HAWAII STATE DEPARTMENT OF HEALTH CLEAN WATER BRANCH

TOTAL MAXIMUM DAILY LOAD (TMDL) PRIORITIZATION FRAMEWORK

April 8, 2024

CLEAN WATER BRANCH PRIORITY GOALS

The mission of the Clean Water Branch (CWB) is to protect the public health of residents and tourists who recreate in and on Hawaii's coastal and inland water resources, and to also protect and restore inland and coastal waters for marine life and wildlife. This mission is accomplished through statewide coastal water surveillance and watershed-based environmental management through a combination of permit issuance, monitoring, enforcement, polluted runoff control projects, and public education.

CWB intends to focus on nutrient TMDLs during the next vision period. CWB's TMDLs need to be implemented and effective, therefore areas where WLAs and LAs have some degree of enforcement, either through permit limits or polluted runoff control plans, will be prioritized. TMDL priorities will also focus on communities that have historically experienced greater exposure to environmental burdens than the general population, as well as communities that are more likely to practice subsistence fishing. Lastly, CWB wishes to prioritize the State's most valuable ecosystems so they can withstand the impacts of climate change.

THE PRIORITIZATION PROCESS

As part of the Integrated Report (IR) development, all impaired waterbodies need to be given a priority ranking. This document describes CWB's methodology for sorting through the list of impaired waters (the 303(d) list) and selecting which waterbodies CWB will develop TMDLs for within the two years following an IR release. The methodology described here is just one factor in selecting waterbodies for TMDL development. Factors like data availability, accessibility, stakeholder involvement, and best professional judgment also play a role when finalizing priority decisions. This is a living a document and is subject to change. It should be noted that this process describes how *future* TMDL priority rankings are to be established and does not apply to the priority rankings in the 2024 or previous IRs. This methodology, or a variation of it, will be implemented in 2026.

CWB assigns each impaired waterbody a ranking of either "high", "medium", or "low". A "high" priority ranking indicates a TMDL is currently in progress for the waterbody, or one will be started within the two years following the IR release. A "medium" priority ranking signifies a waterbody that is being considered for a TMDL in the next IR cycle. CWB does not have plans to begin work on a TMDL for these waterbodies within the next two years, but may begin work within the following 4 years, given there are no significant changes during that time. "Low" priority waterbodies are waterbodies that are not being considered for TMDLs within the 4 years following an IR release. These waterbodies may be considered for TMDLs in later IR cycles.

High priority waterbodies are selected by identifying high priority watersheds using the Recovery Potential Screening Tool (RPS). RPS is a tool developed by the Environmental Protection Agency (EPA) to help states create a "prioritized schedule" for waters needing TMDLs. It uses a systematic, comparative method for identifying differences among watersheds that may affect their relative likelihood to be successfully restored. This approach

involves identifying a group of watersheds to be compared and a specific purpose for the comparison, selecting appropriate indicators in three categories (Ecological, Stressor, Social), calculating index values for the watersheds, examining the analysis, and applying the results as part of the strategic planning and prioritization.

The RPS Tool is a custom-coded Excel spreadsheet that preforms all RPS index calculations and generates RPS outputs as rank-ordered tables, maps, and bubble plots.

For more information, please read the fact sheet provided by EPA: Recovery Potential Screening Fact Sheet (epa.gov)

RPS was chosen because it allows for multi axis analysis such that CWB can compare watersheds on multiple levels, not just one. Watersheds are compared on three different indexes (Ecological, Stressor, and Social).

This framework outlines the methodology for prioritizing waterbodies on the 303(d) list for TMDL projects specifically. There are other types of plans that also lead to waterbody restoration, like Watershed Based Plans. However, this document only applies to TMDL plans, as other plans and programs have their own selection framework.

THE 3 INDEXES

ECOLOGICAL

Traditionally, the ecological index is used to measure resilience to maintain or reestablish natural structure and processes. Thus, it is considered a positive indicator and a higher index value will relate to a higher "recovery potential". While these things are important, they are not beneficial to CWB's prioritization framework. Because TMDLs are mostly implemented through NPDES permit limits, areas with high NPDES permits are CWB's main focus for TMDL prioritizations. Areas with many NPDES permits tend to be areas of high urbanization, thus some of the traditional ecological indicators, like %forest cover, are not applicable to CWB's goals. Thus, the Ecological Indicator has been shifted to Ecological Importance Indicator. This indicator will now identify watersheds that contain areas of ecological importance. Indicators for this index are listed below.

