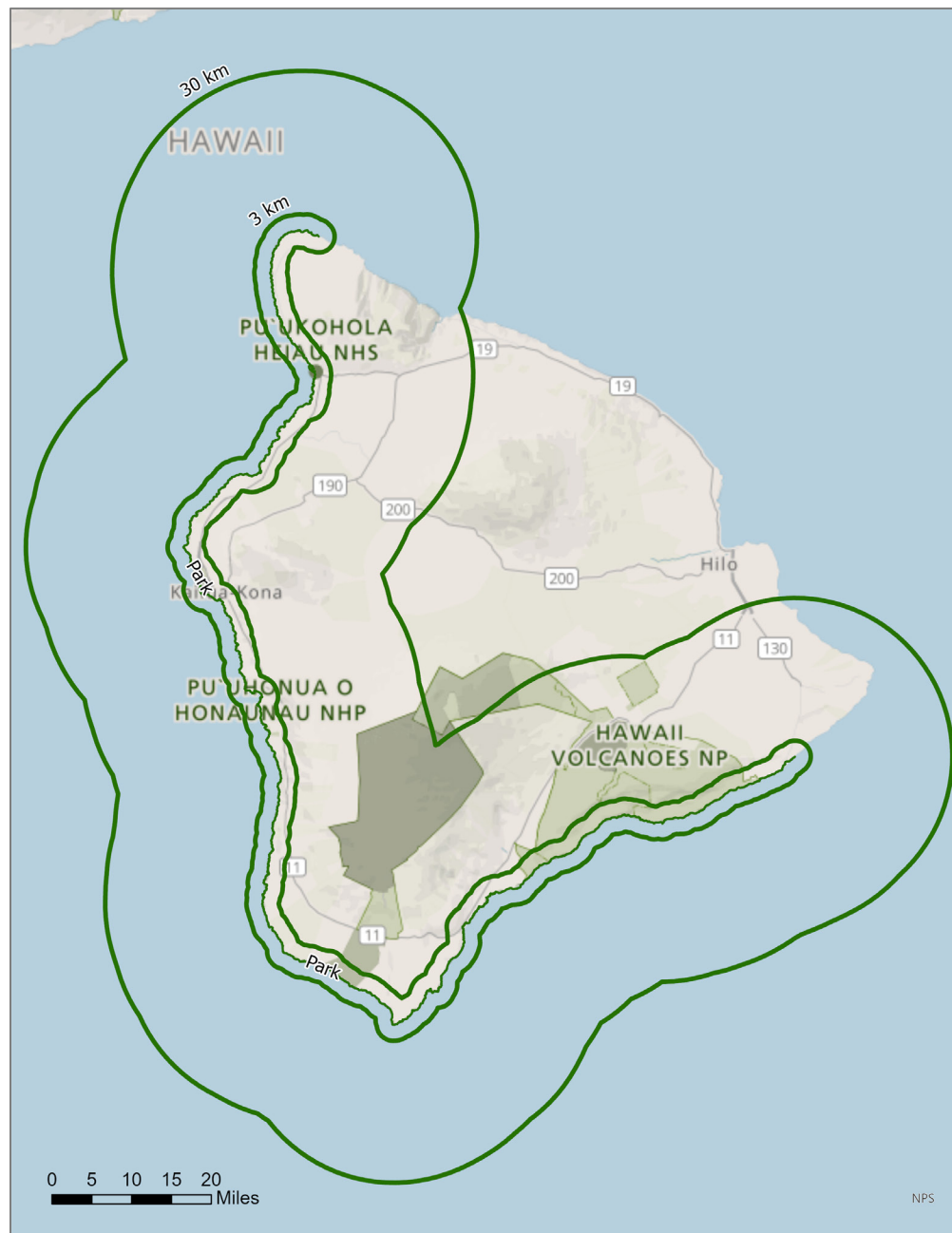




Land Cover Summary Statistics for Pacific Island Network Park Units



Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating impervious surface summary statistics for Ala Kahakai National Historic Trail (ALKA).

