 76.3—79.9 5	1.4 ± 0.2 1.1—2.1 5	0.2 0.1—0.3 2	103 ± 12.7 78—117 3		5, 65, 104, 108, 121

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
			gm per 100 gm			*cal/100 gm*	*mg/100 gm*	
Catfishes, freshwater *Ictaluridae* spp	17.6 ± 0.8 15.4—22.8 10	3.2 ± 1.8 0.3—11.0 10	77.8 ± 1.2 68.0—82.6 14	1.1 ± 0.1 0.9—1.7 10				24, 25, 34, 45, 72, 84, 91, 101, 104, 115, 140
Catfishes, sea *Ariidae* spp	18.3 ± 0.9 12.7—21.2 9	1.2 ± 0.3 0.2—2.9 8	78.3 ± 0.6 75.1—81.1 9	1.3 ± 0.1 0.9—1.6 9	0.5 ± 0.1 0.4—0.6 3	84.2 ± 3.0 74—90 5		5, 65, 108, 112, 121, 143
Chubs, sea *Kyphosidae* spp	21.1 1	4.2 2.0—6.3 2	76.0 75.9—76.0 2	1.3 1.1—1.4 2		102 1		16, 62, 121
Chubs, Utah *Gila atraria*	15.5 1	4.8 1	79.3 1	1.0 1				140
Cisco, longjaw, trout *Coregonus alpenae*	15.5 ± 0.8 13.3—16.9 4	12.5 ± 3.1 7.6—21.5 4	71.2 ± 2.8 63.8—77.2 4	1.5 ± 0.4 1.0—2.7 4				140
Clam Miscellaneous spp	11.7 ± 0.4 7.6—19.0 21	1.4 ± 0.2 0.3—4.8 19	83.0 ± 0.7 73.7—87.9 16	1.8 ± 0.2 0.8—3.9 11				10, 65, 74, 122, 123, 131, 143, 146
Clam, short neck *Venerupis semi decusata*	12.8 ± 0.2 12.2—13.6 5	0.8 ± 0.04 0.7—0.9 5	84.9 1					4, 123
Clam, soft shell *Mya arenaria*	11.2 ± 0.06 9.7—15.6 10	2.0 1.4—2.5 2	84.8 ± 1.0 78.5—87.8 8	1.7 1	1.7 1	89 1		7, 10, 63, 99
Cod, Atlantic *Gadus morhua*	17.9 ± 0.4 16.5—20.7 9	0.3 ± 0.1 0.1—0.8 8	81.1 ± 0.4 78.2—82.6 10	1.1 ± 0.3 1.0—1.2 7				10, 35, 83, 118, 125, 151
Cods *Gadus* spp	18.8 ± 0.7 17.7—21.4 5	0.5 ± 0.2 0.1—1.0 5	79.2 ± 1.0 75.5—81.4 5	1.5 ± 0.2 1.1—2.1 5		86.0 ± 5.6 79.0—97.0 3		14, 35, 102
Congers, pike *Muraenesocidae* spp	18.4 ± 0.7 16.9—21.5 6	0.9 ± 0.2 0.2—1.5 5	78.9 ± 0.6 77.3—80.3 6	1.3 ± 0.2 0.6—2.0 6	0.8 1	85 ± 4.0 80—93 3		5, 65, 75, 108, 112, 121
Crab Miscellaneous spp	15.8 ± 1.4 7.2—22.4 10	3.1 ± 1.3 0.1—12.5 9	76.1 ± 1.8 61.0—84.7 12	2.5 ± 0.5 1.4—6.2 9				34, 56, 58, 94, 96, 108, 143
Crab, blue *Callinectes sapidus*	16.1 ± 0.5 11.9—19.2 18	1.0 ± 0.1 0.4—1.5 18	81.2 ± 0.6 77.4—86.7 17	1.6 ± 0.1 1.3—1.8 15	1.25 0.5—2.0 2	81.5 77—86 2	84 70—98 2	10, 47, 126, 131, 149
Crab, Dungeness *Cancer magister*	17.2 ± 0.7 14.3—23.4 12	1.4 ± 0.1 0.7—2.2 14	80.5 ± 0.3 78.5—82.3 13	1.4 ± 0.1 1.2—1.9 11		85 ± 4.6 77—97 4	57.5 52—63 2	10, 48, 49
Crab, deep sea *Neptunnis* spp	16.5 ± 0.5 12.8—18.8 12	0.5 1	78.4 ± 0.6 75.9—81.4 12	1.45 0.6—2.3 2	0.3 1			51, 52
Crab, king *Paralithodes camtschatica*	17.2 ± 0.7 14.6—19.0 7	0.7 ± 0.2 0.2—1.4 6	80.7 ± 0.6 80.1—82.8 6	1.6 ± 0.2 1.3—2.2 5				10, 92, 124
Crab, samaon *Scylla serrata*	14.9 ± 0.4 11.8—20.1 22	2.9 ± 1.1 0.7—4.0 3	80.3 ± 0.5 75.1—83.9 22	1.8 ± 0.1 1.5—1.9 4	0.6 1			51, 52, 65, 112
Crayfish Miscellaneous spp	18.7 ± 0.9 17.0—19.6 3	1.7 1	76.3 ± 0.2 72.4—80.1 3	1.1 1				36, 65, 112
Croakers *Sciaenidae* spp	19.0 ± 1.4 14.1—29.1 9	1.9 ± 0.4 0.4—4.9 10	78.5 ± 1.1 72.0 9	1.3 ± 0.1 0.9—1.8 9		103 1		5, 14, 62, 65, 67, 95, 108
Dolphin *Coryphaena equisetis*	19.0 ± 0.4 18.5—19.8 3	1.6 ± 0.8 0.7—3.2 3	75.4 2	1.5 2		94.3 ± 6.6 85—107 3		147, 155

