

**2006 STATE OF HAWAII WATER QUALITY MONITORING AND
ASSESSMENT REPORT:**

Integrated Report To The U.S. Environmental Protection Agency and The U.S.
Congress Pursuant To Sections §303(D) and §305(B), Clean Water Act (P.L. 97-
117)

**CHAPTER V
APPENDICES**



APPENDIX A: 2004 Listing & Delisting Criteria for Hawaii State Surface Waters Compiled under Clean Water Act §303(d) (valid and utilized in 2006)

Section 303(d) of the federal Clean Water Act requires states to list impaired waters every two years after reviewing “all existing and readily available water quality-related data and information” from a broad set of data sources and to submit this list to the U.S. Environmental Protection Agency (EPA). If previously listed waters are not listed on the subsequent list, “good cause” must be demonstrated on the basis of availability of newer and/or more accurate water quality data, discovery of past analytical flaws, or changes in conditions such as closing of a discharge pipe or implementation of major non-point source pollution controls.¹

For the 2004 List, the Hawaii State Department of Health (HIDOH) screened available data according to listing criteria, below, that allow sorting of surface water quality data into one of three priority rankings for decision-making. Data evaluated at the end of the current listing cycle shall have been collected within the six-year period prior to each EPA-required submittal deadline. A six-year window was chosen to ensure that data reviewed for each listing cycle are both recent and available in sufficient quantity to warrant a statewide water quality data review. In the process of generating this list, the State is assuming that waterbodies meet water quality standards unless a weight-of-evidence approach shows otherwise.

The format of Hawaii's Water Quality Standards² differs from other states' standards in that many of the criteria are expressed as geometric means of a representative data set, and are not intended for comparison with single sample values. The criteria contain allowances for rainfall events in the form of less strict "10 per cent" and "2 per cent" criteria. Because funding is limited for monitoring waterbodies in Hawaii, we use minimum sample size requirements to ensure a reasonable level of sampling of a waterbody over time and space. These sample sizes are not strict cutoffs, rather they are guides meant to systematize decision-making by the Department of Health in protection of environmental health and public health.

Data Sources:

Data from the following sources may be used for making listing or delisting decisions in addition to or instead of routine HIDOH Clean Water Branch sampling, provided that an acceptable written Quality Assurance/Quality Control (QA/QC) Plan or other documented data quality assurance process was utilized during sample collection and analysis and is available for review, if requested:

- 1) United States Geological Survey (USGS)
- 2) National Oceanic & Atmospheric Administration (NOAA)
- 3) Universities
- 4) Community groups, individuals & respondents to a published, statewide “Call for Data”

¹ Federal regulations concerning the listing process can be found at 40 CFR Part 130.7.

² State Water Quality Standards can be found at HAR 11-54.

- 5) HDOH Hazard Evaluation and Emergency Response Office (HEER)
- 6) Military
- 7) United States Fish and Wildlife (USFWS)
- 8) Superfund investigation and remediation projects
- 9) United States Department of Agriculture (USDA)
- 10) Special projects by HDOH Clean Water Branch
- 11) Other government agencies
- 12) Environmental Assessments and Environmental Impact Statements
- 13) Consulting Firms
- 14) Private & public entities operating under water pollution control permits

Basic Data Quality Requirements for All Listing Priorities:

Acceptable written QA/QC documentation appropriate for the project, and containing descriptions of procedures used during sample collection and analysis, must be available for review, if requested.

Additional Data Quality Requirements for Listing Priority 1:

1. Photographs and written descriptions of the sampling sites are available upon request.
2. A general visual assessment of the water body that contains sufficient information to place the water body in the context of surrounding land uses and overall condition of the habitat is also available upon request.