Land cover summary statistics for Pacific Island Network park units

Science Report NPS/SR—2024/193

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Managed Business Solutions (MBS)

A Sealaska Company Contractor to the National Park Service Natural Resource Stewardship and Science Directorate

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Abstract

This report documents the acquisition of source data and calculation of land cover summary statistics datasets for 12 National Park Service Pacific Island Network park units: Ala Kahakai National Historic Trail, American Memorial Park, Haleakalā National Park, Hawai‘i Volcanoes National Park, Honouliuli National Monument, Kalaupapa National Historical Park, Kaloko-Honokōhau National Historical Park, National Park of American Samoa, Pu‘uhonua o Hōnaunau National Historical Park, Pu‘ukoholā Heiau National Historic Site, War in the Pacific National Historical Park, and Pearl Harbor National Memorial, and nine custom areas of analysis. The source data and land cover calculations are available for use within the National Park Service (NPS) Inventory and Monitoring Program. Land cover summary statistics datasets can be calculated for all geographic regions within the extent of the NPS; this report includes statistics calculated for U.S. Pacific Islands. The land cover summary statistics datasets are calculated from the National Oceanic and Atmospheric Administration Office of Coastal Management product Coastal Change Analysis Program (C-CAP) data. These summary statistics calculate land cover at up to two classification scales: modified Anderson Level 2, and Natural versus Converted land cover. The output land cover summary statistics datasets produced here for the 12 Pacific Island Network park units and nine custom areas of analysis utilize the most recent versions of the source datasets (C-CAP). These land cover summary statistics datasets are used in the NPS Inventory and Monitoring Program, including the NPS Environmental Settings Monitoring Protocol, and may be used by networks and parks for additional efforts.

Background and Summary

The National Park Service (NPS) Inventory and Monitoring (I&M) Program inventories and monitors natural resources in park units across the NPS. Landscape dynamics, weather, and stream hydrology measures are monitored in areas inside and near parks with significant natural resources using methods outlined in the NPS Environmental Settings Protocol (DeVivo et al. 2018). For each park, landscape dynamics measures are calculated in areas of analysis (AOAs) such as a park boundary, a watershed, or a user-defined area within a park.

Land cover statistics for each AOA are derived from raster datasets from one or more sources, depending on the park. The National Land Cover Database (NLCD) provides data on land cover and associated changes for Alaska and the conterminous United States (CONUS). The Land Change Monitoring, Assessment, and Projection (LCMAP) data covers Hawaii and CONUS. Last, the Coastal Change Analysis Program (C-CAP) covers United States islands and territories and is produced through the National Oceanic and Atmospheric Administration's Office of Coastal Management (NOAA OCM).

Not all raster dataset sources are applicable for all NPS geographic regions. Only land cover sources applicable to Pacific Island Network park units are referenced in this report.

This report represents a summary of land cover statistics and is non-interpretive in nature. While this report compares data between time periods, comparisons do not provide any indications of significance or reasons behind why differences may be seen.

Data Records

One .csv file was created containing land cover summary statistics for Pacific Island Network park units and custom AOAs. The .csv file in this database represents 167 NPS unit boundary-derived AOAs and contains data that are geographically referenced to the NAD 83 (2011) epoch 2010.00 datum as represented by the well-known identifier (WKID) 102039 (ESRI 2022a). These are spatially projected to the appropriate local spatial reference which is noted with each dataset (ESRI 2022b).

1. LandcoverStatistics_Output_Dataset.csv (401.7 KB) is a tabular dataset representing land cover summary statistics for all AOAs utilizing C-CAP raster data included in the source dataset.

Data Quality Evaluation

All data have been reviewed by staff in the NPS Inventory and Monitoring Division to ensure accuracy, completeness, and consistency with documented data quality standards (DeVivo et al. 2018), as well as for usability and reproducibility. The *Land Cover Summary Statistics Data Package for Pacific Island Network Park Units* is suitable for its intended use as of the date of processing (2024-05-21).

Usage Notes

This data package is available for download from the NPS DataStore at <https://doi.org/10.57830/2303773>.

This data package can also be directly imported into R using the [NPSutils package](#) with the following code:

```
devtools::install_github("nationalparkservice/NPSutils")
library(NPSutils)
get_data_packages(2303773)
data <- load_data_package(2303773)
list2env(dat, envir=.GlobalEnv)
```

This data package is designed to be used in conjunction with the data that describe the geospatial characteristics of the Areas of Analysis (NPS-IMD-2022).

