

## 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.

Important sources of data on these subjects are *the United States Census of Mineral Industries* and *Mineral Industry Surveys*, and reports and records of the Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources and Division of Forestry and Wildlife. *Historical Statistics of Hawaii*, Section 14, summarizes the data for earlier periods. Comparable national statistics are reported in the *Statistical Abstract of the United States: 1998*, Sections 24 and 25.

**Table 20.01-- FOREST AND NATURAL AREA ACREAGE, BY ISLANDS:  
JUNE 30, 1996 AND JUNE 30, 1997**

Island	Conservation district forest land		Planted forest		Natural areas 3/	
	Forest reserve land 1/	Private forest land 2/	Planted in preceding 3 years	Total standing	Number of areas	Acres
1996						
State total	643,134	328,742	108	46,191	19	109,164
Hawaii	438,416	106,745	13	17,138	8	82,535
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	32,462	88,817	63	7,162	3	1,770
Kauai	82,999	73,850	7	6,249	2	4,786
Niihau	-	-	-	-	-	-
1997						
State total	643,134	328,742	108	46,191	19	109,164
Hawaii	438,416	106,745	13	17,138	8	82,535
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	32,462	88,817	63	7,162	3	1,770
Kauai	82,999	73,850	7	6,249	2	4,786
Niihau	-	-	-	-	-	-

1/ State-owned and privately-owned lands under surrender agreement in forest reserve system.

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

3/ 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, 1987 TO 1997, AND BY COUNTIES, 1997**

[Acres]

Use	1987	1992	1997				
			State total	Hawaii	Maui	Honolulu	Kauai
Total	99,135	109,391	108,704	75,821	(D)	209	(D)
Pastured	27,517	40,909	31,844	14,645	(D)	-	(D)
Not pastured	71,618	68,482	76,860	61,176	(D)	20	(D)

D Withheld to avoid disclosing data for individual farms.

Source: U.S. Bureau of the Census, *1997 Census of Agriculture, Hawaii*, AC97-A-11 (March 1999), pp. 19 and 158.

**Table 20.03-- FOREST AND BRUSHLAND FIRES, BY COUNTIES:  
1995 TO 1997**

[Years ended June 30]

County	Number of Fires			Acres burned		
	1995	1996	1997	1995	1996	1997
State total	198	131	69	23,946	477	378
Hawaii	86	78	30	21,635	232	40
Maui	44	42	24	2,019	67	40
Honolulu	67	10	11	292	175	297
Kauai	1	1	4	0	3	1

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

**Table 20.04-- COMMERCIAL FISHING: 1989 TO 1997**

[Years ended June 30]

Year	Number of commercial fishermen	Commercial fish catch 1/		
		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
1995	3,827	23,970,722	22,945,408	55,283,593
1996	3,672	23,968,916	23,018,189	52,443,466
1997	3,632	25,319,795	24,589,553	53,343,330

1/ 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 20.05-- COMMERCIAL FISH CATCH, BY SPECIES: 1997**

[Year ended June 30, 1997]

Species	Pounds caught	Pounds sold	Value (dollars)
Total catch	25,319,795	24,589,553	53,343,330
Sea catch, all species	25,272,402	24,542,232	53,231,458
Tunas	13,669,343	13,437,806	27,976,535
Aku (Skipjack)	2,150,401	2,062,538	2,668,892
Ahipalaha	3,420,977	3,412,462	3,900,844
Bigeye (ahi)	3,820,918	3,809,506	11,520,331
Yellowfin (ahi)	4,235,749	4,115,227	9,641,885
Billfishes	6,914,329	6,744,237	15,685,901
Blue marlin	1,238,001	1,135,578	1,086,127
Striped marlin	952,989	927,843	1,197,496
Swordfish	4,450,153	4,420,887	13,157,405
Miscellaneous pelagic species	2,454,470	2,315,765	3,830,050
Mahimahi	1,067,892	995,502	1,746,361
Ono	650,121	586,778	1,195,280
Opah	585,756	585,516	664,856
Deep bottom fishes	714,366	671,367	2,530,253
Opakapaka	265,551	254,318	1,110,555
Uku	120,765	115,863	310,704
Ulaula	101,779	96,846	551,153
Akule/opelu	868,431	793,495	1,344,446
Akule	512,709	459,473	821,042
Opelu	335,040	314,206	482,205
Jacks	129,332	115,757	201,420
Inshore fishes	288,434	265,863	590,671
Sharks	67,759	52,163	52,282
Lobsters	37,342	35,398	529,039
Crabs	35,634	29,944	136,513
Shrimps	34,082	33,397	172,397
Seaweeds	8,378	7,646	38,056
Miscellaneous	50,502	39,394	143,895
Pond landings, all species	47,393	47,321	111,872