Table 1, continued

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
			gm per 100 gm			*cal/100 gm*	*mg/100 gm*	
Dories *Zeidae* spp	18.4 18.3—18.4 2	1.05 0.9—1.2 2	78.1±0.7 77.0—79.3 3	1.3±0.03 1.2—1.3 3		80.0 1		11, 16, 144
Drum *Sciaenidae* spp	19.2±0.3 18.1—20.1 6	1.5±0.2 0.9—1.9 4	76.9±1.1 69.7—80.2 8	1.6±0.2 0.9—2.4 8		91.0 1		2, 11, 16, 72, 144
Drum, freshwater *Aplodinotus grunniens*	17.4±0.2 15.9—18.4 11	5.5±0.7 1.0—8.4 11	76.7±1.0 73.9—82.7 10	1.1±0.02 1.0—1.1 10				10, 23, 24, 28, 29, 45, 144
Eel, conger *Congridae* spp	16.4 2	4.5 2	77.6±1.0 76.3—79.5 3	1.2±0.2 1.0—1.5 3		110.5 99—122 2		16, 102
Eels, freshwater *Anguillidae* spp	18.0 2	17.3±2.6 12.7—21.5 3	65.0±1.8 62.2—70.1 4	1.3 2		246 237—255 2		11, 46, 63, 91,
Eels, snake *Ophichthidae* spp	17.7±0.4 15.3—20.2 18	0.9±0.2 0.1—3.1 18	78.8±0.5 74.0—81.1 17	1.3±0.1 0.2—2.6 18	0.6±0.2 0.3—2.4 10	81.4±3.3 73—104 11		5, 65, 71, 101, 104, 121, 143
Flatheads *Percophididae* spp	19.0±0.5 17.6—20.0 4	1.1±0.3 0.2—1.8 4	80.2±2.9 78.4—83.0 5	1.3±0.2 1.0—1.9 5		87±2.9 82—95 4		5, 16, 68, 121, 143
Flounder, winter *Pseudopleuronectes americanus*	17.4±2.3 16.0—19.9 6	0.8±0.5 0.2—3.0 6	79.5±0.9 75.4—81.0 6	1.3±0.0 1.2—1.3 5				6, 10, 14, 63, 95, 148
Flounders *Bothidae* spp	19.0±0.6 17.3—20.8 7	0.9±0.2 .1—2.5 11	78.1±0.7 76.0—80.1 7	1.7±0.2 1.3—2.3 4	0.6 0.4—0.8 2	84.3±5.4 78—95 3		5, 62, 65, 108, 115, 121, 148
Flounders *Pleuronectidae* spp	17.3±0.3 14.0—20.3 22	1.0±0.2 0.1—2.9 21	80.8±0.4 76.8—84.1 20	1.3±0.1 1.1—2.3 15	1.3 1	87.7±3.4 81—92 3		6, 10, 18, 59, 67, 84, 91, 98, 102, 135, 143, 151
Flyingfish and halfbeaks *Exocoetidae* spp	20.1±0.9 17.1—23.5 7	1.1±0.2 0.2—1.4 7	77.5±0.7 75.2—80.3 8	1.2±0.1 0.6—1.6 8	0.4 1	92.3±3.2 83—97 4		5, 11, 16, 65, 68, 108, 121
Goatfish, dwarf *Upeneus parvus*	19.8±0.2 18.7—21.5 14	4.0±0.5 1.6—7.0 14	75.2±0.6 71.7—78.4 15	1.8±0.1 1.6—2.5 15				60
Goatfishes *Mullidae* spp	20.1±0.7 16.9—22.9 9	2.0±0.5 0.4—4.7 9	76.3±0.6 74.5—78.1 6	1.7±0.5 0.6—4.0 6		106.3±5.0 99—120 4		11, 65, 147, 155
Gobies *Gobiidae* spp	17.4±0.6 15.4—20.5 11	1.1±0.3 0.1—2.7 11	79.3±0.5 76.5—81.8 11	1.8±0.2 1.0—2.9 11	0.3 1	75±0.6 74—76 3		5, 11, 65, 104, 108, 121, 143
Goosefishes *Lophiidae* spp	13.2±1.0 10.6—15.2 4	1.2±0.5 0.3—2.5 4	83.6±0.4 82.9—84.2 3	1.6±0.2 1.2—2.0 3		62.7±2.3 58—65 3		10, 11, 102
Groupers *Serranidae* spp	19.2±0.3 16.4—20.8 12	0.8±0.2 0.2—2.3 13	78.6±0.3 76.0—79.8 13	1.3±0.1 0.9—1.8 13	1.0 1	87.4±2.3 83.0—94.0 5		9, 11, 16, 54, 62, 65, 67, 121, 143
Grunts *Pomadasyidae*	19.2±0.4 17.7—21.1 9	0.9±0.3 0.2—2.7 9	77.9±0.5 75.6—79.8 9	1.8±0.3 1.1—3.5 9	2.2 1	87.3±2.3 80—92 6		54, 67, 108, 121, 155
Haddock *Melanogrammus aeglefinus*	18.3±0.3 15.4—19.6 13	0.5±0.2 0.1—1.2 5	80.3±0.3 79.1—81.7 11	1.1±0.1 1.0—1.2 3		79 1	66.3±13.0 45.0—90.0 3	8, 10, 14, 35, 59, 118, 125
Hakes *Merluccius* spp	16.3±0.3 15.4—16.9 4	1.2±0.5 0.6—2.7 4	81.1±1.0 78.5—83.1 4	1.2±0.1 1.0—1.5 4		86 1		6, 11, 35, 144
Halibut, Atlantic *Hippoglossus hippoglossus*	17.7±1.3 12.6—20.1 5	2.4±0.9 0.7—5.2 5	78.1±0.7 76.5—82.9 9	1.1 1		126 1	60 1	13, 63, 88, 119

