TECHNICAL NOTE

USDA NATURAL RESOURCES CONSERVATION SERVICE PACIFIC ISLANDS AREA

Water Quality Technical Note No. 8

OUTSTANDING AQUATIC RESOURCES

This coversheet transmits a copy of the Outstanding Aquatic Resources table listing the streams on you island ranked outstanding in aquatic resources and the criteria satisfied to be outstanding.

The table may be used as a reference to complete Water Quality Technical Note No. 1, Water Quality Risk Assessment or for other assessments.

The table came from the publication entitled “Hawaii Stream Assessment - A Preliminary Appraisal of Hawaii’s Stream Resources,” which was developed by the State of Hawaii, Commission on Water Resources Management and the National Park Service, Rivers and Trails Conservation Assistance Program.

Hawaii Stream Assessment

A Preliminary Appraisal of Hawaii's Stream Resources

A Cooperative Project

The State of Hawaii
Commission on Water Resource Management

The National Park Service
Rivers and Trails Conservation Assistance Program

Hawaii Stream Assessment

A Preliminary Appraisal of Hawaii's Stream Resources

Report R84

Prepared for

COMMISSION ON WATER RESOURCE MANAGEMENT
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By

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Aquatic Resources

Hawaiian streams support a small but unique aquatic fauna, including freshwater fish, mollusks, crustaceans, and insects. Although the diversity of native species in Hawaii's streams is low, most of those species are found only in the Hawaiian islands.

A number of these unique native stream animals have a life cycle involving both the stream and the sea. This type of life history, in which an animal lives its entire adult life in fresh water and its early larval period in the ocean, is called amphidromy.

The common perception among aquatic biologists is that Hawaii's native stream fauna is limited in abundance and distribution, however these characteristics are not well documented. Better understanding of the life history and habitat requirements of the native aquatic fauna is needed in order to manage the natural resources for their survival.

An inventory and assessment of Hawaii's native aquatic resources were needed to inform and assist managers of those resources. An advisory committee of aquatic biologists and resource managers was formed to obtain expert input on the design and development of such an inventory and assessment. The Aquatic Resources Committee was responsible for overseeing the inventory of the available information and the assessment of streams.

Although the habitat requirements of certain stream animals are not fully understood, the committee assumed that their presence indicated that conditions necessary for their survival were also present. Since at least some of the native species traverse or use the entire length of the stream in their life history, conditions on any part of the stream may affect these species. Therefore, the entire stream was considered important as a single unit and assessment of streams by segments was considered inappropriate.

An important first step for this inventory was a search of all available published literature, unpublished reports and field notes. The Board of Land and Natural Resources contracted with The Nature Conservancy's Hawaii Heritage Program to compile all the literature available on biological resources of Hawaiian streams. Personal observations were obtained from the committee and active aquatic biologists. A complete list of sources consulted is provided.

Available biological information for individual streams was entered on standardized data sheets, (Table 20)and then were entered into the HSA database.

The committee established assessment criteria to identify streams containing ecosystems with potentially high quality aquatic resources. They identified four key native species considered to be indicators of the health of the native aquatic ecosystem. The

assessment criteria were based on the presence and abundance of the indicator species, evidence of their spawning, and on unaltered stream conditions. Based on these criteria, streams were ranked as Outstanding, Substantial, Moderate, Limited, Without, Unknown. Aquatic insects were not considered only because their taxonomy and distribution are poorly understood.

Using the information in the data sheets, the Aquatic Resources Committee reviewed the rankings. In those few cases where the rank derived from the database conflicted with the committee's collective expert opinion, the committee adjusted the rankings.

Of 376 perennial streams, 164 (44 percent) have some biological information. Based on the committee's criteria, 73 streams are ranked outstanding, 19 Substantial, 36 Moderate, 27 Limited, 12 Without, and 212 (56 percent) Unknown.

Background

Prior to human habitation in the Hawaiian islands most continuous streams may have been occupied by one or more native stream species. Adult gobies and certain invertebrates breed in streams or estuaries, and the newly hatched larvae are swept out to sea where they become part of the marine zooplankton. After a protracted period of development the postlarvae enter stream mouths and begin a migration upstream.

Native Hawaiian stream species are often described as "current loving" (rheophylic). Their native habitats include clear, well-oxygenated stream water that flows over boulders, cobbles, and gravel. Gobiid gobies are uniquely adapted to life in turbulent coastal waters and streams, and have modified (fused) ventral fins that function as suction disks. This adaptation allows them to 'climb' waterfalls and colonize stream sections inaccessible to other fishes. Kinzie (in press) has summarized details on the taxonomy, life history, ecology, and management of amphidromous fishes, crustaceans, and mollusks found in Hawaiian streams.

The populations and distributions of amphidromous native stream animals have been reduced in modified streams, especially those in which the physical habitat, flow regime, water temperature and chemistry have been significantly altered. Studies by Timbol and Maciolek (1978) showed that 15 percent (55 of 366) of all perennial streams had been significantly altered by channel modification before 1978 and that the biological quality and condition of nearly 75 percent (275) of Hawaii's perennial streams had been degraded.

The introduction of non-native aquatic species, many of which appear to be highly successful competitors or predators, may have also reduced the original distribution and abundance of Hawaii's unique stream fauna in recent years. Oahu streams appear to be the most affected by stream alterations and introduced species.