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii--Fiscal Years 1996-1997* and records.

**Table 20.06-- COMMERCIAL SEA LANDINGS, BY ISLANDS: 1995 TO 1997**

[Years ended June 30]

Island	Pounds landed	Pounds sold	Value (dollars)
1995			
State total	23,936,995	22,912,940	55,206,105
Hawaii	3,708,925	3,512,238	6,708,789
Maui	655,357	518,137	1,423,379
Lanai	19,373	15,126	35,419
Molokai	64,877	59,044	150,116
Oahu	18,578,836	18,062,815	45,027,811
Kauai and Niihau	909,627	745,580	1,860,591
1996			
State total	23,944,770	22,994,532	52,388,694
Hawaii	4,047,710	3,818,650	6,517,456
Maui	695,779	542,335	1,364,300
Lanai	13,378	9,287	21,634
Molokai	74,237	68,621	190,740
Oahu	18,243,799	17,830,788	42,507,194
Kauai and Niihau	869,867	724,851	1,787,370
1997			
State total	25,272,402	24,542,232	53,231,458
Hawaii	3,738,518	3,535,195	6,109,155
Maui	565,100	423,805	1,126,929
Lanai	23,213	17,222	42,935
Molokai	53,651	48,410	167,833
Oahu	19,923,146	19,715,430	43,940,066
Kauai and Niihau	968,774	802,170	1,844,540

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii--Fiscal Years 1995-1997* and records.

**Table 20.07-- COMMERCIAL SEA LANDINGS, BY FISHING METHOD:  
1995 TO 1997**

[Years ended June 30]

<b>Fishing method</b>	<b>Pounds landed</b>	<b>Pounds sold</b>	<b>Value (dollars)</b>
1995			
All methods	23,936,995	22,912,940	55,206,105
Aku pole and line	1,049,924	1,047,924	1,404,367
Longline	14,299,465	14,074,471	37,405,275
Handline	3,679,047	3,545,368	8,308,474
Trolling	3,064,873	2,601,465	5,048,401
Net	936,984	875,209	1,421,861
Trap	142,141	123,192	744,435
Albacore troll	615,871	514,378	410,595
All other methods	148,690	130,933	462,697
1996			
All methods	23,944,770	22,994,532	52,388,694
Aku pole and line	1,434,985	1,434,984	1,820,496
Longline	14,071,115	13,895,031	34,889,154
Handline	3,713,208	3,556,162	7,819,282
Trolling	3,332,501	2,822,572	5,140,175
Net	845,841	803,615	1,354,076
Trap	139,613	138,212	770,820
Albacore troll	279,086	233,012	193,899
All other methods	128,421	110,944	400,792
1997			
All methods	25,272,402	24,542,232	53,231,458
Aku pole and line	1,623,910	1,616,589	2,102,305
Longline	16,047,720	15,992,066	36,710,270
Handline	3,741,917	3,603,710	7,950,473
Trolling	2,921,901	2,469,756	4,364,854
Net	660,400	605,737	1,024,264
Trap	125,286	123,208	777,679
Albacore troll	50,199	50,199	40,000
All other methods	101,069	80,967	261,613

Source: Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources, *Commercial Fish Landings, State of Hawaii--Fiscal Years 1995-1997* and records.