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
			gm per 100 gm			*cal/100 gm*	*mg/100 gm*	
Halibut, Pacific *Hippoglossus stenolepis*	21.1±0.1 20.3—22.0 12	1.1±0.2 0.6—3.6 13	77.9±0.1 77.3—78.7 16	1.4±0.0 1.2—1.4 12				10, 119, 141
Herring, Atlantic *Clupea harengus*	18.2±0.8 15.2—21.9 7	15.7±1.9 2.4—29.1 17	60.1±2.5 52.6—78.0 11	1.7 1				14, 87
Herring, fimbriated *Sardinella fimbriata*	20.0±0.4 18.3—21.8 7	2.0±0.5 0.4—3.6 6	76.1±0.8 71.3—78.1 8	2.0±0.2 1.3—3.4 8	1.7 0.6—2.7 2	102.3±8.9 88—128 4		9, 121
Herring, lake, trout *Coregonus artedii*	18.8±0.9 15.6—20.8 6	3.3±1.04 1.5—7.2 6	77.6±1.1 62.6—81.3 18	1.4±0.2 1.0—2.8 8				45, 73
Herring, Pacific *Clupea harengus pallasi*	14.6±1.7 9.4—16.5 4	11.1±1.6 8.0—12.8 3	71.5 69.0—73.9 2	3.8±0.9 2.5—3.3 7				10, 31, 38, 41
Jack mackerel *Trachurus trachurus*	19.7 1	6.8±4.3 1.5—15.3 3	76.7 1	1.2 1				62, 144
Jacks *Caranx* spp	19.9±0.4 16.6—22.0 14	1.2±0.5 0.1—6.1 12	76.5±0.5 71.5—79.8 16	1.5±0.1 1.0—2.7 15	0.6±0.4 0.2—1.4 3	96.6±45 84—135 10		9, 16, 26, 65, 73, 112, 121, 155
Kingfishes *Menticirrhus* spp	17.2±0.3 16.5—17.9 5	3.1±1.1 0.7—6.1 5	78.4±1.2 75.3—81.7 5	1.1±0.1 1.1—1.3 5				14, 95
Leatherjacket *Scomeroides lysan*	19.9±0.3 19.3—20.7 4	1.3±0.4 0.1—1.8 4	77.1±0.4 76.4—77.7 4	1.6±0.1 1.3—1.8 4	0.3 1	109 88—130 2		5, 121, 143
Lingcod *Ophiodon elongatus*	17.5±0.4 16.7—18.1 3	0.7±0.2 0.5—1.0 3	80.2 79.2—81.1 2	1.2±0.0 1.2—1.2 3		99 81—117 2		10, 133, 137, 153
Lizardfish *Saurida tumbil*	19.3±0.3 17.4—23.5 17	1.13±0.1 0.1—1.8 18	78.2±0.3 76.3—80.2 17	1.7±0.1 1.4—2.2 17				60, 65, 121
Lizardfish *Saurida undosquamis*	19.4±0.2 18.4—20.9 13	2.3±0.2 0.5—3.4 13	77.0±0.3 75.6—79.2 13	1.8±0.1 1.5—2.2 12	0.9 1	88		60, 143
Lobster *Panulirus* spp	19.6±0.8 16.2—21.6 7	1.3±0.2 0.6—1.9 6	76.0±1.1 71.5—81.2 10	2.4±0.6 1.2—3.4 4	0.8 1	95 92—98 2	260 170—350 2	10, 16, 35, 42, 56, 59, 63, 84, 90, 143
Mackerel *Scomber* spp	22.0±0.3 13.5—25.3 44	5.3±0.7 0.3—18.1 42	71.7±0.6 61.4—77.7 45	1.5±0.04 1.1—2.4 43	0.3 1	114±3.6 108—124 4		5, 43, 60, 67, 107, 108, 109, 112, 143, 144, 155
Mackerel *Scombermorus* spp	18.9±0.5 15.9—22.4 16	3.7±1.4 0.2—14.4 13	74.9±1.4 63.0—82.1 15	1.3±0.1 0.9—1.6 15	2.8±0.1 2.6—3.0 3	103.4±17.3 80—172 5		2, 10, 14, 54, 65, 67, 72, 95, 109, 112, 121, 133, 155
Mackerel *Auxis* spp	24.8 23.7—25.8 2	3.2±1.2 0.7—7.2 5	71.2 70.2—72.2 2	1.4 1.3—1.5 2				62, 65, 121
Mackerel, Atlantic *Scomber scomberus*	19.1±0.6 15.1—23.1 17	16.3±2.1 0.7—24.0 17	64.0±1.9 49.3—78.6 15	1.5±0.1 1.0—3.0 15		169±30.7 84—230 4	80 1	10, 59, 89, 93, 102, 118
Mackerel, Indian *Rastrelliger* spp	19.1±0.7 16.6—21.4 9	2.0±0.4 0.5—4.1 14	76.4±0.8 73.3—79.3 9	1.5±0.1 1.1—2.2 9	2.1±0.2 1.8—2.5 3	97.7—3.8 92—105 3		12, 65, 70, 121, 145
Mackerel, Pacific *Pneumatophorus japonicus*	21.2 1	4.6±2.5 1.6—9.5 3	72.3 1	2.4 1				62, 93
Mojarras *Gerreidae* spp	18.6±0.6 17.7—19.6 3	1.3 1.2—1.3 2	78.5±0.2 3	1.6±0.3 3		84 1		65, 67, 121

