

**STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
OFFICE OF CONSERVATION AND COASTAL LANDS
Honolulu, Hawai'i**

File No: CDUP OA-2957

August 24, 2018

Board of Land and
Natural Resources
State of Hawaii
Honolulu, Hawaii

REGARDING: Informational Briefing Regarding the Carrying Capacity Study Being Prepared for the Hanauma Bay Nature Preserve Pursuant to Condition 12 of Conservation District Use Permit (CDUP) OA-2957

PERMITEE: City and County of Honolulu
Department of Parks and Recreation

LOCATION: Hanauma Bay Nature Preserve, Island of O'ahu

TAX MAP KEYS: (1) 3-9-12: 002, 010, 012, 014, 016 & adjacent submerged lands

SUBZONES: Protective, Limited, General

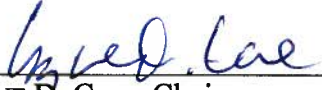
This informational briefing and presentation is to update the Board regarding the Carrying Capacity Study being prepared for the Hanauma Bay Nature Preserve (see **Exhibit A**) pursuant to Condition No. 12 of Conservation District Use Permit (CDUP) OA-2957 which states that *"The applicant will contract for the continuation of the carrying capacity study and submit a yearly update of the baseline data to the Board."* Attached is a handout prepared by the permittee regarding the project (see **Exhibit B**).

