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# FISHERIES OF TURKEY

by

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Date: January 20, 1972

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# FISHERIES IN TURKEY

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## 1.0 FOOD AND POPULATION

At the request of A. I. D. /Turkey, one week[1] was spent in Turkey and over half of this time was in the vicinity of El Azig in the eastern part. It was not possible in such short time to evaluate the potential of inland fisheries and aquaculture for the country, or even for the region visited.

Turkey has a total area of 78,058,000 ha. This includes 26,384,000 ha of cultivated land, with approximately 8 per cent under irrigation.[2] Food crop production on these lands is principally cereals, vegetables, and fruits. In addition, there are 27,995,000 ha of pasture lands supporting over 50 million sheep and goats, and 13 million cattle.

Food available in 1961 in grams per capita per day was:

| | |
|---|---|
| Cereal | 611 |
| Root crops | 100 |
| Sugar products | 51 |
| Pulses, seeds | 36 |
| Vegetables | 288 |
| Fruit | 340 |
| Meat | 37 |
| Eggs | 5 |
| Fish | 6 |
| Milk | 221 |
| Fats and oils | 22 |

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[1] Dates of visit: November 7 - 14, 1971.
[2] Production Yearbook, 1967. FAO. Volume 21.

FAO estimates indicate that food production has risen at about the same rate as population in the period 1961 to 1968. Consequently, the above figures would appear reasonably accurate for today and indicate a relatively good diet is possible both from the standpoint of calories and proteins. However, food available within a country is seldom divided equally and malnutrition undoubtedly exists in lower income groups, especially in the cities.

The population has been increasing at the rate of 2.7 per cent per year, sufficient to increase the total population from 21 million in 1950 to almost 37 million by 1972, and to 45 million by 1980.

## 2.0 WATER AREAS AND FISHERIES

Turkey has a large number of inland lakes, totaling in excess of 203,550 ha. It has 145,000 km of rivers and a coastal shoreline of 207,000 km. The total fish catch is given by FAO as 188,000 metric tons in 1967 and 135,400 metric tons in 1968, an average of approximately 160,000 metric tons per year. Practically all of this was from coastal and off-shore fisheries, with only about 3 per cent or 6,200 metric tons from inland fisheries.

The total catch is estimated to make available about 2 grams high-quality fish protein per person per day, or approximately 10 per cent of the required amounts of animal protein and 3.7 per cent of the total protein requirement per capita.

## 3.0 GOVERNMENT DIVISIONS AND UNIVERSITIES DEALING WITH FISHERIES

### 3.01 The Department of Fisheries in the Ministry of Agriculture

This department has been newly created and is headed by Mr. Suat Beyhan,


MAP OF TURKEY

who is an engineer. There are presently 12 persons in the department, three of whom have had some training related to fisheries. Plans are being developed to establish four regional stations to deal with fisheries management, fish seed production, and research. Also under planning is the establishment of fisheries schools in the Black Sea and Mediterranean coastal areas and in the lake regions to teach fish technology, navigation, and methods of fishing. The new Department has also prepared a manual on how to grow trout. They expressed interest in equipment needed in their new laboratories. Lists of essential equipment for water chemistry and limnology laboratories are given in Sections 5.02 and 5.03.

3.02 Istanbul University Hydrobiological Research Institute

This Institute was not visited, but was reported to have been established about 1945. It has prepared and published limnological surveys on many of the big lakes giving pH, oxygen distribution, water temperatures at three seasons during the year, salinity, concentration of sodium as chloride and as carbonate, and bottom fauna in milligrams per square meter of lake bottom. These data should furnish a basis for further sutdy and for devising various systems of management. Many of the lakes are too saline for growth of freshwater fishes. The principal fish species present in some of the lakes were also determined.

3.03 El Azig Faculty of Veterinary Sciences

At El Azig in east central Turkey, a new school is being developed that is expected to gradually develop into a new university. The Faculty of Veterinary Sciences is part of the Ankara University and is under the direction of Dean Mustafa Temizer. Dean Temizer expects this nucleus to expand into a Faculty of Sciences.

The staff at El Azig includes specialists in biochemistry, virology, microbiology, histology, pharmacology, parasitology, pathology, animal nutrition, and fisheries. They plan to include research and teaching of fisheries, wildlife, and water resources in their program. Names of the faculty and their specialties are given in Section 5.01.