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
			gm per 100 gm			*cal/100 gm*	*mg/100 gm*	
Mullet *Mugil* spp	19.2 ± 0.7 12.3—22.6 14	3.3 ± 0.5 0.4—5.9 11	75.3 ± 1.1 69.3—86.0 15	1.4 ± 0.1 0.9—2.1 13	2.2 1.9—2.4 2	128.4 ± 13.4 103—124 5		34, 65, 72, 90, 101, 104, 105, 112, 121, 143, 144
Mullet, striped *Mugil cephalus*	19.4 ± 0.4 17.9—21.8 11	5.5 ± 1.3 0.2—14.8 12	73.7 ± 1.4 64.5—80.2 11	1.3 ± 0.1 1.0—1.8 10		143 ± 13.7 102—219 8		5, 11, 54, 68, 95, 102, 108, 147
Mullet, red *Mullus barbatus*	19.0 ± 0.4 16.8—23.0 19	5.0 ± 0.7 0.8—10.8 19	75.3 ± 0.8 68.4—79.9 19	1.7 ± 0.1 1.3—2.1 18				11, 111
Needlefishes *Belonidae* spp	23.2 ± 1.8 20.6—26.6 3	1.1 ± 0.5 0.3—2.1 3	74.9 ± 2.3 70.4—78.0 3	1.6 ± 0.1 1.4—1.8 3		84.5 78—91 2		11, 65, 143
Ocean perch, Pacific *Sebastes alutus*	18.1 ± 0.6 17.2—19.2 3	1.4 ± 0.1 1.2—1.5 3	79.1 ± 0.4 78.4—79.8 3	1.2 ± 0.03 1.1—1.2 3				66, 137
Oysters *Ostreidae* spp	7.8 ± 0.5 5.0—14.3 22	1.5 ± 0.1 0.7—2.6 21	84.8 ± 0.9 76.0—93.0 26	1.8 ± 0.1 1.1—2.7 19	4.2 ± 0.3 2.3—6.5 20	78.5 ± 5.7 54—92 6	262 ± 52.9 112—470 6	10, 16, 33, 42, 57, 59, 65, 81, 94, 98, 103, 123, 125, 143
Oyster, blue point *Crassostrea virginica*	6.9 ± 0.3 5.6—10.0 24	1.5 ± 0.1 0.7—2.4 24	85.7 ± 0.5 77.4—90.2 40	1.5 ± 0.1 0.7—2.9 23	3.3 ± 0.2 1.9—4.7 18		47.5 37—58 2	10, 53, 82, 126, 131, 146, 154
Parrotfishes *Scaridae* spp	19.7 ± 0.7 18.9—21.0 3	0.9 ± 0.5 0.4—2.0 3	78.7 ± 1.4 75.8—80.2 3	1.3 ± 0.1 1.1—1.5 3		105 1		65, 67, 143
Perch, yellow *Perca flavescens*	19.0 ± 0.3 17.3—19.9 9	0.9 ± 0.1 0.5—1.2 8	79.1 ± 0.3 78.3—80.2 6	1.4 ± 0.3 0.6—3.3 8				10, 19, 20, 45, 140