RPS ECOLOGICAL IMPORTANCE INDICATORS

Indicator Name	Description	Reasoning for inclusion
% Coral Coverage in Watershed Assessment Unit	Percent of the Watershed DU with Major Biological Cover classified as "Coral". Data accessed from Benthic Habitat GIS Layer (Benthic Habitat | Benthic Habitat | Hawaii Statewide GIS Program). Data source: NOAA National Centers for Coastal Science.	Coral reefs are high value ecosystems. They are biologically diverse and economically valuable. Watersheds with more coral cover should be prioritized over watersheds with low coral cover.
%Wetlands in Watershed	Percent of the watershed classified as wetland cover by the 2010 C-CAP Land Cover dataset. Wetland cover includes 'Palustrine Forested Wetland' (code 13), 'Palustrine Scrub Shrub Wetland' (code 14), 'Palustrine Emergent Wetland' (code 15), 'Estuarine Forested Wetland' code (16), 'Estuarine Scrub Shrub Wetland' (code 17), and 'Estuarine Emergent Wetland' (code 18) in the 2010 C-CAP Land Cover dataset. Calculated as wetland area divided by watershed area, multiplied by 100.	Wetlands are a high value ecosystem. They play a key role in mitigating climate change impacts and are habitats for 3 endangered waterfowl.
Marine Water Quality Classification	Marine waters are classified as either AA or A. A GIS map of the marine water quality classification (Water Quality Classification | Water Quality Classification | Hawaii Statewide GIS Program) was overlayed with a map of the marine Watershed Decision Units. Watershed DUs with Class AA are noted as AA and likewise for Watershed DUs with Class A waters. Where both water classes are found inside a DU, Class AA was chosen.	Class AA waters should remain in their natural pristine state as nearly as possible. If a Class AA water is impaired, it should take higher priority over a Class A water.

Indicator Name	Description	Reasoning for inclusion
Predicted Reef Health Index Score	The mean Predicted Reef Health Index (RHI) score for the watershed. Predicted RHI scores are derived from statistical modeling of coral distribution and abundance based on environmental and fishing pressure data. Higher values correspond to greater potential for healthy coral reefs to be present offshore of the watershed. Source data was a geospatial dataset of watershed health and vulnerability metrics created by the Hawaii Institute of Marine Biology at the University of Hawaii at Manoa (February 2018 version), received via personal communication with EPA Region 9 staff in March 2018. The data used to build the index was collected between 2000 and 2015. The scores were originally summarized by CWRM watershed. HUC12 scores were calculated by area-weighting the Hawaii CWRM watershed scores for each HUC12. (See also CWRM Watersheds and WBD Snapshot, EnviroAtlas Version glossary definitions).	Coral reefs are high value ecosystems. They are biologically diverse and economically valuable. A high value will indicate a healthy reef that will need to be protected. Conversely, a low score could indicate reef that could benefit from restoration.
Watershed Health Index Score	The mean Watershed Health Index score for the watershed. Higher values correspond to greater extent of land cover to support healthy coral reefs. Source data was a geospatial dataset of watershed health and vulnerability metrics created by the Hawaii Institute of Marine Biology at the University of Hawaii at Manoa (February 2018 version), received via personal communication with EPA Region 9 staff in March 2018. The data used to build the index was collected between 2000 and 2015. The scores were originally summarized by CWRM watershed. HUC12 scores were calculated by area-weighting the Hawaii CWRM watershed scores for each HUC12. (See also CWRM Watersheds and WBD Snapshot, EnviroAtlas Version glossary definitions).	Coral reefs are high value ecosystems. They are biologically diverse and economically valuable. A high value will indicate a healthy reef that will need to be protected. Conversely, a low score could indicate reef that could benefit from restoration.

STRESSOR

The stressor indicators measure the extent of anthropogenic sources of impaired water quality. Traditionally, the stressor indicator is used as a “negative” index, meaning when the stressor index is high, the waterbody may be less likely to “recover”. However, this use of the stressor index does not align with CWB’s TMDL goals, as CWB wants to address the larger impairments in our islands. Stressor indicators are chosen based on their ability to be regulated against and their potential pollutant impact on a waterbody.