Methods

This report documents the methods used to calculate land cover summary statistics datasets for AOAs pertinent to Pacific Island Network park units using source land cover data available as of the date of this report's publication.

Using custom scripts and scripted tools, land cover summary statistics were calculated from C-CAP source raster datasets for available Pacific Island Network park units' AOAs (see Code Availability section for details). Figure 1 depicts a flowchart of output summary statistics datasets representing modified Anderson Level 2 and Natural versus Converted land cover classifications for a user-defined list of AOAs. Not all land cover sources were available for all AOAs.

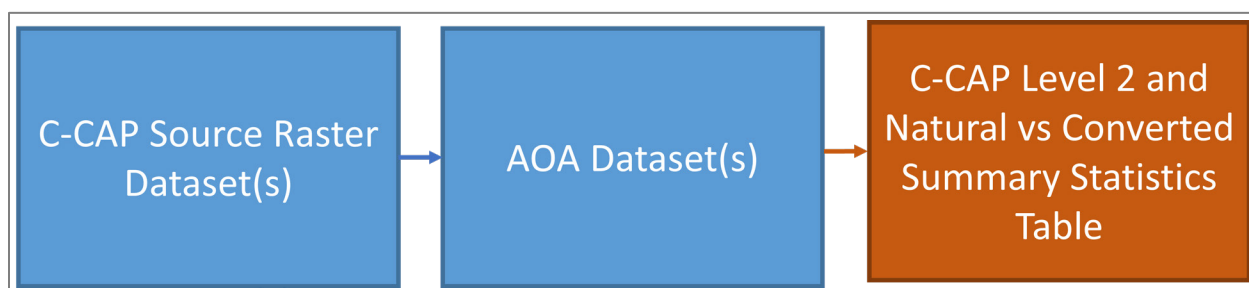


Figure 1. Generalized process flow for land cover summary statistics calculations. Orange boxes indicate datasets documented by this report.

Study Area

The 12 park units and nine custom AOAs analyzed are located within the Pacific Island Network, spanning across the Pacific Ocean.

Areas of Analysis

As part of the I&M Program's Environmental Settings Protocol, AOAs have been identified for each park for which landscape dynamics statistics are to be calculated (Kinseth and Nelson 2022). These include a combination of watersheds, areas defined by park boundaries, and, in some cases, custom AOAs within or near parks. Land cover statistics were calculated for 167 AOAs pertinent to Ala Kahakai National Historic Trail (ALKA), American Memorial Park (AMME), Haleakalā National Park (HALE), Hawai'i Volcanoes National Park (HAVO), Honouliuli National Monument (HONO), Kalaupapa National Historical Park (KALA), Kaloko-Honokōhau National Historical Park (KAHO), National Park of American Samoa (NPSA), Pu'uhonua o Hōnaunau National Historical Park (PUHO), Pu'ukoholā Heiau National Historic Site (PUHE), War in the Pacific National Historical Park (WAPA) and Pearl Harbor National Memorial (PERL).

Statistics are presented in this report for standard AOAs (park, 3 km, and 30 km buffer AOAs). Statistics have additionally been calculated for nine Custom AOAs pertinent to Pacific Island Network park units (see Appendix A). While the statistics for Custom AOAs are not presented in this report, they are included in the output dataset.

Source Land Cover Data

Coastal Change Analysis Program

C-CAP data cover U.S. island states and territories, and ranges from a pixel resolution of 2 m to 2.4 m depending on the geographic region and date of data acquisition. These data are produced approximately every five years (dates vary by geographic area) through NOAA OCM and are available for download through NOAA OCM's Data Access Viewer (Table 1; NOAA-OCM 2024). Data used in this report were accessed and downloaded from published geospatial datasets on NPS DataStore (NPS-IMD 2021a - NPS-IMD 2021g).

Table 1. Extent and availability of source raster datasets for land cover statistics calculations from the Coastal Change Analysis Program (C-CAP) sources.

Source	Geographic Extent	Period of Record
C-CAP	Hawai'i	2010–2011 (dates vary)
C-CAP	American Samoa	2010
C-CAP	Guam	2011–2016 (dates vary)
C-CAP	Commonwealth of the Northern Mariana Islands	2005–2016 (dates vary)

Calculation of Land Cover Summary Statistics

Land cover summary statistics were calculated from source land cover rasters, using one or more AOAs to define the boundary for the statistics calculations. All source datasets must be downloaded and stored in the appropriate location before running the statistical calculations (Table 2).