Listing Priority 1:

Waters will be listed if these criteria are met for conventional pollutants such as total suspended solids, nutrients and temperature and toxic substances compiled in the Hawaii Administrative Rule, Chapter 11-54, Water Quality Standards:

1. For conventional pollutants, at least ten (10) samples per water body were collected and analyzed, the geometric mean³ of the data for a single waterbody exceeds the corresponding geomean criterion and at least one of the following requirements is met:
 - a. For streams, there must be at least two stations per stream (upper and lower) and at least five (5) samples per station.
 - b. For non-flowing fresh water bodies such as ponds and reservoirs, and for tidally-influenced water bodies such as estuaries and coastal waters, the samples must be distributed either on transects or randomly over the extent of the water body or section of water body sampled. In order to obtain a representative sample for evaluating water quality over the area of

³ The concept of a geometric mean may seem confusing: the nth root of the product of n numbers. However, people use an “arithmetic” mean in every day life for averaging. Unlike an “arithmetic” mean, a “geometric” mean or “geomean” multiplies numbers rather than adding them to find an average. This method allows people to use geometric means when they have highly variable number sets and do not want a few high or low values to distort an average.

concern, not only at a single point, samples should be collected along onshore-offshore transects extending seaward at least 50 feet, or at randomly scattered points across the surface of the area of concern.

2. In order to independently evaluate the “10% of the time” and “2% of the time” numeric criteria, sample sizes for the 10% criteria must be 100, for the 2% criteria must be 500. For listing, calculations using these data sets must exceed the corresponding criteria.
3. For toxic substances, at least three samples per water body were collected and analyzed, and the sample geometric mean exceeded the corresponding numeric criterion listed in §11-54-04(a).

Listing Priority 2:

Waters may be listed if all data requirements under Listing Priority 1 are not met, provided that at least one of the following factors is met and sufficient site documentation is available:

1. For Conventional Pollutants,
 - a. At least ten (10) samples per water body were collected and analyzed, but wet and dry season data must be combined because insufficient sample sizes exist to evaluate the wet and dry standards separately (Note: if the geometric mean of this data only exceeds the dry season standard, a majority of the dry season sample values must exceed the dry season standard to warrant listing; however, if the geometric mean of this data exceeds both the wet and dry season standards, the waterbody may be listed for both wet and dry exceedances), this category is referred to as Priority Listing 2a.
 - b. The majority of sample values in a data set of 5 - 9 values for a single waterbody exceed the corresponding geometric mean criterion in the rule by a factor of 2 or more, this category is referred to as Priority Listing 2b.
 - c. Calculations with a sample size of 50 to 90 show exceedance of the corresponding “10% of the time” criterion or
 - d. Calculations with a sample size of 250 to 450 show exceedance of the corresponding “2% of the time” criterion.
2. The type of water quality problem identified is particularly severe (i.e., each of two measurements of a toxic substance is more than twice the corresponding water quality criterion). This category is referred to as Priority Listing 2c.
3. For narrative information, at least three sampling events are presented, direct correlations to the narrative criteria in 11-54-04 can be established and the narrative standards are not attained. Data sets for evaluation of narrative criteria must include at least 3 sampling events and represent conditions in both the wet and dry seasons. These narrative criteria may be evaluated using HDOH approved habitat or biological assessments as long as they can be directly correlated to specific narrative criteria in HAR 11-54-04. This category is referred to as Priority Listing 2d.

4. For toxic substances, at least three samples per water body for toxic substances were collected and analyzed; compute the sample geometric mean and compare to the narrative criteria listed in §11-54-04(a). Acute toxicity standards for sediment may be evaluated using broadly accepted standards such as those developed in Canada and New York, provided that HDOH deems them appropriate for use in the Hawaiian environment. This category is referred to as Priority Listing 2e.

Listing Priority 3:

These waters are considered a high priority for additional monitoring; data will be assessed at the end of the next listing cycle and a listing decision made at that time:

1. ≤ 5 sample values are available for conventional pollutants.
2. <3 sampling events for determination of toxic or narrative standard exceedances.
3. Other information is limited and inconclusive.