**Table 20.08-- FISH POPULATIONS AROUND SELECTED SHORELINE  
AREAS: YEAR ENDED JUNE 30, 1996**

Location	Species	Fish per acre	Pounds per acre
Marine Life Conservation Districts:			
Hanauma Bay, Oahu:			
Inshore	69	4,413	2,489
Pupukea, Oahu	91	1,958	178
Waikiki, Oahu	64	1,340	132
Molokini Shoal, Maui	95	4,932	386
Honolua-Mokuleia Bay, Maui	75	4,388	1,125
Manele-Hulopoe Bays, Lanai	89	2,382	410
Kealakekua Bay, Hawaii	64	1,408	435
Lapakahi, Hawaii	58	1,326	195
Wailea Bay, Hawaii	47	1,363	149
Old Kona Airport, Hawaii	32	1,557	90
Artificial reefs:			
Maunalua Bay, Oahu (tire modules)	54	2,704	407
Waianae, Oahu (Z-Slabs)	48	2,805	685
Keawakapu, Maui	29	1,503	325
Fisheries Management Areas:			
Waikiki-Diamond Head, Oahu	60	581	85
Puako Bay-Puako Reef, Hawaii	59	1,513	143
Red Hill, Hawaii	34	2,387	306
Papawai, Hawaii	43	3,139	572
Other areas:			
Honaunau Bay, Hawaii	45	2,643	366
Mahaiula Bay, Hawaii	31	720	17

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, 1995 to June 30, 1996.*

**Table 20.09-- FISH POPULATIONS AROUND SELECTED SHORELINE  
AREAS: YEAR ENDED JUNE 30, 1997**

Location	Species	Fish per acre	Pounds per acre
Marine Life Conservation Districts:			
Hanauma Bay, Oahu:			
Inshore	66	3,257	2,036
Waikiki, Oahu	39	1,403	484
Molokini Shoal, Maui	93	3,365	390
Honolua-Mokuleia Bay, Maui	72	5,692	1,814
Manele-Hulopoe Bays, Lanai	94	3,595	657
Kealakekua Bay, Hawaii	62	4,291	492
Lapakahi, Hawaii	74	4,126	488
Wailea Bay, Hawaii	45	2,243	253
Old Kona Airport, Hawaii	62	7,028	488
Artificial reefs:			
Maunaloa Bay, Oahu (tire modules)	46	4,044	661
Waianae, Oahu (Z-Slabs)	41	5,266	951
Keawakapu, Maui	22	1,954	431
Fisheries Management Areas:			
Waikiki-Diamond Head, Oahu	51	899	68
Puako Bay-Puako Reef, Hawaii	51	2,476	363
Red Hill, Hawaii	44	7,746	502
Other areas:			
Honaunau Bay, Hawaii	56	6,124	502
Mo'omomi-Kawa'aloa Bays, Molokai	42	1,846	542

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, 1996 to June 30, 1997.*

**Table 20.10-- FISH POPULATIONS AROUND SELECTED SHORELINE  
AREAS: YEAR ENDED JUNE 30, 1998**

Location	Species	Fish per acre	Pounds per acre
Marine Life Conservation Districts:			
Hanauma Bay, Oahu:			
Inshore	64	4,025	2,366
Offshore	90	3,207	342
Pupukea, Oahu	94	2,129	236
Waikiki, Oahu	45	1,985	152
Molokini Shoal, Maui	92	2,034	376
Honolua-Mokuleia Bay, Maui	74	3,764	1,013
Manele-Hulopoe Bays, Lanai	86	2,686	409
Kealakekua Bay, Hawaii	46	2,658	245
Lapakahi, Hawaii	50	4,303	430
Wailea Bay, Hawaii	47	3,022	984
Old Kona Airport, Hawaii	50	8,836	491
Artificial reefs:			
Maunaloa Bay, Oahu (tire modules)	44	6,531	1,749
Waianae, Oahu (Z-Slabs)	59	2,168	445
Keawakapu, Maui	29	2,617	485
Fisheries Management Areas:			
Waikiki-Diamond Head, Oahu	57	1,228	145
Puako Bay-Puako Reef, Hawaii	50	5,200	1,853
Red Hill, Hawaii	29	2,981	452
Other areas:			
Honaunau Bay	43	3,507	395
Ahihi-La Perouse Bays-Cape Kinau, Maui	81	962	51