Table 2. Required locations of land cover summary statistics raster and areas of analysis source datasets.

Source Dataset	Save Location
Area(s) of Analysis	\\data\\raw\\AOAs\\<source folder>
Land Cover Raster(s)	\\data\\raw\\source

The land cover summary statistics were calculated from a series of custom Python tools run in sequence. First, the source AOAs were aggregated into a single dataset. This included creating watershed AOAs from the USGS Watershed Boundary Dataset for any watershed that intersects or is within the boundary of a park AOA (USGS 2021). Intersecting watersheds were saved as HUC12 features in the working folder. Then, source land cover rasters were processed, clipped to the maximum spatial extent of each AOA, and projected to the appropriate spatial reference. The clipped rasters were then reclassified as Level 2 (C-CAP) land cover classes. Then, the area and percent area of each land cover class within the raster were calculated into an output table. From the output table, additional land cover classifications were derived, including Natural versus Converted classes. A total of 20 Level 2 C-CAP land cover metrics, and two Natural versus Converted metrics were

calculated for each AOA where raster data were available (Appendix B). Summaries of data for each park are presented in Appendices C through N.

Code Availability

A custom Python toolbox was used to execute the methods in the report (CREATE_IMD_LandcoverStatistics.pyt). ArcGIS Pro 2.9+ (including the Spatial Analyst extension) and Python 3.7+ are both required to access and run the processes referenced in this report. The custom Python toolbox can be accessed at <https://doi.org/10.57830/2300941>. The RMarkdown file needed to produce this report and data package can be accessed at <https://doi.org/10.57830/2301786>.

Literature Cited

- DeVivo, J. C., L. Nelson, M. Kineth, T. Philippi, and W. B. Monahan. 2018. Protocol for monitoring environmental setting of National Park Service units: landscape dynamics, climate, and hydrology. Natural Resource Report NPS/IMD/NRR—2018/1844. National Park Service, Fort Collins, Colorado. <https://doi.org/10.36967/2258457>
- Earth Resources Observation and Science Center (EROS). 2022. LCMAP product mosaic downloads. Available at <https://eros.usgs.gov/lcmap/apps/data-downloads> (accessed 01 March 2023).
- Environmental Systems Research Institute (ESRI). 2022a. Geographic coordinate systems. Available at <https://developers.arcgis.com/rest/services-reference/geographic-coordinate-systems.htm>
- Environmental Systems Research Institute (ESRI). 2022b. Projected coordinate systems. Available at <https://developers.arcgis.com/rest/services-reference/projected-coordinate-systems.htm>
- Jin, S., C. G. Homer, L. Yang, P. Danielson, J. Dewitz, C. Li, Z. Zhu, G. Xian, and D. Howard. 2019. Overall methodology design for the United States National Land Cover Database 2016 products. Remote Sensing, 11(24). <https://doi.org/10.3390/rs11242971>
- Kineth, M., and L. Nelson. 2022. Boundary-derived areas of analysis for National Park Service units, Fall 2021. NPS/NRSS/DRR—2022/3. <https://doi.org/10.36967/2287628>
- Multi-Resolution Land Characteristics Consortium (MRLC). 2019. National Land Cover Database website. Available at <https://www.mrlc.gov/data> (accessed 1 March 2023).
- National Oceanic and Atmospheric Administration Office for Coastal Management (NOAA-OCM). 2024. NOAA Data Access Viewer Web Application. Available at: <https://coast.noaa.gov/dataviewer/#/> (accessed 7 February 2024).
- NPS Natural Resource Inventory and Monitoring Division. 2021a. Landscape Dynamics - American Samoa - C-CAP Land Cover Level 2, 2010. <https://irma.nps.gov/DataStore/Reference/Profile/2287334>
- NPS Natural Resource Inventory and Monitoring Division. 2021b. Landscape Dynamics - Guam - C-CAP Land Cover Level 2, 2011. <https://irma.nps.gov/DataStore/Reference/Profile/2287338>
- NPS Natural Resource Inventory and Monitoring Division. 2021c. Landscape Dynamics - Guam - C-CAP Land Cover Level 2, 2016. <https://irma.nps.gov/DataStore/Reference/Profile/2287341>
- NPS Natural Resource Inventory and Monitoring Division. 2021d. Landscape Dynamics - Hawaii (Big Island), Maui, Molokai - C-CAP Land Cover Level 2, 2010. <https://irma.nps.gov/DataStore/Reference/Profile/2287238>