Under the direction of Gurkan Ekingen of their staff, a series of six experimental ponds has been constructed and additional ones are planned. The water supply comes from seepage out of a small irrigation reservoir (Figure 1) and is cool enough to grow trout most of the year. The Faculty also has riparian rights to the shoreline of approximately 500 meters on Hazar Bolo, a hydroelectric reservoir of 8,000 ha which is located about 20 km from El Azig (Figure 2). The reservoir is 300 m deep, but nothing is known of its limnological characteristics. Dr. Temizer suggested that a small research unit could be established there to study the reservoir fisheries. The water from this lake goes through a tunnel to several power stations at lower levels.

Also, 45 km from El Azig will be Keban, a new reservoir on the Euphrates (Firat) River, which will be the largest in Turkey. Studies on the management of its fisheries would be part of the Faculty's planned program. To the north at a distance of slightly over 100 km is the Munzur River, which arises at the base of a mountain cliff and is fed by melting snows from the mountains. This is trout water and the stream contains a strain of brown trout. Salmo trutta, the origin of which is unknown. This river produces excellent trout fishing, which is enjoyed by a rather limited number of tourists and natives. Most of the local fishermen

Figure 1. A portion of the six experimental ponds constructed by Veterinary Faculty at El Azig. Brown trout are being cultured using ground meats for food. The water supply is seepage from an irrigation reservoir.

Figure 2. The Veterinary Faculty has the use of a 500-meter shoreline for research on Hazar Bolo.

catch the trout by driving them into traps. Fish captured varied from 20 to 75 cm in length. The best fishing is near the town of Ovacik, city of Tunceli, and is in the midst of beautiful mountain scenery. Small side streams entering the valley should provide suitable sites for commercial trout farms, but at the present time remoteness from markets would make trout culture unfeasible.

Appropriate members of the Veterinary Faculty plan to shift part of their research time to projects on fish feeding, fish parasites and disease control, chemical and cultural aspects of fisheries. Their training should be quite useful in these fields. Publications describing species of fishes in Turkey and neighboring countries will be needed. A few publications are listed in Section 5.04.

El Azig is in an area of very low rainfall, but fish cultures are possible in natural lakes, in reservoirs, below springs, and in irrigation canals and ponds fed by irrigation water. The feasibility of such cultures would necessitate more detailed study than was possible on this trip. Among the factors to be considered are distance from markets, cost of transportation to market, cost of fertilizer and fish feeds, other costs of production, sale price of fishes, and acceptability of the cultured fish on the markets.

The Keban Reservoir will increase availability of fish on local markets and it may be expected that methods for their transportation and sale to more distant markets will gradually be developed by private industry if sufficient profit can be made. This in turn will stimulate further expansion of inland fisheries.

3.04 The Institute of Veterinary Virology

This Institute is located at El Azig. It was established in 1952 and is presently under the direction of Dr. Raffet Erdem. It has a staff of 11 persons who work on food hygiene and technology, diagnosis of disease and parasites, virology and bacteriology. Workers prepare serum for treatment of rabies and a vaccine for poultry diseases. Their expertise and laboratory facilities would add strength to the Veterinary Faculty's proposed teaching and research in fisheries and wildlife.

## 4.0 POSSIBILITY OF FISHERIES IN THE POPPY-GROWING AREAS

This is an area of many lakes and it is possible that fisheries might be developed in and around the lakes to provide work and income for farmers who previously grew poppies. No time was available on this trip to evaluate the potential of fisheries in the area. Some of the lakes are reported to be too saline for fish production and others are reported to contain small amounts of arsenic. However, fish do not normally store arsenic in their flesh. Fish grown experimentally in water containing 16 ppm arsenic trioxide contained arsenic only in their digestive tracts and did not store it in their bodies.

The types of fisheries that can be developed around and in shallow lakes are:

1. Improvement of fisheries in the lake itself by stocking more efficient species and sometimes by use of phosphate fertilization.

2. Culture of fish in pens extending from the shoreline out to water depths of 2 meters. Cultures in pens produce from 200 to 10,000 kg fish per ha of pen. The latter is with intensive feeding.

3. Cage culture of fish in slat boxes or cages suspended in the top water of the lake. Production of 25 to 125 kg per cubic meter of box can be obtained.