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, 1997 to June 30, 1998.*

**Table 20.11-- MOST ABUNDANT AND HEAVIEST FISH SPECIES AT SPECIFIED LOCATIONS: YEAR ENDED JUNE 30, 1996**

[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
Hanauma Bay MLCD (inshore):				
Manini ( <i>Acanthurus triostegus</i> )	1	1,059	6	139
Mamo ( <i>Abudefduf abdominalis</i> )	2	457	10	57
White weke ( <i>Mulloidides flavolineatus</i> )	3	428	3	213
Pualu ( <i>Acanthurus xanthopterus</i> )	4	298	1	654
Uouoa ( <i>Chaenomugil leuciscus</i> )	6	218	2	226
Waikiki MLCD:				
Parrotfishes (Family Scaridae)	1	274	6	5
Manini ( <i>Acanthurus triostegus</i> )	2	264	1	35
Saddle-back wrasse ( <i>Thalassoma duperrey</i> )	3	154	4	8
Maiii/lavender tang ( <i>Acanthurus nigrofuscus</i> )	5	75	2	22
Moana ( <i>Parupeneus multifasciatus</i> )	6	65	3	12
Kealakekua Bay MLCD:				
Kole ( <i>Ctenochaetus strigosus</i> )	1	359	3	21
Yellow tang ( <i>Zebrasoma flavescens</i> )	2	244	2	23
Blackfin damsel ( <i>Chromis vanderbilti</i> )	3	99	(1/)	(NA)
Nenua ( <i>Kyphosus</i> sp)	8	48	1	267

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, 1995 to June 30, 1996.*

**Table 20.12-- MOST ABUNDANT AND HEAVIEST FISH SPECIES AT SPECIFIED LOCATIONS: YEAR ENDED JUNE 30, 1997**

[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
Hanauma Bay MLCD (inshore):				
Manini ( <i>Acanthurus triostegus</i> )	1	588	5	61
Parrotfishes (Family Scaridae)	2	348	(1/)	(NA)
Mamo ( <i>Abudefduf abdominalis</i> )	3	327	(1/)	(NA)
Mullet ( <i>Mugil cephalus</i> )	(1/)	(NA)	1	649
Redlipped parrot ( <i>Scarus rubroviolaceus</i> )	(1/)	(NA)	2	319
Nenu ( <i>Kyphosus</i> sp.)	(1/)	(NA)	3	251
Waikiki MLCD:				
White ulua ( <i>Caranx ignobilis</i> )	1	218	1	353
Manini ( <i>Acanthurus triostegus</i> )	2	207	2	21
Saddle-back wrasse ( <i>Thalassoma duperrey</i> )	3	205	7	6
Maiii/lavender tang ( <i>Acanthurus nigrofuscus</i> )	7	101	3	18
Kealakekua Bay MLCD:				
Blackfin damsel ( <i>Chromis vanderbilti</i> )	1	1,142	(1/)	(NA)
Kole ( <i>Ctenochaetus strigosus</i> )	2	518	7	25
Chocolate dip damsel ( <i>Chromis hanui</i> )	3	469	9	11
Six-banded/menpachi ulua ( <i>Caranx sexfasciatus</i> )	(1/)	(NA)	1	119
Omilu ( <i>Caranx melampygus</i> )	(1/)	(NA)	2	60
Ele ele ( <i>Melichthys niger</i> )	(1/)	(NA)	3	58