The Department of Health reserves the right to list waters within any priority category when dilution calculations, predictive modeling, historical data or other supporting information indicate probable exceedance of the water quality standards and/or a risk to public and environmental health. These determinations will be made based on a weight of evidence approach with input from the U.S. Environmental Protection Agency.

Delisting Criteria:

Waters may be delisted if the data show that water quality standards are attained, and the appropriate sample sizes and other information required under Listing Priority 1 are available.

APPENDIX B: Contact Log

Contact Name	Affiliation	phone	email	Date contacted	method	rep	Response
All State Newspapers				10/2/2005	paid ad	lk	n/a
Susan Miller	DBEDT			9/30/2005	email	lk	will post to list
Bill Walsh	DLNR-DAR			9/30/2005	phone/email	lk	will post to list
Mike Kido	UH-HSRC	956-0811		10/4/2005	phone	lk	will submit data
Martha Yent	DLNR- State Parks	587-0287		9/29/2005	meeting	lk	will look
Jay Silberman	USGS	541-2077					
Adam Asquith	SeaGrant	822-2190	asquith@hawaii.edu	10/20/2005	email	lk	no reponse
Reuben Wolff	USGS	587-2432		10/5/2005	phone	lk	see reports
Wendy Wiltse	EPA-Hawaii	541-2752		10/19/2005	phone	lk	referred new contacts
Ed Laws	UH	956-7402	elaws@hawaii.edu	10/20/2005	email	lk	said we have all he has
Jeff Burgett	FWS	792-9472		10/7/2005	phone	lk	referred to G. Smith
Leticia Colmenares	WCC	236-9120	leticia@hawaii.edu	10/19/2005	email	lk	check her website for data
Dan Hoover	UH	956-2703	dhoover@hawaii.edu	10/18/2005	phone	lk	will check
Curt Storlazzi	USGS		cstorlazzi@usgs.gov	10/18/2005	email	lk	sent references
Maqs Alam	UH	956-8121	alam@hawaii.edu	10/19/2005	email	lk	no response
Joanne Leong	UH-HIMB	236-7401	joannleo@hawaii.edu	10/18/2005	email	lk	no response
Roger Fujioka	UH	956-3096	rfujioka@hawaii.edu	10/20/2005	email	lk	no response
Phil Moravcik	WRRC	956-3097	morav@hawaii.edu	10/19/2005	email	lk	does monitoring for city outfalls
Dick Brock	UH	956-2859	brockr@hawaii.edu	10/17/2005	phone	lk	will compile
Steve Dollar	UH	956-7631	dollar@hawaii.edu	10/17/2005	phone	lk	left message then emailed
Fred Mackenzie	UH	956-6344	fredm@hawaii.edu	10/20/2005	email	lk	no response
Ross Sutherland	UH	956-3524	sutherla@hawaii.edu	10/20/2005	email	lk	no response
Mike Fitzsimmons	LSU	225-578-3079	fitzsimons@lsu.edu	10/20/2005	email	lk	no response
Carl Berg	Hanalei Hui			10/17/2005	email	lk	will send
Gordon Smith	FWS	792-9457		10/17/2005	phone	lk	no data
David Ziemann	Oceanic Institute	259-7951	dziemann@oceanicistitute.org	10/19/2005	email	lk	no data to submit
Isabella Abbot	UH	956-8073		10/17/2005	phone	lk	will talk to grad student
Randy Bartlett	Maui Land & Pine		rtb@lava.net	10/20/2005	email	lk	no response
Pi'i La'eha	Maunalani Resort	885-6677		10/20/2005	phone	lk	will look
Nelson Aires	DLNR	587-4175		10/17/2005	phone	lk	no data to submit
Sam Gon	Nature Conservancy	537-4508		10/17/2005	phone	lk	left message
Mike Parsons	UHH	933-3903	mparsons@hawaii.edu	10/20/2005	email	lk	no response
Ceilia Smith	UH Botany	956-6947		10/21/2005	phone	lk	no answer
Christina McGuire	UH		mcquirec@hawaii.edu	10/20/2005	email	lk	out of the office til 11/5
Allison Sherwood	UH		asherwoo@hawaii.edu	10/20/2005	email	lk	no data to submit
Don Heacock	DAR	645-0532	donheacock@midpac.net	10/20/2005	phone	lk	will try to send info
Mike Yamamoto	DAR	587-0087	Mike.N.Yamamoto@hawaii.gov	10/21/2005	email	lk	no response
Glenn Higashi	DAR	587-0112	Glenn.R.Higashi@hawaii.gov	10/21/2005	email	lk	no response

