

## Section 20

# FORESTRY, FISHERIES, AND MINING

This section presents data on forests and forest reserves, commercial fishing and fish populations, and mining and mineral products.

The most recent available statistics show 1.7 million acres of forest and 700,000 acres of timberland in the State, most of it on the Big Island. Over 46,000 acres had been planted in eucalyptus and other species of trees by mid-1995. Recent surveys of vegetation on three islands show ohia lehua to be the most common type of tree on Oahu and Kauai (with acreages of 38,000 and 109,000, respectively) and kiawe the leading type (at 33,000 acres) on Molokai. Forest and brushland fires burned 37 square miles in fiscal 1995.

The commercial fish catch in fiscal year 1994 amounted to 24 million pounds, with a value of \$58 million to primary producers. *Ahi* (yellowfin and bigeye tuna) and *aku* (skipjack) accounted for 46 percent of the total value. Other important species are swordfish, marlin, *opakapaka*, *mahimahi*, *akule*, and *ono*. Commercial fishermen numbered 4,060. Among Marine Life Conservation Districts, those with the most fish per acre were Kealakekua Bay (5,878), Honolulu Bay (4,343), and Manele-Hulopoe Bays (3,787).

The value of mineral production reached \$137 million in 1994, almost all of it in cement (\$45 million) and crushed stone (\$84 million).

Important sources of data on these subjects are the United States Census of Mineral Industries and reports and records of the U.S. Bureau of Mines and Hawaii State Department of Land and Natural Resources, Aquatic Resources Division and Forestry and Wildlife Division. *Historical Statistics of Hawaii*, Section 14, summarizes the data for earlier periods. Comparable Mainland statistics are reported in the *Statistical Abstract of the United States: 1995*, Sections 24 and 25.

**Table 20.01-- FOREST AND NATURAL AREA ACREAGE, BY ISLANDS:  
JUNE 30, 1995**

| Island           | Conservation district forest land |                                   | Planted forest               |                | Natural areas <sup>3/</sup> |         |
|------------------|-----------------------------------|-----------------------------------|------------------------------|----------------|-----------------------------|---------|
|                  | Forest reserve land <sup>1/</sup> | Private forest land <sup>2/</sup> | Planted in preceding 3 years | Total standing | Number of areas             | Acres   |
| State total..... | 622,339                           | 328,742                           | 108                          | 46,191         | 21                          | 122,703 |
| Hawaii .....     | 422,355                           | 106,745                           | 13                           | 17,138         | 9                           | 86,135  |
| Maui .....       | 73,227                            | 53,180                            | 15                           | 11,892         | 4                           | 17,123  |
| Kahoolawe.....   | -                                 | -                                 | -                            | -              | -                           | -       |
| Lanai .....      | -                                 | 6,150                             | -                            | 512            | -                           | -       |
| Molokai.....     | 16,030                            | -                                 | 10                           | 3,238          | 2                           | 2,950   |
| Oahu .....       | 27,728                            | 88,817                            | 63                           | 7,162          | 3                           | 1,770   |
| Kauai.....       | 82,999                            | 73,850                            | 7                            | 6,249          | 3                           | 14,725  |
| Niihau.....      | -                                 | -                                 | -                            | -              | -                           | -       |

<sup>1/</sup> State owned and privately owned lands under surrender agreement in forest reserve system.

<sup>2/</sup> Private forest land within conservation district. The majority of these lands were previously in the forest reserve system.

<sup>3/</sup> Includes Waimanu Research Reserve (3,600 acres) and Alakai Wilderness Preserve (9,939 acres).

Source: Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife, records.