- NPS Natural Resource Inventory and Monitoring Division. 2021e. Landscape Dynamics - Oahu - C-CAP Land Cover Level 2, 2011. <https://irma.nps.gov/DataStore/Reference/Profile/2287278>
- NPS Natural Resource Inventory and Monitoring Division. 2021f. Landscape Dynamics - Saipan - C-CAP Land Cover Level 2, 2005. <https://irma.nps.gov/DataStore/Reference/Profile/2287343>
- NPS Natural Resource Inventory and Monitoring Division. 2021g. Landscape Dynamics - Saipan - C-CAP Land Cover Level 2, 2016. <https://irma.nps.gov/DataStore/Reference/Profile/2287346>
- NPS Natural Resource Inventory and Monitoring Division (NPS-IMD). 2022. NPS Unit Boundary-derived Areas of Analysis, Fall 2023. <https://doi.org/10.57830/2287631>
- United States Geological Survey (USGS). 2021. National map staged products directory. Available at <http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/WBD/National/GDB/> (accessed 13 January 2023).
- United States Geological Survey (USGS). 2022. Land change monitoring, assessment, and projection (LCMAP) collection 1.3 science products for the conterminous United States: USGS data release. <https://doi.org/10.5066/P9C46NG0>

Appendix A. Custom Areas of Analysis

Table 3 lists the Custom Areas of Analysis included in this analysis. Custom AOA summary statistics are included in the output dataset.

Table 3. Custom Area(s) of Analysis (AOAs) pertinent to the Pacific Island Network used to calculate land cover summary statistics. [AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

AOA Code	Description
PACN_Guam_Custom	Custom Area of Analysis covering the island of Guam.
PACN_Hawaii_Custom	Custom Area of Analysis covering the island of Hawai'i.
PACN_Maui_Custom	Custom Area of Analysis covering the island of Maui.
PACN_Molokai_Custom	Custom Area of Analysis covering the island of Moloka'i.
PACN_Oahu_Custom	Custom Area of Analysis covering the island of Oahu.
PACN_Ofu_Custom	Custom Area of Analysis covering the Ofu Island.
PACN_Tau_Custom	Custom Area of Analysis covering Tau Island.
PACN_Tutuila_Custom	Custom Area of Analysis covering Tutuila Island.
PACN_Saipan_Custom	Custom Area of Analysis covering Saipan Island.

Appendix B. Reclassification Tables

Table 4 lists the reclassification values for C-CAP natural/converted classifications.

Table 4. Table with reclassification values for C-CAP natural/converted classifications. Reclassified values were used for land cover summary statistics calculations.

C-CAP Land Cover Level 2 Class (Value)	C-CAP Land Cover Natural vs Converted Reclassification (Value)
Impervious Surface (2)	Converted (1)
Developed Open Space (5)	Converted (1)
Cultivated Crops (6)	Converted (1)
Pasture/Hay (7)	Converted (1)
Grassland/Herbaceous (8)	Natural (2)
Deciduous Forest (9)	Natural (2)
Evergreen Forest (10)	Natural (2)
Scrub/Shrub (12)	Natural (2)
Palustrine Forested Wetland (13)	Natural (2)
Palustrine Scrub/Shrub Wetland (14)	Natural (2)
Palustrine Emergent Wetland (15)	Natural (2)
Estuarine Forested Wetland (16)	Natural (2)
Estuarine Scrub/Shrub Wetland (17)	Natural (2)
Estuarine Emergent Wetland (18)	Natural (2)
Unconsolidated Shore (19)	Natural (2)
Bare Land (20)	Natural (2)
Open Water (21)	Natural (2)
Palustrine Aquatic Bed (22)	Natural (2)
Estuarine Aquatic Bed (23)	Natural (2)
Upland Forest (11)	Natural (2)

Appendix C. Ala Kahakai National Historic Trail

Ala Kahakai National Historic Trail (ALKA) is located in Hawai'i. Figure 2 shows the location of ALKA, along with the surrounding 3 km buffer and 30 km buffer AOAs.