STRESSOR INDICATORS

Indicator Name	Description	Reasoning for inclusion
% 11-56 Agriculture Land in Watershed	Percentage of the watershed that is agricultural land that may be included in the 11-56 NPS registry. Data source: Agricultural Land Use – 2020 Update Hawaii Statewide GIS Program, selecting for polygons with a listed acreage of 1000 acres or more.	Since 11-56 was passed, the HDOH now has more ability to enforce pollutant limits on some non-point sources of pollution. Places where WLA and LAs are enforceable should prioritized.
% 11-56 Forestry Land in Watershed	Percentage of the watershed that is Forestry land that may be included in the 11-56 NPS registry. Data source: Agricultural Land Use – 2020 Update Hawaii Statewide GIS Program, selecting for polygons with a listed acreage of 5 acres or more and a crop category of "Commercial Forestry"	Since 11-56 was passed, the HDOH now has more ability to enforce pollutant limits on some non-point sources of pollution. Places where WLA and LAs are enforceable should prioritized.
% Urban in Watershed	Percent of the watershed classified as urban cover by the 2010 C-CAP Land Cover dataset. Urban cover includes 'Impervious Surface' (code 2) and 'Developed Open Space' (code 5) in the 2010 C-CAP Land Cover dataset. Calculated as urban area divided by watershed area, multiplied by 100. (See also 2010 C-CAP Land Cover glossary definition).	A large percentage of urban cover can be used to indicate a possible MS4 permit in the area. An MS4 is a vehicle to enforce future WLAs, thus aligns with CWB priority goals of TMDLs that are enforceable. Watersheds with a high percentage of urban area should be prioritized over areas that are not regulated by permits or runoff control plans.
Count of 11-56 Marinas in Watershed	Count of marinas in the watershed that may be included in the 11-56 NPS registry. Data source: Small Boat Harbors/ Ramps Hawaii Statewide GIS Program, omitting harbors listed as abandoned and harbors with the number of berths or moorings was less than 10.	Since 11-56 was passed, the HDOH now has more ability to enforce pollutant limits on some non-point sources of pollution. Places where WLA and LAs are enforceable should prioritized.
Count of Impaired Nutrient Parameters	Count of each nutrient parameter assessed to be impaired within a Watershed Assessment Unit. Source data were HDOH IR provided by CWB staff.	TMDLs project take significant time and resources to complete. These are not always scalable with the number of nutrient parameters since many of the parameters are interconnected. To be efficient with CWB resources, it is better to prioritize projects with many impairments over few.
Density of All Roads in Watershed	Density of all roads in the watershed (kilometer per square kilometer). Source data were the 2017 TIGER/Line All Roads County-Based Shapefiles for Hawaii from the US Census Bureau (https://www.census.gov/cgi-bin/geo/shapefiles; downloaded March 2018). Includes roads with MTFCC code equal to S1100 (primary road), S1200 (secondary road), S1400 (local road), S1500 (vehicular trail), S1630 (ramp), S1640 (service drive), S1730 (alley), S1740 (private road), S1750 (internal use), or S1780 (parking lot road) in the 2017 TIGER/Line All Roads County-Based Shapefiles for Hawaii. Features with MTFCC code equal to S1710 (walkway) and S1720 (stairway) were classified as non-road features and not counted. Calculated as the total length of all roads in the watershed divided by the watershed area, multiplied by 100.	A high density of roads could indicate a potential MS4 permit in the area. An MS4 is a vehicle to enforce future WLAs, thus aligns with CWB priority goals of TMDLs that are enforceable. Watersheds with a higher density of roads should be prioritized over areas that are not regulated by permits or runoff control plans.

Indicator Name	Description	Reasoning for inclusion
NPDES Permit Count in WS	Count of NPDES permits in the watershed. National Pollutant Discharge Elimination System (NPDES) permits are issued to regulate discharge of pollutants into surface waters. Wastewater treatment plants, factories, and other point sources of discharge into surface waters are regulated by the National Pollutant Discharge Elimination System (NPDES). The number of NPDES permits issued in a watershed is an indicator of the presence and complexity of point source pollutant discharge. While NPDES permit counts may be related to the magnitude of point source pollutant loading, higher permit counts often do not correspond to higher pollutant loads. For example, a watershed may contain a single, large NPDES permitted wastewater treatment facility that discharges higher pollutant loads than the combined total of several smaller NPDES permitted facilities located in another watershed. Source data was a map layer of NPDES permits within EPA's Facility Registry Service (July 2019 version; downloaded from ftp://newftp.epa.gov/epadatacommons/OEI/FRS/FRS_Interests_Download.zip). Only permits that had Permit Status Description equal to "Admin Continued", "Effective", or "Expired" were included; permits with Permit Status Description equal to "Terminated", "Pending", "Not Needed", or "Null" were not counted. Duplicate permits were addressed by removing duplicate combinations of Registry ID and Source ID.	NPDES are one of the main vehicles of TMDL implementation. Focus should be on watersheds with NPDES permits. However, like the description notes, count of NPDES permits does not account for pollutant load coming from point sources.
WWTP Count in WS	Count of wastewater treatment plants (WWTP) in the watershed. Source data was a map layer of WWTPs within EPA's Facility Registry Service (January 2020 version; downloaded from https://edg.epa.gov/data/PUBLIC/OEI/OIC/FRS_Wastewater.zip). Only WWTPs that had Permit Status Description equal to "Admin Continued", "Effective", or "Expired" were included; permits with Permit Status Description equal to "Terminated", "Pending", "Not Needed", or "Null" were not counted.	Watersheds with WWTPS should be prioritized because WWTP can be a major source of nutrient pollution and a WLA would be enforceable through an NPDES permits.