**Table 20.02-- WOODLAND ON FARMS, 1982 TO 1992, AND BY COUNTIES, 1992**

[Acres]

| Use                | 1982    | 1987   | 1992        |        |        |          |       |
|--------------------|---------|--------|-------------|--------|--------|----------|-------|
|                    |         |        | State total | Hawaii | Maui   | Honolulu | Kauai |
| Total.....         | 117,270 | 99,135 | 109,391     | 79,319 | (D)    | 1,094    | (D)   |
| Pastured .....     | 36,550  | 27,517 | 40,909      | 22,606 | (D)    | 474      | (D)   |
| Not pastured ..... | 80,720  | 71,618 | 68,482      | 56,713 | 10,047 | 620      | 1,102 |

D Withheld to avoid disclosing data for individual farms.

Source: U.S. Bureau of the Census, *1992 Census of Agriculture, Hawaii*, AC92-A-11 (October 1994), pp. 17 and 156.

**Table 20.03-- LAND AREA, BY VEGETATION TYPE AND FOREST RESERVE STATUS, FOR MOLOKAI, OAHU, AND KAUAI: 1986**

[In acres. Excludes land in forest plantations]

| Vegetation type       | Molokai |                | Oahu    |                | Kauai   |                |
|-----------------------|---------|----------------|---------|----------------|---------|----------------|
|                       | Total   | Forest reserve | Total   | Forest reserve | Total   | Forest reserve |
| Total, all types ...  | 163,214 | 44,288         | 370,002 | 34,931         | 347,088 | 88,127         |
| Tree type:            |         |                |         |                |         |                |
| Ohia lehua .....      | 32,833  | 30,161         | 37,563  | 9,524          | 109,040 | 50,702         |
| Koa .....             | -       | -              | 28,548  | 6,601          | 13,438  | 6,223          |
| Kukui.....            | 4,773   | 4,009          | 2,775   | 617            | 7,634   | 2,029          |
| Kiawe .....           | 33,215  | -              | 17,354  | 241            | 10,358  | 116            |
| Eucalyptus .....      | 1,527   | 954            | 1,131   | 411            | 3,157   | 1,288          |
| Guava .....           | 5,918   | 4,200          | 10,287  | 1,421          | 12,143  | 3,099          |
| Other trees.....      | 2,673   | 573            | 36,700  | 6,776          | 32,763  | 6,043          |
| Shrub type.....       | 16,417  | 1,527          | 33,974  | 2,965          | 36,061  | 7,189          |
| Forb type.....        | 191     | -              | 11,338  | 2,718          | 4,120   | 2,043          |
| Grassland.....        | 38,751  | 764            | 45,102  | 3,261          | 34,168  | 5,198          |
| Cultivated land ..... | 18,325  | -              | 55,770  | -              | 64,741  | 387            |
| No vegetation.....    | 3,819   | -              | 822     | -              | 6,709   | 3,810          |
| Urban and other ..... | 4,772   | 2,100          | 88,638  | 396            | 12,756  | -              |

Source: Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife, multi-resource inventory reports.

**Table 20.04-- FOREST AND BRUSHLAND FIRES, BY COUNTIES:  
1993 TO 1995**

[Years ended June 30]

| County           | Number of fires |      |      | Acres burned |       |        |
|------------------|-----------------|------|------|--------------|-------|--------|
|                  | 1993            | 1994 | 1995 | 1993         | 1994  | 1995   |
| State total..... | 118             | 108  | 198  | 4,287        | 5,085 | 23,946 |
| Hawaii.....      | 64              | 59   | 86   | 2,148        | 3,533 | 21,635 |
| Maui.....        | 15              | 5    | 44   | 225          | 448   | 2,019  |
| Honolulu.....    | 36              | 40   | 67   | 1,911        | 1,103 | 292    |
| Kauai.....       | 3               | 4    | 1    | 4            | 1     | 0      |

Source: Hawaii State Department of Land and Natural Resources, Division of Forestry and Wildlife, records.