Respectfully submitted,

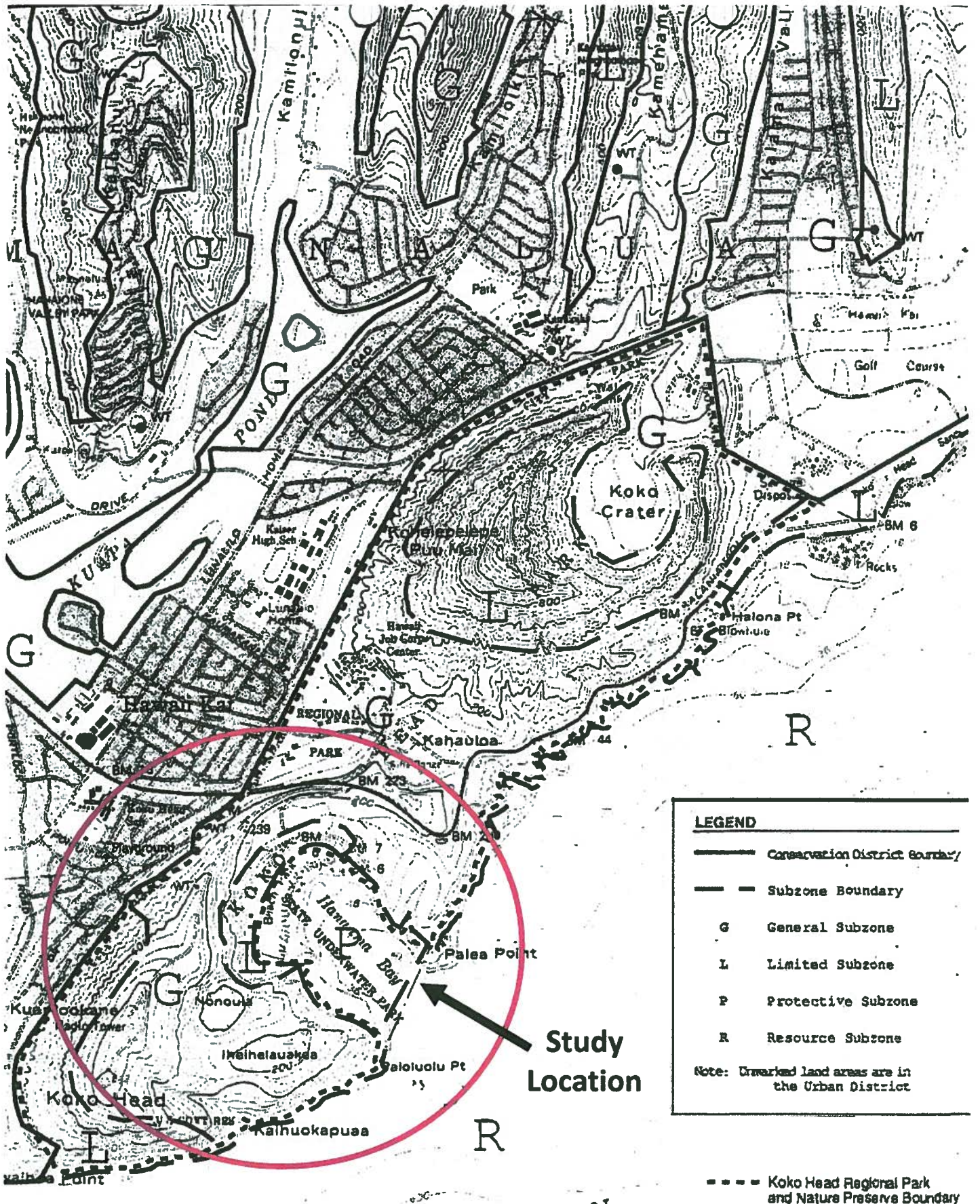


Lauren Yasaka
Office of Conservation and Coastal Lands

Approved for submittal:



SUZANNE D. Case, Chairperson
Board of Land and Natural Resources



Conservation District Subzone Map

Hanauma Bay Biological Carrying Capacity Study

Main Objective: To conduct a biological carrying capacity study to determine the changes in biological populations as they relate to the type and level of visitor use that can be accommodated while sustaining acceptable resources.

Actions and Justifications

Compile sources and references of historical data.

- Create annotated bibliography of all historical published and unpublished literature on Hanauma Bay.
 - Provides access to an index, summaries, and documents for all data to managers, researchers, and the public in one location.

Visitor Counts

- Monitor spatial and temporal activity patterns of human use within the Bay through visual and photographic counts to determine the visitor number and duration of activities.
 - Relates visitor reef activity use to coral breakage, visibility, and coral health in different sectors.

Direct Human Impact Monitoring

- Reef transects to assess all biological organisms and surveys to determine coral recruitment.
 - Links visitor use with marine health.
- Coral Trampling Experiment using Coral Skeletons
 - 60 coral skeletons secured on the reef in eight different areas within the Bay and a reference site not impacted by human use to examine breakage due to human trampling patterns.

Annual monitoring of long-term monitoring sites established in 1999

- Benthic and Fish Surveys along 20 transects at 3 m and 10 m depth.
 - Determine changes in biological populations over time and relate to shifts in activities (ex. fish feeding).

Visibility Measurements

- Deployment of sediment traps, resuspension chambers, visibility measurements
 - Evaluate the linkage between human use, suspended sediments, and coral and fish populations

Temperature Monitoring

- Automatic loggers are recording temperature at 30-minute intervals in all sectors.
 - Bleaching and mortality of corals is related to temperature. This will be used to eliminate other factors that may be attributed to loss of corals.

PRELIMINARY 1st QUARTER RESULTS

Approximately 100 documents and data were compiled from historical visitor counts, research activities, monitoring surveys, water quality measurements and others. Summaries and indices are being generated.

Half of the visitor use was determined to be within the Keyhole area. This is correlated to the loss of half of the coral skeletons. The offshore control site with no direct human contact exhibited no breakage or loss.

Long-term monitoring sites show a decline in coral since 1999. The shallow site declined continually that may be attributed to visitor use. The deeper site shows declines following the 2014/2015 bleaching event that initiated the loss of nearly 10% of the shallow reef flat coral cover. Annual monitoring results will be connected to other surveys and numerical data to determine the relationships of observed changes.

Water visibility was 9.2 feet greater on days when Hanauma Bay is closed to the public as compared to open access days. The greatest average difference between open and closed days were observed in the two sectors with the highest snorkeling and wading traffic, Keyhole (11.5 ft.) and Channel (11.2 ft.)