SOCIAL

Social indicators measure relevant community, regulatory, economic, or behavioral factors. CWB is using this index to identify watersheds with areas of high community and/or cultural value, as well as Environmental Justice areas.

SOCIAL INDICATORS

Indicator Name	Description	Reasoning for inclusion
% of WS Hawaiian Homelands	Percent of watershed that is owned by the Department of Hawaiian Homelands as identified by the U.S. Census Bureau (September 2021). Accessed through Hawaii GIS Program (2020 Census Hawaiian Homelands | Hawaii Statewide GIS Program).	The Native Hawaiian community has been disproportionately impacted by environmental and social injustices as result of colonization. From a CWB sampler observation: this community still practices aspects of a subsistence lifestyle more than other communities.
EJ Low-income Percentile	This methodology uses data from EPA's EJ Screening tool on the block group scale and ArcGIS's Summarize Within Tool to estimate the low income and total populations within each watershed. Low-income percent and percentiles are then calculated for each watershed. EJ Screening Tool data was chosen as it regularly updated and maintained by EPA, as well as being accessible in shapefile format.	Low income and people of color populations often experience greater exposure to environmental burdens than the general population as whole. Many studies have established that sources of environmental hazards are often located and concentrated in areas that are dominated by low income and people of color populations. In order to address this unfair burden on low-income communities, watersheds with the greatest percent of low-income communities should be given higher priority.
Percent Protected Lands in Watershed	Percent of the watershed that is a protected terrestrial natural area. Source data were the USGS Gap Analysis Program Protected Areas Database (PAD) of the United States Version 1.4 geospatial map layer (http://gapanalysis.usgs.gov/padus) and the Hawaii Division of Forestry and Wildlife Reserves map layer (July 2015 version; http://files.hawaii.gov/dbedt/op/gis/data/reserves.html). Since this indicator focuses on terrestrial areas, offshore and marine protected areas were removed from the PAD before calculating protected land percentages. Equation used: Protected Land Area / Watershed Area * 100.	Protected lands are areas dedicated to the preservation of biological diversity, recreational, and cultural uses. Watersheds with these high value areas should be a high priority to restore/ protect.
Presence/ Absence Marine Protected Areas	Presence/absence of Marine Protected Areas (MPA) in the watershed (1 = presence; 0 = absence). Source data was the USGS Gap Analysis Program Protected Areas Database (PAD) of the United States Version 1.4 geospatial map layer for Marine Protected Areas (http://gapanalysis.usgs.gov/padus). The MPA Inventory is a comprehensive catalog that provides detailed information for existing marine protected areas in the United States. The inventory provides geospatial boundary information (in polygon format) and classification attributes that seek to define the conservation objectives, protection level, governance, and related management criteria for all sites in the database.	Protected lands are areas dedicated to the preservation of biological diversity, recreational, and cultural uses. Watersheds with these high value areas should be a high priority to restore/ protect.

SUMMARY OF ALL INDICATORS

The following is a list of all the indicators to be considered and their respective index.

Indicator Name	Index
% Coral Coverage in Watershed Assessment Unit	Ecological
%Wetlands in Watershed	Ecological
Marine Water Quality Classification	Ecological
Predicted Reef Health Index Score	Ecological
Watershed Health Index Score	Ecological
% 11-56 Agriculture Land in Watershed	Stressor
% 11-56 Forestry Land in Watershed	Stressor
% Urban in Watershed	Stressor
Count of 11-56 Marinas in Watershed	Stressor
Count of Impaired Nutrient Parameters	Stressor
Density of All Roads in Watershed	Stressor
NPDES Permit Count in WS	Stressor
WWTP Count in WS	Stressor
% of WS Hawaiian Homelands	Social
EJ Low-income Percentile	Social
Percent Protected Lands in Watershed	Social
Presence/ Absence Marine Protected Areas	Social

OTHER CRITERIA

No watershed with a completed Watershed Based Plan should be prioritized. While a Watershed Based Plan is different from a TMDL, they both work to restore water quality. HDOH CWB has limited resources and while Watershed Based Plans and TMDLs can work together, it is not an effective use of HDOH CWB's resources to complete a TMDL where there is already a plan to restore water quality.