Perches *Serranidae* spp	18.0 1	1.0 ± 0.4 0.3—1.5 3	81.1 ± 0.5 80.4—82.0 3	1.2 1.1—1.2 2		83 1		11, 16, 62, 67, 115
Pikes *Esocidae* spp	19.0 18.2—19.7 2	1.2 1.2—1.2 2	77.9 ± 1.8 72.5—80.2 4	1.2 1.1—1.3 2				31, 84, 140
Pilchards *Sardinops* spp	16.7 ± 0.6 14.7—19.4 7	2.0 ± 0.7 0.3—5.2 7	76.7 ± 0.6 74.5—78.9 7	3.7 ± 0.6 1.1—4.9 7		87.3 ± 10.3 70—117 4		11, 68
Pilchard *Sardina caerulea*	19.2 ± 0.2 16.9—21.4 30	8.0 ± 1.1 0.3—21.4 32	71.4 ± 1.1 59.7—79.7 30	1.8 ± 0.3 1.3—2.7 4				44, 93, 152
Pollack, coalfish *Pollachius virens*	18.6 ± 0.3 17.4—19.3 7	0.5 ± 0.1 0.2—1.0 7	79.2 ± 0.7 77.4—81.6 6	1.6 ± 0.1 1.3—2.0 6				6, 10, 18, 102
Pollack, walleye *Theragra chalcogramma*	17.4 16.8—18.0 2	0.9 0.7—1.0 2	82.5 1	1.1 1				6, 35
Pomfrets *Bramidae* spp	18.9 ± 0.6 16.2—21.6 10	1.1 ± 0.3 0.6—1.4 3	76.5 ± 1.1 70.6—80.3 10	1.3 ± 0.2 0.4—2.2 7	2.8 1.3—2.3 2	93.3 ± 4.1 84—101 4		72, 90, 102, 109, 112, 121, 155
Pompano *Trachinotus* spp	19.3 ± 0.4 17.6—21.0 8	1.4 ± 0.4 0.2—4.0 8	77.3 ± 0.6 75.3—80.4 8	1.2 ± 0.1 0.4—1.5 8	2.8 1	86.2 ± 3.4 83—99 5		54, 65, 121, 155
Porgies *Dentex* spp	19.9 ± 0.5 18.7—21.4 5	1.8 ± 0.5 1.0—3.5 5	77.4 ± 0.7 76.4—80.0 5	1.6 ± 0.2 1.3—2.1 5		94.7 ± 5.2 86—104 3		9, 11, 144
Porgies *Sparus* spp	20.8 ± 0.4 19.0—22.8 8	1.8 ± 0.5 0.2—4.9 10	75.3 ± 0.5 73.6—77.4 8	1.5 ± 0.2 1.3—2.5 8	1.1 0.7—1.5 2	100.7 ± 3.5 90—115 6		5, 86, 108, 121, 143, 144, 155
Porgies *Pagrus* spp	20.3 ± 0.2 19.9—20.5 3	1.2 ± 0.5 0.6—2.2 3	77.1 ± 0.2 76.9—77.5 3	1.5 ± 0.2 3		102 1		9, 144