**Table 20.05-- COMMERCIAL FISHING: 1989 TO 1994**

[Years ended June 30]

| Year      | Number of commercial fishermen | Commercial fish catch <sup>1/</sup> |             |                                      |
|-----------|--------------------------------|-------------------------------------|-------------|--------------------------------------|
|           |                                | Pounds landed                       | Pounds sold | Value to primary producers (dollars) |
| 1989..... | 3,491                          | 14,008,279                          | 13,524,731  | 29,815,290                           |
| 1990..... | 3,551                          | 16,663,945                          | 16,090,478  | 39,902,182                           |
| 1991..... | 4,043                          | 22,218,099                          | 21,331,184  | 53,769,946                           |
| 1992..... | 3,800                          | 23,578,601                          | 22,761,039  | 55,381,574                           |
| 1993..... | 3,836                          | 25,209,513                          | 24,562,796  | 61,059,027                           |
| 1994..... | 4,060                          | 24,028,693                          | 23,310,535  | 57,999,092                           |

<sup>1/</sup> Represents the total catches of all licensed commercial fishers. Includes both sea and pond catches. Data for 1989-1993 revised from *Data Book 1993-94*, table 20.5.

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings for Fiscal Year* (annual), as revised, and records.

**Table 20.06-- COMMERCIAL FISH CATCH, BY SPECIES: 1994**

[Year ended June 30, 1994]

| Species                            | Pounds caught | Pounds sold | Value (dollars) |
|------------------------------------|---------------|-------------|-----------------|
| Total catch.....                   | 24,028,693    | 23,310,535  | 57,999,092      |
| Sea catch, all species.....        | 24,000,859    | 23,283,573  | 57,938,896      |
| Tunas.....                         | 11,212,282    | 10,961,670  | 26,899,020      |
| Aku (Skipjack).....                | 2,747,983     | 2,658,781   | 3,231,826       |
| Ahipalaha.....                     | 864,047       | 858,860     | 956,804         |
| Bigeye (ahi).....                  | 3,812,120     | 3,767,931   | 14,015,363      |
| Yellowfin (ahi).....               | 3,740,866     | 3,634,939   | 8,367,726       |
| Billfishes.....                    | 8,879,709     | 8,685,390   | 22,505,032      |
| Blue marlin.....                   | 1,360,439     | 1,244,961   | 1,187,379       |
| Striped marlin.....                | 1,025,953     | 989,083     | 1,279,280       |
| Swordfish.....                     | 6,302,444     | 6,270,797   | 19,839,121      |
| Miscellaneous pelagic species..... | 1,584,197     | 1,480,540   | 3,009,591       |
| Mahimahi.....                      | 702,053       | 639,122     | 1,491,610       |
| Ono.....                           | 370,484       | 338,850     | 954,208         |
| Opah.....                          | 407,702       | 402,792     | 407,402         |
| Deep bottom fishes.....            | 802,684       | 766,295     | 2,794,075       |
| Opakapaka.....                     | 349,597       | 339,507     | 1,324,801       |
| Uku.....                           | 117,117       | 114,815     | 359,441         |
| Ulaula.....                        | 111,116       | 107,859     | 595,077         |
| Akule/opelu.....                   | 821,980       | 786,328     | 1,384,781       |
| Akule.....                         | 484,450       | 466,894     | 813,516         |
| Opelu.....                         | 314,633       | 297,204     | 525,582         |
| Jacks.....                         | 127,262       | 116,382     | 204,581         |
| Inshore fishes.....                | 288,890       | 268,079     | 542,233         |
| Sharks.....                        | 145,558       | 100,034     | 100,117         |
| Lobsters.....                      | 1,472         | 867         | 5,683           |
| Crabs.....                         | 49,015        | 45,370      | 175,773         |
| Shrimps.....                       | 43,415        | 38,488      | 197,533         |
| Seaweeds.....                      | 7,112         | 6,177       | 34,477          |
| Miscellaneous.....                 | 37,283        | 27,953      | 86,000          |
| Pond landings, all species.....    | 27,834        | 26,962      | 60,196          |

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii--Fiscal Year 1993-1994*.