## 5.0 APPENDIX

### 5.01 Staff of Veterinary Faculty at El Azig

| Name | Specialty | Where Trained |
|---|---|---|
| Dr. Mustafa Temizer | Dean | |
| Dr. Bahir Özgencil | Pathology | United States, Germany |
| Dr. Ruhi Töre | Biochemistry | |
| Dr. Mehmet Kandil | Virology | Germany, England |
| Dr. Hilmi Türker | Animal Nutrition | England |
| Dr. Ismet Dokmeci | Pharmacology | France |
| Dr. Rifat Cantoray | Parasitology | France |
| Gürkan Ekingen | Fisheries | United States (Auburn University) |
| Ahmet Çolak | Fisheries | |
| Nursal Metin | Pathology | |
| Tanju Asi | Biochemistry | |
| Attila Ilgaz | Microbiology | |
| Haluk Arvasi | Histology | |
| Ercan Artan | Anatomy | |
| Dr. Mustafa Kahraman | Microbiology | (To transfer from Ankara University) |
| Dr. Ahmet Noyan | Physiology | (To transfer from Ankara University) |

## 5.02 List of Equipment and Chemicals Needed for a Basic Water Chemistry Laboratory

## Materials for Water Chemistry Lab

| | I Sampling Equipment | Cost in U.S. |
|---|---|---|
| 36 | BOD bottles 300 ml | $78.23 |
| 2 | Sampling device - bottle train sampler | |
| 4-6 | Field thermometer 0-50°C | 16.50 |
| 2 | Field reagent box | |
| | **II Laboratory Hardware** | |
| 4-6 | Ring Stand or Burette Support 60-75 cm high | 30.00 |
| 4-6 | Fisher or Bunsen burner (if gas is available) | 35.00 |
| 12 | Wire gauze, 15 cm x 15 cm, asbestos center | 4.20 |
| 2 | Crucible tongs | 7.00 |
| 2-3 | Burette clamps, double | 2.40 |
| 6 | Clamps, single general utility | 13.20 |
| 4-6 | Ring clamps or support rings or tripods, 125 mm diameter | 9.00 |
| 3-4 | Triangular files - glass cutter | 3.60 |
| 1 | Cork borer | 5.00 |
| 1 | Rack for funnels | 15.50 |
| 1 | Rack for Kjeldahl flasks | 6.50 |
| | **III Volumetric glassware - pyrex, corex or kimax** | |
| | Volumetric flasks | |
| 10 | 1 liter | 38.00 |
| 10 | 500 ml | 35.50 |
| 10 | 200 or 250 ml | 27.00 |

| | | |
|---|---|---|
| | Volumetric pipettes | |
| 3-4 | 5 ml | $ 9.60 |
| 3-4 | 10 ml | 10.40 |
| 1-2 | 25 ml | 5.70 |
| 1-2 | 50 ml | 6.06 |
| 3-4 | 100 ml | 13.20 |
| 1-2 | 200 ml | 7,60 |
| | Graduated pipettes | |
| 5 | 1 ml in hundredths of ml | 7.50 |
| 5 | 2 ml in tenths of ml | 8.00 |
| 5 | 5 ml in tenths of ml | 8.00 |
| 5 | 10 ml in tenths of ml | 9.50 |
| | Graduated cylinders | |
| 1 | 50 ml | 3.10 |
| 3-4 | 100 ml | 13.80 |
| 3-4 | 200 ml | 14.40 |
| 3-4 | 100 ml | 27.60 |
| | Burettes | |
| 2 | 50 ml in tenths of ml | 33.00 |
| 2 | 25 ml in tenths of ml | 32.00 |
| 4 | 10 ml in tenths of ml, squeeze bottle, self zeroing | 80.00 |
| | IV Other Glassware - Pyrex, Kimax | |
| | Beakers, Griffin low form with lip | |
| 5-6 | 100 ml | 2.70 |
| 5-6 | 250 ml | 3.75 |