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
	gm per 100 gm					*cal/100 gm*	*mg/100 gm*	
Porgy *Box boops*	19.0 ± 0.8 17.3—20.9 4	6.3 ± 1.3 4.5—10.1 4	73.5 ± 1.5 69.3—76.5 4	1.9 ± 0.2 1.4—2.4 4		128.8 ± 13.8 113—170 4		11, 102
Prawns Miscellaneous spp	16.8 ± 1.1 8.9—23.2 19	1.2 ± 0.2 0.3—3.1 17	75.3 ± 1.0 67.5—80.6 20	2.7 ± 0.3 1.6—5.2 14				2, 16, 35, 77, 90, 112, 113, 114
Puffer *Sphoeroides* spp	23.2 1	0.7 1	74.2 1	1.1 1.0—1.2 2				39, 65
Redfish *Sebastes marinus*	18.0 ± 0.1 17.9—18.1 7	1.3 ± 0.2 0.6—2.2 7	79.4 ± 0.2 78.8—79.6 6	1.1 ± 0.0 1.1—1.1 6				10, 32, 118, 133
Rockfishes *Sebastes* spp	18.8 ± 0.3 17.2—20.8 13	1.2 ± 0.2 0.2—2.4 14	78.3 ± 0.5 75.1—80.0 12	1.2 ± 0.02 1.1—1.3 11				10, 106, 107, 117, 133, 136
Sablefish *Anoplopoma fimbria*	13.3 12.9—13.6 2	14.0 12.8—15.2 2	71.5 1	1.0 1				10, 137
Salmon, chinook *Oncorhynchus tshawytscha*	16.2 ± 0.4 13.4—17.6 10	11.5 ± 2.4 2.2—19.0 8	67.6 ± 2.2 61.3—79.9 10	0.9 ± 0.02 0.9—1.0 10				10, 55
Salmon, chum *Oncorhynchus keta*	20.7 ± 0.7 18.4—24.5 9	4.3 ± 0.6 1.3—4.8 11	73.8 ± 1.4 68.9—78.3 8	1.5 ± 0.1 1.2—1.7 8				10, 61, 64
Salmon, coho *Oncorhynchus kisutch*	21.5 ± 0.1 20.5—22.0 14	5.7 ± 0.5 3.1—9.0 14	72.7 ± 0.5 70.3—75.3 13	1.2 ± 0.01 1.1—1.3 13				10, 69, 116
Salmon, pink *Oncorhynchus gorbuscha*	19.4 ± 0.2 17.2—20.6 22	5.3 ± 0.4 2.0—9.4 36	74.0 ± 0.5 69.0—78.3 33	1.2 ± 0.02 1.1—1.4 21			65 1	10, 40, 61, 120, 134, 139
Salmon, sockeye *Oncorhynchus nerka*	20.9 ± 0.5 17.9—22.7 13	7.5 ± 1.2 1.6—19.2 16	72.8 ± 1.4 65.6—80.3 14	1.2 ± 0.02 1.1—1.3 12				10, 61, 84, 115, 142
Sandlanches *Ammodytes lancedatus*	17.9 1	1.5 1	78.0 1	2.8 1		87.0 1		102
Sardine *Sardinella eba*	19.0 1	3.7 1	77.1 1	2.6 1				9
Sardine, gilt *Sardinella aurita*	20.5 ± 0.2 17.3—22.3 49	3.8 ± 0.3 0.4—20.0 125	74.8 ± 0.3 65.9—79.9 50	2.1 ± 0.1 1.4—2.9 49				9, 60
Sardine, Indian *Sardinella longiceps*	19.3 ± 0.7 17.7—21.0 4	2.9 ± 0.6 1.9—4.6 4	75.7 ± 0.1 75.3—76.0 4	1.5 ± 0.1 1.3—1.6 4	0.7 0.1—1.3 2	103 ± 6.0 91—110 3		5, 65, 108, 121
Scad *Decapterus* spp	21.8 ± 1.5 19.2—24.4 3	2.4 ± 0.7 1.0—4.9 5	75.4 74.2—76.6 2	1.5 1.1—1.8 2	1.2 1	109 101—117 2		65, 121, 147
Scallop *Pectinidae* spp	17.2 ± 0.7 15.2—20.1 7	0.7 ± 0.2 0.3—1.6 7	79.2 ± 0.8 74.6—85.6 11	1.7 ± 0.1 1.3—1.8 6				10, 16, 63, 84, 91, 125, 131, 150
Scallop, Atlantic Bay *Pecten irradians*	15.4 ± 0.2 13.4—17.0 24	0.5 ± 0.03 0.3—0.9 24	80.7 ± 0.4 74.6—83.7 24	1.4 ± 0.04 1.1—1.7 24	1.7 ± 0.2 1.4—1.9 3		105.7 ± 35.2 60—175 3	150
Scallop, calico *Aequipecten gibbus*	15.9 ± 0.2 15.6—16.4 4	0.6 ± 0.06 0.5—0.7 4	79.8 ± 0.4 78.8—80.4 4	1.5 ± 0.03 1.4—1.5 4				150
Scup *Stenotomus chrysops*	18.8 ± 0.1 18.4—19.1 5	3.7 ± 0.8 1.2—5.9 5	75.5 ± 0.6 73.6—77.0 5	1.2 ± 0.1 1.1—1.4 5				14, 95, 148