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, 1996 to June 30, 1997.*

**Table 20.13-- MOST ABUNDANT AND HEAVIEST FISH SPECIES AT SPECIFIED LOCATIONS: YEAR ENDED JUNE 30, 1998**

[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
Hanauma Bay MLCD (inshore):				
Manini ( <i>Acanthurus triostegus</i> )	1	697	8	68
Saddle-back wrasse ( <i>Thalassoma duperrey</i> )	2	450	(1/)	(NA)
Parrotfishes (Family Scaridae)	3	290	(1/)	(NA)
Nenuë ( <i>Kyphosus</i> sp.)	6	211	1	561
Pualu ( <i>Acanthurus xanthopterus</i> )	(1/)	(NA)	2	298
Mullet ( <i>Mugil cephalus</i> )	(1/)	(NA)	3	278
Waikiki MLCD:				
Ohua/green wrasse	1	523	6	5
Parrotfishes (Family Scaridae)	2	372	7	5
Saddle-back wrasse ( <i>Thalassoma duperrey</i> )	3	247	5	15
Kala ( <i>Naso unicornis</i> )	7	77	1	43
Manini ( <i>Acanthurus triostegus</i> )	4	209	2	21
Maiiii/lavender tang ( <i>Acanthurus nigrofuscus</i> )	5	123	3	18
Kealakekua Bay MLCD:				
Kole ( <i>Ctenochaetus strigosus</i> )	1	323	3	30
Yellow tang ( <i>Zebrasoma flavescens</i> )	2	312	1	41
Blackfin damsel ( <i>Chromis vanderbilti</i> )	3	237	(1/)	(NA)
Ele ele ( <i>Melichthys niger</i> )	10	85	2	18

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, 1997 to June 30, 1998.*

**Table 20.14-- MINERAL INDUSTRIES: 1967 TO 1992**

<b>Subject</b>	<b>1967</b>	<b>1972</b>	<b>1977</b>	<b>1982</b>	<b>1987</b>	<b>1992</b>
Number of establishments	12	15	7	12	9	7
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	9.4
Production, development, and exploration 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	8.1
Value added by mining (million dollars)	5.0	9.0	8.1	9.7	23.5	27.3
Cost of supplies used, purchased machinery installed, etc. (million dollars)	2.3	4.1	2.9	5.9	10.4	11.3
Value of shipments and receipts (million dollars)	5.5	11.0	9.7	12.8	31.1	33.7
Capital expenditures (million dollars)	1.8	2.0	1.3	2.7	2.8	4.8

Source: U.S. Bureau of the Census, *1987 Census of Mineral Industries, Geographic Area Series, Pacific States*, MIC87-A-9 (October 1990), Hawaii table 1; *1992 Census of Mineral Industries, Geographic Area Series, Pacific States*, MIC92-A-9 (May 1996), Hawaii table 1.

**Table 20.15-- NONFUEL MINERAL PRODUCTION: 1995 TO 1997**

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

Minerals	1995	1996 1/	1997 2/
QUANTITY (1,000 METRIC TONS)			
Cement:			
Masonry	5	5	5
Portland	357	312	318
Gemstones	(NA)	(NA)	(NA)
Sand and gravel (construction)	405	(D)	(D)
Stone (crushed) 3/	7,450	6,560	5,500
VALUE (\$1,000)			
Total 4/	114,000	110,000	99,900
Cement:			
Masonry 5/	501	500	520
Portland 5/	35,500	32,000	33,200
Gemstones	(D)	153	129
Sand and gravel (construction)	4,030	(D)	(D)
Stone (crushed) 3/	73,500	77,500	66,000

NA Not available.

D Withheld to avoid disclosing company proprietary data.

1/ Revised.

2/ Preliminary.

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

4/ Partial total, excludes values that must be concealed to avoid disclosing company proprietary data.

5/ For 1996 & 1997, data have been estimated.

Source: U.S. Geological Survey, Bureau of Mines, "The *Mineral Industry of Hawaii*" from internet address <http://minerals.er.usgs.gov/minerals/pubs/state/hi.html>.