| | | |
|---|---|---|
| 3-4 | 600 ml | $ 5.75 |
| 3-4 | 1,000 ml | 8.80 |
| | Flasks (Erlenmeyer, narrow mouth) | |
| 12 | 125 ml | 25.44 |
| 24 | 250 ml | 52.32 |
| 12 | 500 ml | 27.24 |
| 12 | 1,000 ml | 31.20 |
| | V Miscellaneous Equipment | |
| 6 | condensers, 300 mm | 27.00 |
| 24 | Funnels, 5-7.5 cm diameter, long stem | 15.36 |
| 2 | Dessicator, 220-300 mm diameter | 26.00 |
| | Rubber stoppers, 1 doz of each size to fit each size flask | 37.40 |
| 30m | Rubber tubing 5-6 mm inside diameter | 54.00 |
| 10m | Glass tubing 5-6 mm diameter | 16.00 |
| 1 | pH meter - Photovolt, battery powered for field use[1] | 265.00 |
| 1 | Spare electrode for pH meter | 24.00 |
| 24 | Nessler tubes, graduated at 50 and 100 ml | 60.24 |
| 1 | Rack for Nessler tubes | 9.75 |
| 1 pr | Asbestos gloves | 6.00 |
| 1 | Oven - for temp. up to 150-200°C | 225.00 |
| 1 | Still, 4 liter/hr., distilled $H_2O$ | 305.00 |
| 1 | Storage jug for distilled $H_2O$, 40-50 liter | 25.52 |
| 6 | Wash bottles, 500 ml polyethylene | 3.65 |
| 1 | Analytic balance, sensitivity 0.1 mg, capacity 150-200 gm | 795.00 |

[1]or laboratory 220 volt model

| | | |
|---|---|---|
| 1 | Set of weights for balance | $ 15.00 |
| 1 | Triple beam or torsion balance, sensitivity 0.1 gm, capacity 1-2 kg | 185.00 |
| 3-4 | Reagent bottles, 16 oz or 500 ml | 6.92 |
| 36 | Dropping bottles, 60 ml polyethylene, or glass with pipette | 12.60 |
| 3 box | Filter paper 15 cm Whatman No. 42 | 9.36 |
| 3 box | Filter paper 15 cm Whatman No. 5 | 5.58 |
| 25 | Pipets, ungraduated, with rubber bulb (eyedroppers) | 1.65 |
| 5-6 | Evaporating dish, porcelain, 50 or 100 ml | 6.75 |
| 1 box | Glazed weighing paper, for use with analytic balance | 0.45 |
| 12 | Kjeldahl flasks, 800 ml | 158.00 |
| 12 | Stoppers for Kjeldahl flasks | 2.50 |
| 1 | Hood or suction manifold to exhaust fumes | 295.00 |
| 2 | Thermometer 0-200°C | 7.20 |
| 12 | Brown bottle, 16 oz or 500 ml, for reagent storage | 2.75 |
| 12 | Spatula, assorted sizes | 9.60 |
| 1,000 | Labels | 2.00 |
| 1 | Powder funnel 10=15 cm inches diameter | 0.78 |
| 1 | Powder funnel 5-7.5 cm inches diameter | 1.00 |
| 500 gm | Boiling beads | 1.50 |
| 1 | Magnetic Stirrer | 37.00 |
| 12 | Magnetic Stirring bars, 2 to 3 cm | 30.00 |
| | TOTAL COST = | $3,458.85 |

Chemicals for Water Chemistry Laboratory
For Determination of Dissolved $O_2$, $CO_2$, Alkalinity
Ammonia, Organic Nitrogen, Total Hardness, and pH

(All reagents are Reagent Grade except where otherwise stated)

| | |
|---|---|
| **$O_2$Det'n*** | |
| 6-4Kg bottles | $H_2SO_4$, conc. Sp. Gr. 1.84 |
| 500 gm | Sulfamic acid ($NH_2SO_2OH$) |
| 2 Kg | $MnSO_4$ |
| 5 Kg | NaOH |
| 2 Kg | KI |
| 500 gm | $K_2Cr_2O_7$ |
| 250 gm | Soluble starch powder |
| 2 liter | glycerine |
| 3 - 2.7 Kg bottles | HCl, conc. Sp. Gr. 1.19 |
| **$CO_2$Det'n** | |
| 10 gm | phenolphthalein indicator |
| 2 liter | ethyl or methyl alcohol, purified grade |
| 1 Kg | $Na_2CO_3$, or 2 liters, 1-N std. NaOH |
| **Alkalinity Det'n** | |
| 10 gm | Xylene cyanole indicator |
| 10 gm | Methyl orange indicator |
| **pH Det'n** | |
| 1 liter each | pH buffers, pH 5, 7, 9 (liquid or tablets) |

*Det'n = determination

Ammonia Det'n

| | |
|---|---|
| 6 liter | Nessler's reagent or 500 gm $HgI_2$ |
| 500 gm | $ZnSO_4$ |
| 1 Kg | Rochelle salt |
| 100 gm | Lead Acetate |
| 500 gm | $KH_2PO_4$ |
| 1 Kg | $K_2HPO_4$ |
| 500 strips | Litmus paper, red |
| 500 gm | $NH_4Cl$ |