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
	gm per 100 gm					*cal/100 gm*	*mg/100 gm*	
Shad *Alosa sapidissima*	18.5 ± 0.5 15.7—20.0 9	8.3 ± 1.7 1.7—15.2 9	71.4 ± 1.4 64.6—77.0 9	1.5 ± 0.1 1.2—1.9 9				5, 14, 95, 108, 143
Shad *Clupeidae* spp	17.4 ± 0.7 15.1—21.5 8	12.0 ± 3.6 1.2—23.1 6	70.2 ± 2.6 58.0—78.3 8	2.1 ± 0.4 1.2—4.2 8		87 1		45, 65, 112, 121, 140
Sharks Mixed spp	22.7 ± 0.8 14.9—27.1 18	0.5 ± 0.2 0.1—2.9 14	76.3 ± 0.5 72.0—76.9 17	1.3 ± 0.1 1.0—2.0 17		101 ± 4.3 4		54, 65, 67, 68, 72, 90, 102, 112
Shrimp Miscellaneous spp	20.5 ± 0.71 16.2—22.7 16	1.1 ± 0.2 0.1—3.2 19	76.2 ± 0.7 69.6—84.8 26	2.6 ± 0.5 1.3—6.8 14	2.2 2	88.3 ± 9.7 69—99 3	159.5 ± 13.8 138—200 4	10, 16, 35, 37, 42, 56, 59, 94, 98, 108, 125, 127, 131, 143
Skates *Rajidae* spp	20.3 19.0—21.5 2	0.2 1	78.0 ± 0.9 76.4—79.6 3	1.3 1.1—1.4 2		80 1		16, 90, 102
Skipjack *Euthynnus pelamis*	25.5 ± 0.4 23.8—26.6 8	3.4 ± 0.6 0.3—7.4 14	70.0 ± 0.4 68.6—71.1 6	1.5 ± 0.1 1.3—1.7 7				43, 50, 61, 62, 70, 147
Smelts *Osmeridae* spp	16.6 ± 0.6 14.3—18.8 9	3.9 ± 0.7 2.3—6.7 9	79.0 ± 0.4 76.8—80.2 8	1.5 ± 0.2 1.1—2.3 6				10, 21, 45, 91, 125, 140
Snappers *Lutjanidae* spp	19.2 ± 0.4 16.7—21.9 16	2.0 ± 0.5 0.4—7.4 16	77.9 ± 0.5 72.7—81.9 19	1.3 ± 0.1 1.0—1.7 15	0.7 ± 0.2 .2—1.3 4	99.5 ± 5.2 82—146 12		5, 9, 16, 34, 54, 65, 67, 68, 84, 96, 121, 143, 147, 155
Snooks *Centropomidae* spp	18.5 ± 1.1 13.7—20.6 6	0.9 ± 0.2 0.3—1.9 6	78.3 ± 0.7 77.0—82.0 8	1.2 ± 0.1 1.0—1.5 8	0.6 0.2—0.6 2	82.5 79—86 2		16, 54, 65, 104, 121
Soles *Limanda* spp	18.0 ± 0.4 17.0—19.2 6	1.0 ± 0.2 0.1—1.3 6	81.1 ± 0.3 80.0—82.7 8	1.3 ± 0.1 1.1—1.5 4				6, 10, 18, 135
Sole *Soleidae*	18.7 ± 1.3 16.6—21.2 3	1.07 ± 0.5 0.2—1.7 3	78.4 ± 1.2 75.0—80.1 4	1.7 ± 0.2 1.3—2.1 4		82.5 80—85 2		11, 16, 102, 144
Sole, Dover *Microstomus pacificus*	15.0 ± 0.3 13.9—16.6 7	0.8 ± 0.1 0.6—1.2 6	83.7 ± 0.3 82.6—84.4 6	1.1 ± 0.0 1.1—1.1 4				10, 117, 120, 135
Sole, English *Parophys ventulus*	17.1 ± 0.4 16.4—18.5 5	1.4 ± 0.1 1.2—1.8 5	81.2 ± 0.2 80.7—81.8 4	1.2 ± 0.0 1.2—1.3 5				10, 18, 133, 135
Sole, Petrole *Eopsetta jordani*	17.4 ± 0.8 14.8—19.4 6	2.4 ± 0.9 0.9—6.7 6	78.5 ± 1.0 74.8—81.0 5	1.8 ± 0.5 1.2—3.8 5		85.0 1		10, 11, 135
Spot *Leiostomus xanthurus*	17.9 1	3.1 1	77.5 1	1.1 1				95
Sprat *Clupea sprattus*	16.9 16.7—17.1 2	6.7 1.8—11.6 2	69.2 ± 1.2 66.8—71.0 3	1.9 ± 0.1 1.8—2.0 3		176 1		16, 35, 102
Squawfish, northern *Ptychocheilus oregonensis*	17.0 ± 0.4 15.6—18.0 7	2.5 ± 0.2 1.8—3.1 7	79.3 ± 0.2 78.8—80.1 7	1.1 ± 0.02 1.0—1.1 7				28, 140
Squid *Loliginidae* spp	15.3 ± 1.1 11.9—18.4 6	1.0 ± 0.2 0.5—1.4 6	79.3 ± 1.6 74.2—84.0 6	1.8 ± 0.3 1.0—3.1 7	3.0 1	89 80—98 2		38, 65, 67, 80, 108, 143
Surgeonfish *Acipenseridae* spp	18.7 ± 0.5 17.4—20.9 6	1.3 ± 0.5 0.4—3.8 6	80.3 ± 1.9 74.4—89.0 6	1.0 ± 0.2 0.3—1.4 5	1.3 1.3—1.3 2	92.2 ± 6.9 81—119 5		65, 121, 143, 147
Swordfish *Xiphias gladius*	19.5 ± 0.4 18.6—20.8 6	4.1 ± 0.7 2.0—6.4 6	76.2 ± 0.4 74.7—77.5 6	1.3 ± 0.1 1.0—1.9 6	0.7 1	100 87—113 2		11, 85, 89, 143