**Table 20.07-- COMMERCIAL SEA LANDINGS, BY ISLANDS: 1993 AND 1994**

[Years ended June 30]

| Island                 | Pounds landed | Pounds sold | Value (dollars) |
|------------------------|---------------|-------------|-----------------|
| 1993                   |               |             |                 |
| State total .....      | 25,185,107    | 24,538,772  | 61,007,332      |
| Hawaii .....           | 3,769,233     | 3,617,773   | 6,222,003       |
| Maui .....             | 436,987       | 343,371     | 897,947         |
| Lanai .....            | 27,282        | 23,828      | 57,488          |
| Molokai .....          | 52,820        | 42,299      | 95,025          |
| Oahu .....             | 20,378,185    | 20,069,661  | 52,726,368      |
| Kauai and Niihau ..... | 520,600       | 441,840     | 1,008,501       |
| 1994                   |               |             |                 |
| State total .....      | 24,000,859    | 23,283,573  | 57,938,896      |
| Hawaii .....           | 3,692,005     | 3,492,782   | 6,348,052       |
| Maui .....             | 551,010       | 427,490     | 1,025,214       |
| Lanai .....            | 18,387        | 13,892      | 33,949          |
| Molokai .....          | 51,917        | 42,467      | 110,982         |
| Oahu .....             | 19,002,745    | 18,723,718  | 48,979,936      |
| Kauai and Niihau ..... | 684,795       | 583,224     | 1,440,763       |

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii* for fiscal years 1992-1993 and 1993-1994, as revised.

**Table 20.08-- COMMERCIAL SEA LANDINGS, BY FISHING METHOD:  
1993 AND 1994**

[Years ended June 30]

| Fishing method          | Pounds landed | Pounds sold | Value (dollars) |
|-------------------------|---------------|-------------|-----------------|
| <b>1993</b>             |               |             |                 |
| All methods.....        | 25,185,107    | 24,538,772  | 61,007,332      |
| Aku pole and line.....  | 1,453,461     | 1,443,408   | 2,119,505       |
| Longline .....          | 16,650,591    | 16,566,096  | 44,734,833      |
| Handline.....           | 3,412,024     | 3,328,110   | 7,032,187       |
| Trolling.....           | 2,328,895     | 1,979,477   | 3,687,012       |
| Net.....                | 1,001,168     | 930,289     | 1,360,824       |
| Trap.....               | 227,500       | 203,551     | 1,831,157       |
| All other methods ..... | 111,468       | 87,841      | 241,814         |
| <b>1994</b>             |               |             |                 |
| All methods.....        | 24,000,859    | 23,283,573  | 57,938,896      |
| Aku pole and line.....  | 2,386,748     | 2,380,001   | 2,765,011       |
| Longline .....          | 14,346,651    | 14,211,286  | 41,120,838      |
| Handline.....           | 3,511,625     | 3,407,069   | 7,842,661       |
| Trolling.....           | 2,861,204     | 2,436,350   | 4,525,508       |
| Net.....                | 687,836       | 665,729     | 1,079,846       |
| Trap.....               | 79,027        | 73,884      | 298,262         |
| All other methods ..... | 127,768       | 109,272     | 306,770         |

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii--Fiscal Years 1992-1993 and 1993-1994*, as revised.