Hardness Det'n

| | |
|---|---|
| 10 gm | Calmagite (or Chrome Black T, Eriochrome Black T, or F241) |
| 100 gm | Hydroxylamine HCl |
| 250 gm | $CaCl_2$ |
| 500 gm | E.D.T.A. (Versene)* |
| 100 gm | $MgCl_2$ |
| 1.8 Kg bottle | $NH_4OH$ Sp. Gr. 0.90 |

Kjeldahl Digestion for Organic Nitrogen

| | |
|---|---|
| 2 Kg | $Na_2SO_4$ or $K_2SO_4$ (anhydrous) |

Miscellaneous

| | |
|---|---|
| 2 Kg | Anhydrous $CaCl_2$, granular, 4 to 8 mesh, Technical grade |
| 1 Kg | Soda Lime, granular, 4 to 8 mesh, Technical grade |

TOTAL COST.....$ 193.00

*sodium salt of ethylenediaminetetraacetic acid

## 5.03 List of Equipment Needed for a Basic Limnological Research Laboratory

| LIMNOLOGICAL APPARATUS | COST |
|---|---|
| **MAPPING** | |
| 2 PLANETABLES WITH ALIDADES (LOCAL CONSTRUCTION) (Satisfactory for mapping areas up to 10 acres with reasonable accuracy) | $ 5.00 |
| 1 STEEL TAPE 100 FT OR 50 M | 6.10 |
| 2 TRANSITS WITH TRIPODS ($834.50) | 1,669.00 |
| 2 PROTRACTORS ($2.60 each) | 5.20 |
| 1 GRADUATED LINE FOR DEPTHS | 1.00 |
| 1 STADIA ROD (For use with transit where high degree of accuracy is not required) | 69.00 |
| 1 POLAR PLANIMETER | 54.00 |
| **TEMPERATURE** | |
| 12 MAXIMUM - MINIMUM THERMOMETERS @ $15.00 each | 180.00 |
| 1 ELECTRIC - RESISTANCE THERMOMETER. 50 FT CABLE (The thermometer on YSI Oxygen meter may be satisfactory) | 175.00 |
| **VISIBILITY** | |
| 1 SECCHI DISK (Local construction) | 1.00 |
| **CURRENT** | |
| 1 CURRENT METER | 520.00 |
| **BOTTOM MATERIALS SAMPLER** | |
| 1 EKMAN DREDGE WITH MESSENGER | 92.00 |
| 1 SIEVE FOR SCREENING (Local construction) (30 mesh/inch) | 10.00 |

| LIMNOLOGICAL APPARATUS | COST |
|---|---|
| **WATER SAMPLER** | |
| *1 KEMMERER SAMPLER WITH MESSENGER (Can be operated on ordinary rope) | 92.00 |
| ***1 VAN DORN WATER SAMPLER | 90.00 |
| MESSENGER (Can be obtained with transparent cylinder, which is desirable for seeing stratification of algae. This should be operated on a cable because the clamping mechanism tends to cut rope.) | 12.50 |
| 1 BOTTLE TRAIN APPARATUS (Local construction) | 30.00 |
| BOD bottles for train - $57.27 per 24 | 57.27 |
| **PLANKTON** | |
| *1 PLANKTON NET, WISCONSIN TYPE WITH DETACHABLE "BUCKET," NO. 20 BOLTING CLOTH | 80.00 |
| 1 EXTRA BUCKET FOR ABOVE | 50.00 |
| 1 EXTRA BOLTING CLOTH NO. 20 FOR REPLACEMENT At least 1 yard (price approximately $23 per yd. from PAUL O. ABBE', INC., 139 Center Ave., Little Falls, N. J. 07424) | 23.00 |
| **1 PLANKTON CENTRIFUGE | 206.00 |
| *1 HENSEN-STEMPLE PIPET 1 ml. x 2 ml. | 23.00 |
| 1 OVEN, DRYING | 200.00 |
| 1 FURNACE, MUFFLE - 1400°F | 300.00 |
| 2 DESICCATORS @$20.00 each | 40.00 |
| 1 NEPHELOMETER, COLEMAN MODEL 9 | 557.00 |
| **GENERAL** | |
| 1 COMPOUND MICROSCOPE, With substage condenser, objectives 16 mm., 4 mm., and oil imm. and 10X Ocular. Mechanical Stage. about | 600.00 |
| 1 STAGE MICROMETER 2 mm. 0.1 and 0.01 mm. | 27.00 |