Table 1, continued.

	Protein	Fat	Moisture	Ash	Carbohydrate	Energy	Cholesterol	References
	gm per 100 gm					*cal/100 gm*	*mg/100 gm*	
Trouts *Salmonidae* spp	16.1±1.1 12.4—19.0 5	11.0±1.1 8.7—14.0 5	71.3±1.8 64.0—76.3 6	1.3±0.2 1.0—2.0 5				35, 91
Trout, brook *Salvelinus fontinalis*	17.5 13.7—21.2 2	4.5 3.4—5.5 2	74.5±1.2 71.5—77.2 4	2.7 2.0—3.3 2				63, 97
Trout, Dolly Varden *Salvelinus malma*	19.9 1	6.5 1	73.1 1	1.2 1				31
Trout, lake *Salvelinus namaycush*	16.4±0.9 11.3—20.0 9	14.9±2.7 9.1—36.0 10	69.3±2.1 52.5—79.0 11	1.2±0.3 0.5—3.3 8				26, 45, 83, 84, 138, 140
Trout, rainbow *Salmo gairdneri*	22.0 1	11.7 1	72.0 66.3—77.7 2	1.3 1				31, 91
Tuna, big eye *Thunnus obesus*	22.5 1	1.3±0.3 0.6—2.0 4	73.1 1	1.3 1		98 1		61, 155
Tuna, bluefin *Thunnus thynnus*	24.7±0.3 23.3—27.5 13	3.9±0.6 1.2—8.0 13	70.4±0.4 67.7—72.6 13	1.3±0.02 1.2—1.4 12		122±3.2 114—129 5		11, 43, 68, 70, 89, 147, 155
Tuna, yellowfin *Thunnus albacares*	24.3±0.2 22.9—25.8 26	2.2±0.5 0.1—9.5 25	73.2±0.5 67.3—77.1 27	1.5±0.03 1.3—1.9 25				10, 16, 43, 65, 70, 78, 93, 107, 147
Tunny, little *Euthynnus alletteratus*	22.8±0.1 22.0—25.4 48	5.7±0.8 0.7—20.2 48	69.8±0.7 59.0—74.4 47	1.6±0.02 1.2—2.1 48				9, 60, 96
Turbot *Rhombus maximus*	16.4 2	2.9 2	78.3 2	1.0 2		94 74—114 2		102
Walleye *Stizostedion vitreum*	19.3±0.2 18.8—19.8 4	1.5±0.3 0.8—1.9 4	79.3±0.6 78.2—80.0 3	1.2±0.03 1.1—1.2 3				133, 140
Weakfish *Cynoscion regalis*	18.7±0.6 15.7—20.0 7	3.2±0.4 1.4—4.3 7	76.6±0.7 74.6—79.6 7	1.19±0.03 1.1—1.3 7				14, 15, 95
Whitefish, lake, trout *Coregonus clupeaformus*	18.0±0.3 15.1—19.8 16	7.6±1.2 1.7—18.5 17	73.4±1.3 62.6—79.0 14	1.3±0.1 1.0—3.1 15				10, 110, 133
Whiting *Merluccius bilinearis*	16.1±0.3 15.2—16.7 6	1.2±0.3 0.2—2.0 6	80.7±0.5 79.3—82.4 5	1.2±0.02 1.1—1.2 5		87.7±11.8 73—111 3	75 1	6, 10, 14, 17

[1] Standard error of the mean.
[2] Range.
[3] This number of averages used to compute the overall average.

factors that influence the fat and moisture content do not cause much variation in the protein and ash content of the edible portion of the fish.

The variability of the fat content of fish flesh is reflected in the energy values. The energy values listed in Table 1 were, in all cases, calculated values, that is:

$$\text{Estimated energy value} = (\text{protein} \times 4) + (\text{fat} \times 9) + (\text{carbohydrate} \times 4)$$

Values for the cholesterol content of raw edible fish are very limited. More work needs to be done in this area because the medical services can use this data in the dietary treatment of certain vascular diseases. Indications are that fish can play a significant role in the dietary regime for certain diseases.

Table 1 does not represent all of the available data on the proximate and energy values of raw edible portions of crustaceans, finfish, and mollusks. This interim report, however, will give a useful résumé until more data becomes available.

SUMMARY

Table 1 lists the values for the overall average for protein, fat, moisture, ash, carbohydrate, energy, and cholesterol; the range of the averages used to compute the mean and standard

error of the mean; and also the number of averages used in the computation for 154 different fish. This review contains data from 155 references.

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