**Table 20.09-- FISH POPULATIONS AROUND SELECTED SHORELINE  
AREAS: YEAR ENDED JUNE 30, 1994**

| Location                                   | Species | Fish per acre | Pounds per<br>acre |
|--------------------------------------------|---------|---------------|--------------------|
| <b>Marine Life Conservation Districts:</b> |         |               |                    |
| Hanauma Bay, Oahu:                         |         |               |                    |
| Inshore.....                               | 58      | 3,313         | 2,926              |
| Offshore.....                              | 71      | 1,537         | 182                |
| Pupukea, Oahu.....                         | 81      | 1,653         | 238                |
| Waikiki, Oahu.....                         | 41      | 935           | 79                 |
| Molokini Shoal, Maui.....                  | 89      | 3,541         | 612                |
| Honolua Bay, Maui.....                     | 74      | 4,343         | 1,930              |
| Manele-Hulopoe Bays, Lanai.....            | 91      | 3,787         | 1,109              |
| Kealakekua Bay, Hawaii.....                | 67      | 5,878         | 615                |
| Old Kona Airport, Hawaii.....              | 37      | 2,868         | 106                |
| <b>Artificial reefs:</b>                   |         |               |                    |
| Maunalua Bay, Oahu (tire modules) .....    | 46      | 3,338         | 327                |
| Waianae, Oahu (tire modules).....          | 51      | 5,853         | 1,191              |
| Keawakapu, Maui.....                       | 28      | 5,732         | 361                |
| <b>Fisheries Management Areas:</b>         |         |               |                    |
| Waikiki-Diamond Head, Oahu <u>1/</u> ..... | 62      | 117,579       | 1,039              |
| Red Hill, Hawaii.....                      | 37      | 9,282         | 200                |
| <b>Other areas:</b>                        |         |               |                    |
| Honaunau Bay.....                          | 56      | 6,137         | 397                |

1/ Data reflect presence of a large school of gold-spot herring.  
Source follows next table.



**Table 20.10-- MOST ABUNDANT AND HEAVIEST FISH SPECIES AT SPECIFIED LOCATIONS: YEAR ENDED JUNE 30, 1994**

[Three leading species at each location, based on both individuals per acre and pounds per acre]

| Location and species                                                | Individuals per acre |        | Pounds per acre |        |
|---------------------------------------------------------------------|----------------------|--------|-----------------|--------|
|                                                                     | Rank                 | Number | Rank            | Number |
| <b>Hanauma Bay MLCD (inshore):</b>                                  |                      |        |                 |        |
| Mamo ( <i>Abudefduf abdominalis</i> ).....                          | 1                    | 421    | 6               | 73     |
| Manini ( <i>Acanthurus triostegus</i> ) .....                       | 2                    | 405    | (1/)            | (NA)   |
| Nenu ( <i>Kyphosus</i> sp.) .....                                   | 3                    | 354    | 1               | 1,204  |
| Awa awa ( <i>Elops hawaiiensis</i> ).....                           | (1/)                 | (NA)   | 2               | 697    |
| Pualu ( <i>Acanthurus xanthopterus</i> ).....                       | (1/)                 | (NA)   | 3               | 148    |
| <b>Waikiki MLCD:</b>                                                |                      |        |                 |        |
| Saddle-back wrasse ( <i>Thalassoma duperrey</i> ).....              | 1                    | 192    | 3               | 7      |
| Manini ( <i>Acanthurus triostegus</i> ) .....                       | 2                    | 116    | 5               | 5      |
| Parrotfishes (family <i>Scaridae</i> ).....                         | 3                    | 99     | 7               | 4      |
| Humuhumu nukunuku a puaa ( <i>Rhinecanthus</i><br>rectangules)..... | 8                    | 35     | 1               | 11     |
| Cornetfish ( <i>Fistularia commersoni</i> ) .....                   | (1/)                 | (NA)   | 2               | 8      |
| <b>Kealakekua Bay MLCD:</b>                                         |                      |        |                 |        |
| Yellow tang ( <i>Zebrafoma flarescens</i> ).....                    | 1                    | 997    | 1               | 112    |
| Kole ( <i>Ctenochaetus strigosus</i> ) .....                        | 2                    | 940    | 3               | 62     |
| Blackfin damsel ( <i>Chromis vanderbilti</i> ) .....                | 3                    | 813    | (1/)            | (NA)   |
| Pualu ( <i>Acanthurus xanthopterus</i> ).....                       | (1/)                 | (NA)   | 2               | 71     |

NA Not available.