APPENDIX C: Data Intake Log

No.	Waterbody Type (Estuary, Embayment, Coastal, Oceanic)	Waterbody Name	Pollutants	Description of Data Pkg (Paper/Electronic, Data Format)	Last Name	First Name	Organization	Date Received	QA/QC Procedures (Y/N)	Geolocation (Y/N)	Pictures (Y/N)
2006-001	various	various	various	paper, 64 pp., notation: wqдох.wk4	Brock	Richard	UH Manoa	? See Linda	?	maps of station locations, 12 pages	?
2006-002	embayment	Kauai Lagoon	various	paper, 22 pp	Tagawa	Walter	GACI-FM	12/9/2004		map of station locations, 1 p.	?
2006-003	various	various	various	paper, 45 pp, notation: DMR's through June 2005	?	?	CWB	?	?	?	?
2006-004	embayment	Kauai Lagoon	various	paper, 40 pp.	Tagawa	Walter	GACI-FM	10/28/2004	?	map of station locations, 1 p.	?
2006-005	embayment	area fronting Hulopoe-Manele Bay Golf Course	various	paper, 137 pp.	Matsuda	Ralph	Castle & Cooke Resorts, LLC	10/13/2005; 10/14/2005 (duplicate sent to separate addressee)	?	map of station locations	?
2006-006	coastal	Wailoa Small Boat Harbor Entrance Channel and Turning Basin	various	paper, 69 pp. (p. 10 missing); duplicate 16 pp., includes p.10	Clarence	?	?	06/20/2005; 10/03/2005 (partial duplicate sent)	?	map of station locations	Y
2006-007	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 40 pp. Report 2-2003	?	?	Makena Resort Corp.	5/11/2004	?	photo map of station locations	?
2006-008	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 38 pp. Report 1-2004	?	?	Makena Resort Corp.	8/25/2004	?	photo map of station locations	?
2006-009	embayment	Kauai Lagoon	various	paper, 29 pp.	Tagawa	Walter	GACI-FM	2/3/2005	?	?	?

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2006-010	embayment	Kiholo Bay	various	paper, 7 pp.	Busch	Georgine	The Earl & Doris Bakken Foundation	7/21/2004	?	map of station locations, 1 p.	?
2006-011	embayment	Hulopoe Bay	various	paper, 119 pp.	Brock	Richard	Environmental Assessment Co.	11/21/1996	?	map of station locations, 1 p.	?
2006-012	embayment	Hulopoe Bay & Manele Bay	various	paper, 67 pp.	Brock	Richard	Environmental Assessment Co.	7/29/1999	?	map of station locations, 1 p.	?
2006-013	coastal	coastline near Waikoloa Resort	various	paper, 89 pp.	Rohr	Thos	Waikoloa	6/24/2005	?	map of station locations, 1 p.	?
2006-014	coastal	coastline near Waikoloa Resort	various	paper, 86 pp.	Rohr	Thos	Waikoloa	10/15/2004	?	map of station locations, 1 p.	?
2006-015	embayment	Hulopoe Bay & Manele Bay	various	paper, 124 pp.	Brock	Richard	Environmental Assessment Co.	11/5/1999	?	map of station locations, 1 p.	?
2006-016	embayment	Hulopoe Bay & Manele Bay	various	paper, 124 pp.	Brock	Richard	Environmental Assessment Co.	3/24/2000	?	map of station locations, 1 p.	?
2006-017	embayment	Hulopoe Bay & Manele Bay	various	paper, 118 pp.	Brock	Richard	Environmental Assessment Co.	12/8/1999	?	map of station locations, 1 p.	?
2006-018	embayment	Hulopoe Bay & Manele Bay	various	paper, 127 pp. 2005-6A,B	Brock	Richard	Environmental Assessment Co.	3/4/2005	?	map of station locations, 1 p.	?