| LIMNOLOGICAL APPARATUS | COST |
|---|---|
| 1 OCULAR MICROMETER DISC 5mm. in O.a mm. | 10.00 |
| 1 OCULAR MICROMETER DISC, WHIPPLE | 18.00 |
| 1 COUNTING CELL, SEDGWICK-RAFTER, PLANKTON | 12.25 |
| 1 STEREOSCOPIC MICROSCOPE 10X-70X | 600.00 |
| **BALANCES** | |
| 1 TRIPLE BEAM WITH WEIGHTS TO 2000 GRAM CAPACITY 0.1 gr. DIVISIONS Approximately | 30.00 |
| 1 DIAL-O-GRAM 310 OHAUS (TYPE) 311 g. by 0.01 g. | 60.00 |
| 1 ANALYTICAL BALANCE, SENSITIVE TO 0.1 mg. | 980.00 |
| Total cost: | $6,880.32 |

*WILDLIFE SUPPLY CO., 2200 S. Hamilton St., Saginaw, Mich. 48602

**FOERST MECHANICAL SPECIALTIES CO., 2407 N. St. Louis Ave, Chicago, Ill.

***HYDRO PRODUCTS, P. O. Box 10766, San Diego, California

| LIMNOLOGICAL APPARATUS | COST |
|---|---|

REFERENCE BOOKS

| | |
|---|---|
| Hutchinson, G. Evelyn. 1957. A Treatise on Limnology Vol. I. Geography, Physics, and Chemistry John Wiley and Sons, Inc. London. 1015 pg. | 22.00 |
| _____ 1967. A Treatise on Limnology. Vol. II. Introduction to Lake Biology and the Limnoplankton John Wiley and Sons, Inc. New York, London, Sydney. 115 pg. | 39.00 |
| Prescott, G. W. 1964. How to Know the Fresh-water Algae. Wm. C. Brown Company Publishers, Dubuque, Iowa. | 4.00 |
| Edmondson, W. T. (Ed.) 1959. Ward and Whipple Fresh-water Biology. 2nd Edition. John Wiley and Sons, Inc. London. 1248 pg. | 34.50 |
| Usinger, Robert L. 1963. Aquatic Insects of California. Univ. of Calif. Press, Berkeley and Los Angeles, 508 pg. | 10.00 |
| American Public Health Association 1965. Standard Methods for the Examination of Water, Sewage, and Industrial Wastes. American Public Health Association, Inc., 1790 Broadway, New York 19, N.Y. 522 pg. | 14.00 |
| Welch, Paul S. 1948. Limnological Methods. Blakiston Co. Philadelphia. 381 pg. | |
| Lagler, Karl F. 1956. Freshwater Fishery Biology. 2nd ed. Wm. C. Brown Co. Publishers, Dubuque, Iowa. | 7.95 |
| Total cost: | $131.45 |

## 5.04 References Possibly of Use in Identifying Fishes of Turkey[1]

Banarescu, P. 1964. Fauna Republicii Populare Romine, Vol. 13, Pisces--Osteichthyes (Pesit ganoizi si ososi). Acad., R.P.R., Bucharest, 959 pp. and 4 fold-out figures.

Beckman, W. C. 1962. The freshwater fishes of Syria and their general biology and management. FAO Fisheries Tech. Pap. 8:1-301.

Berg, L. S. 1962-65. Freshwater fishes of the U.S.S.R. and adjacent countries (English Translation). Israel Program for Scientific Translations, Jerusalem. Vol. 1 (1962), 504 pp. Vol. 2 (1964), 496 pp. Vol. 3 (1965), 510 pp. and foldout map.

Khalaf, K. T. 1961. The marine and freshwater fishes of Iraq. Ar-Rabitta Press, Baghdad. 164 pp.

Klausewitz, Wolfgang., (Natur-Museum Senckenberg, Senckenberg-Anlage 25, 6 Frankfurt am Main, Germany) and his students publish regularly on Turkish fishes. (Copies of reprints can probably be obtained by writing Dr. Klausewitz.

Kosswig, C. 1952. Die Zoogeographie der Turkischen Susswasserfische. Publ. Hydrobiol. Res. Inst., Fac. Sci., Univ. Istanbul, Ser. B: 1:85-101.

---

[1] List prepared by Dr. J. S. Ramsey, staff member, Department of Fisheries and Allied Aquacultures, International Center for Aquaculture, Auburn University, Auburn, Alabama 36830.