MLCD Marine Life Conservation District.

1/ Not in first 10.

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Statewide Marine Research and Surveys, Survey of Fish and Habitat, July 1, 1993 to June 30, 1994.*

**Table 20.11 MINERAL INDUSTRIES: 1967 TO 1992**

[Excluding mines at manufactures]

| Subject                                                                                  | 1967 | 1972 | 1977 | 1982 | 1987 | 1992 |
|------------------------------------------------------------------------------------------|------|------|------|------|------|------|
| Number of establishments.....                                                            | 12   | 15   | 7    | 12   | 9    | 9    |
| With 20 employees or more.....                                                           | 3    | 5    | 2    | 4    | 4    | 4    |
| All employees:                                                                           |      |      |      |      |      |      |
| Number (1,000) .....                                                                     | .2   | .3   | .1   | .2   | .2   | .2   |
| Payroll (million dollars) .....                                                          | 1.6  | 2.4  | 1.9  | 3.8  | 7.4  | 9.6  |
| Production, development, and ex-<br>ploration workers:                                   |      |      |      |      |      |      |
| Number (1,000) .....                                                                     | .2   | .2   | .1   | .1   | .2   | .2   |
| Hours (millions).....                                                                    | .4   | .4   | .2   | .2   | .4   | .4   |
| Wages (million dollars) .....                                                            | 1.3  | 1.8  | 1.5  | 2.6  | 5.7  | 8.3  |
| Value added by mining (million<br>dollars) .....                                         | 5.0  | 9.0  | 8.1  | 9.7  | 23.5 | 27.9 |
| Cost of supplies used, purchased<br>machinery installed, etc.<br>(million dollars) ..... | 2.3  | 4.1  | 2.9  | 5.9  | 10.4 | 11.5 |
| Value of shipments and receipts<br>(million dollars) .....                               | 5.5  | 11.0 | 9.7  | 12.8 | 31.1 | 34.5 |
| Capital expenditures (million dollars) ..                                                | 1.8  | 2.0  | 1.3  | 2.7  | 2.8  | 4.9  |

Source: U.S. Bureau of the Census, *1982 Census of Mineral Industries, Geographic Area Series, Pacific States*, MIC82-a-9 (April 1985), tables 1 and 2a; *1987 Census of Mineral Industries, Geographic Area Series, Pacific States*, MIC87-A-9 (October 1990), Hawaii table 1; and *Census and You*, March 1995, p. 5.

**Table 20.12-- NONFUEL MINERAL PRODUCTION: 1992 TO 1994**

[Estimated production as measured by mine shipments, sales, or marketable production, including consumption by producers]

| Minerals                        | 1992 <u>1/</u> | 1993 <u>1/</u> | 1994 <u>2/</u> |
|---------------------------------|----------------|----------------|----------------|
| QUANTITY (1,000 METRIC TONS)    |                |                |                |
| Cement:                         |                |                |                |
| Masonry.....                    | 7              | 7              | 6              |
| Portland .....                  | 520            | 451            | 415            |
| Stone (crushed) <u>3/</u> ..... | 9,525          | 8,456          | 8,700          |
| VALUE (\$1,000)                 |                |                |                |
| Total <u>3/</u> .....           | 148,857        | 138,704        | 137,401        |
| Cement:                         |                |                |                |
| Masonry.....                    | 1,421          | 880            | 764            |
| Portland.....                   | 53,936         | 48,269         | 44,344         |
| Stone (crushed) <u>3/</u> ..... | 93,500         | 81,412         | 84,000         |
| Other industrial minerals.....  | (W)            | 8,143          | 8,293          |

W Withheld to avoid disclosing company proprietary data.

1/ Revised.

2/ Preliminary.

3/ Excludes certain stones, to avoid disclosing data for individual firms.

Source: U.S. Bureau of Mines, "The Mineral Industry of Hawaii 1994," *Mineral Industry Surveys* (1995).