Methods

Committee

The Aquatic Resources Committee consisted of seven aquatic biologists and resource managers. They directed all aspects of the inventory and assessment. The committee

Table 19 Outstanding Aquatic Resources

Streams ranked outstanding in Aquatic Resources and the criteria satisfied to be outstanding.

CODE	HSA code; island-hydrographic unit-stream
STREAM	Stream Name at mouth
Ala-moo	Y - *Lentipes concolor* common
Spa-wn	Y - Evidence of spawning by NG1* goby
NG1 Abn	Y - Abundance of any NG1*
NG1 4	Y - All 4 NG1 species present
Crit B	Y - Good diversity and habitat as per criteria B
Qual	Quality of information
E	Excellent
G	Good
P	Poor

CODE	STREAM	Ala moo	Spa wn	NG1 Abn	NG1 4	Crit B	Qual
Kauai							
2-1-01	Awaawapuhi				Y		G
2-1-04	Kalalau	Y		Y	Y	Y	E
2-1-05	Pohakuao	Y		Y			G
2-1-07	Hanakoa	Y		Y			E
2-1-08	Waiahuakua	Y		Y			G
2-1-10	Hanakapiai	Y	Y	Y	Y	Y	E
2-1-11	Maunapuluo	Y		Y	Y		E
2-1-12	Limahuli					Y	E
2-1-14	Wainiha R.		Y	Y	Y		E
2-1-15	Lumahai R.		Y	Y	Y	Y	E
2-1-19	Hanalei R.		Y	Y	Y		E
2-1-25	Kalihiwai R.			Y			E
2-2-01	Anahola			Y	Y		E
2-2-04	Kapaa	Y		Y			E
2-2-15	Huleia			Y			E
2-5-15	Milolii				Y	Y	E
2-5-16	Nualolo				Y	Y	G
Oahu							
3-1-09	Koloa Gl.			Y			E
3-1-13	Kaluanui			Y			E
3-1-16	Punaluu		Y	Y			E
3-1-18	Kahana						E
3-1-19	Kaaawa			Y			E
3-1-20	Makaua			Y			G
3-6-07	Paukauila S.			Y			G

CODE	STREAM	Ala moo	Spa wn	NG1 Abn	NG1 4	Crit B	Qual
Molokai							
4-1-03	Waikolu	Y		Y	Y		E
4-1-06	Waiohookalo	Y		Y			G
4-1-09	Pelekunu	Y	Y	Y	Y	Y	G
4-1-15	Wailau	Y					E
4-1-21	Halawa	Y		Y		Y	G
Maui							
6-1-11	Honokohau				Y		E
6-2-03	Kahakuloa			Y		Y	E
6-2-06	Makamakaole			Y			E
6-2-07	Waihee R.	Y		Y			E
6-4-11	Piinaau	Y		Y	Y		E
6-4-14	Wailuanui	Y		Y			G
6-4-18	Waiohue Gl.	Y		Y	Y		E
6-4-22	Hanawi	Y	Y	Y	Y		E
6-4-23	Makapipi	Y		Y			E
6-4-32	Kawaikae	Y					G
6-5-03	Kapia	Y		Y			G
6-5-07	Wailua	Y		Y			G
6-5-08	Honolewa	Y		Y			G
6-5-09	Waieli	Y		Y			E
6-5-10	Kakiweka	Y		Y			E
6-5-11	Hahalawe	Y		Y			
6-5-12	Puaaluu	Y		Y	Y		E
6-5-13	Oheo Gl	Y		Y	Y	Y	E
6-5-17	Kukuiula	Y		Y			G
6-5-20	Alelele			Y			E

CODE	STREAM	Alamoo	Spawn	NG1 Abn	NG1 4	Crit B	Qual
6-5-24	Manawainui	Y		Y			G
Hawaii							
8-1-12	Aamakao	Y		Y			G
8-1-44	Wailoa/ Waipio				Y		P
8-1-45	Lalakea					Y	P
8-2-02	Kaawalii	Y		Y			G
8-2-05	Kilau	Y		Y			G
8-2-06	Manowaiopae	Y		Y			G
8-2-07	Kuwaikahi	Y		Y			G
8-2-09	Kaiwilahilahi	Y		Y			G
8-2-12	Kapehu	Y		Y			G
8-2-14	Maulua			Y			P
8-2-16	Pohakupuka	Y		Y			P

CODE	STREAM	Alamoo	Spawn	NG1 Abn	NG1 4	Crit B	Qual
8-2-20	Manoloa	Y		Y			E
8-2-21	Ninole	Y		Y			G
8-2-27	Nanue			Y	Y		P
8-2-28	Opea	Y		Y			G
8-2-29	Peleau	Y		Y			G
8-2-32	Hakalau	Y		Y			G
8-2-33	Kolekole			Y		Y	E
8-2-34	Paheehee			Y			G
8-2-35	Honomu	Y		Y			G
8-2-37	Kapehu	Y		Y			G
8-2-46	Hanawi			Y	Y		P
8-2-51	Kaapoko	Y		Y			G
8-2-56	Honolii	Y		Y	Y		E
8-2-57	Maili			Y		Y	P