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2006-019	embayment	Hulopoe Bay & Manele Bay	various	paper, 128 pp. 2005-12A,B	Brock	Richard	Environmental Assessment Co.	6/28/2005	?	map of station locations, 1 p.	?
2006-020	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 32 pp. Report 1-98	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-021	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 33 pp. Report 1-97	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-022	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 31 pp. Report 2-96	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-023	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 21 pp. Report 1-95	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-024	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 33 pp. Report 2000	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-025	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 34 pp. Report 2001	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-026	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 34 pp. Report 1-2002	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?

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2006-027	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 28 pp. Report 1-2003	?	?	Makena Resort Corp.	11/1/2005	?	photo map of station locations	?
2006-028	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 39 pp. Report II- 2004	?	?	Makena Resort Corp.	11/9/2005	?	photo map of station locations	?
2006-029	coastal	coastline fronting Makena Resort/Golf Courses	nutrients	paper, 37 pp. Report 2-99	?	?	Makena Resort Corp.	11/10/2005	?	photo map of station locations	?
2006-030	estuary	Enchanted Lake	organochlorine pesticides	paper, 34 pp.	?	?	HIMB/KBAC	12/1/2004	?	photo map of station locations	?
2006-031	embayment	Hulopoe Bay & Manele Bay	various	paper, and disk	Brock	Richard	Environmental Assessment Co.	11/1/2003	?	map of station locations, 1 p.	?
2006-032	Kona and Anchialine Pools	Kukio, Kona	various	paper, 58 pp. Report 2005-08	Brock	Richard	Environmental Assessment Co.	11/2/2003	?	map of station locations	?
2006-033	Streams, Estuaries, and Embayment	Hanalei Bay region	various	7 email files, and paper copied for AR	Berg	Carl	Hanalei Hui	11/1/2005	?	map of station locations	?
2006-034	coastal	Kaloko Honokohau	various	web report reference http://pubs.usgs.gov/of/2005/1161	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y
2006-035	coastal	Honolua Bay	various	web report reference http://pubs.usgs.gov/of/2005/1068	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y
2006-036	coastal	South Molokai	various	report reference Coral Reefs, v. 23, p. 559-569	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y

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2006-037	coastal	South Molokai	various	report reference Continental Shelf Research, v. 24(12), p. 1396-1419	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y
2006-038	coastal	West Maui	various	web report reference http://pubs.usgs.gov/of/2004/1287	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y
2006-039	Pearl Harbor estuary	Pearl Harbor	various	web report reference http://pubs.usgs.gov/of/2003/of03-430	Storlazzi	Curt	USGS	10/17/2005	Y	map of station locations	Y
2006-040	coastal	West Maui	various	web report reference http://pubs.usgs.gov/of/2003/of03-482	Storlazzi	Curt	USGS	10/18/2005	Y	map of station locations	Y
2006-041	coastal, estuaries, embayment, stream	various	various	website http://www.wcc.hawaii.edu/water	Colmenares	Letty	WCC	10/20/2005	Y	map of station locations	Y
2006-042	coastal	Ewa Beach	various	CD in pdf format/permit requirement			Haseko Ewa Inc.	12/5/2005?			