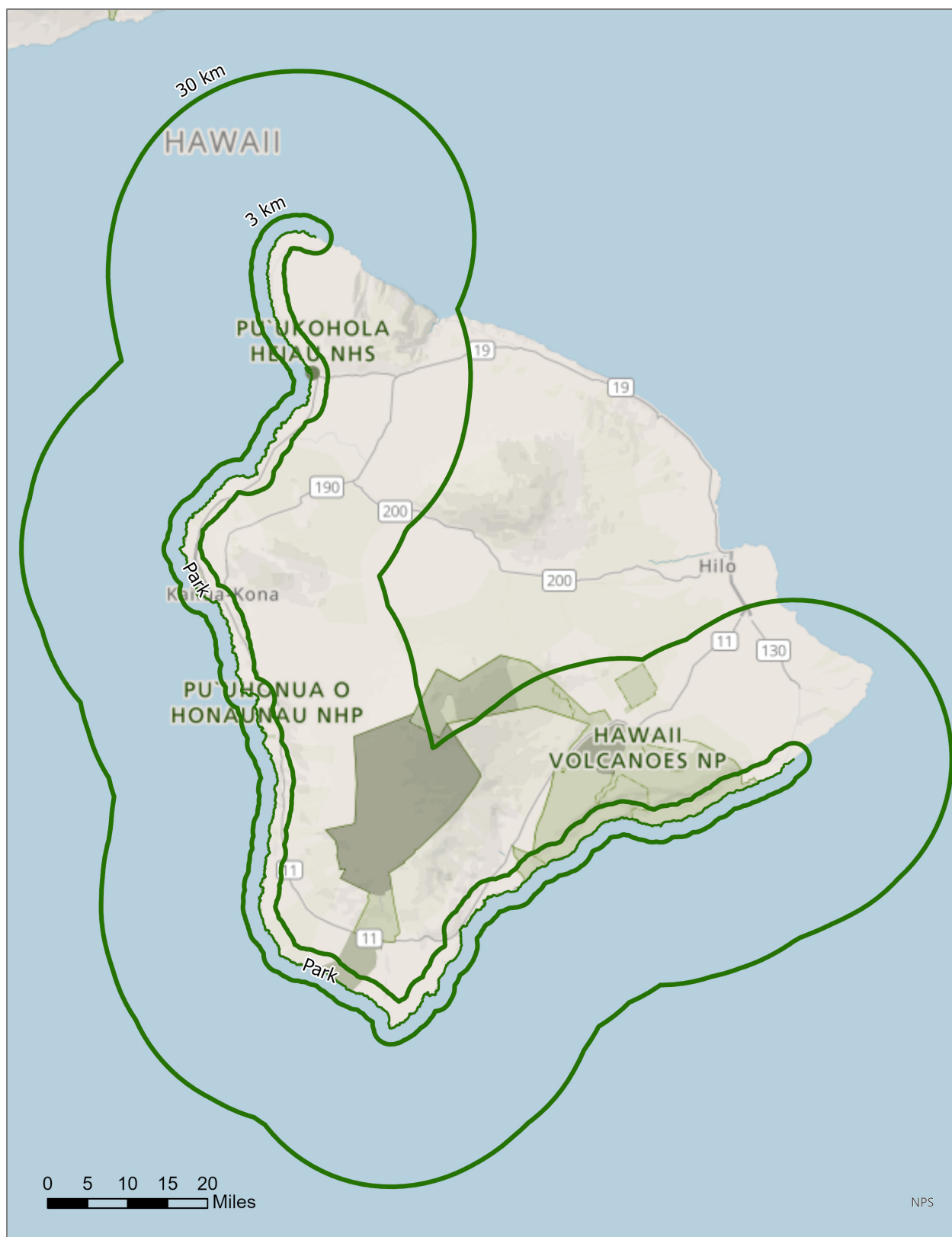


Figure 2. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Ala Kahakai National Historic Trail (ALKA). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for 47 AOAs relevant to ALKA (Table 5).

Table 5. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Ala Kahakai National Historic Trail (ALKA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	ALKA_Park	Area of Analysis within the boundary of Ala Kahakai National Historic Trail.
Boundary Based AOA	ALKA_3km	Area of Analysis within a three-kilometer buffer of Ala Kahakai National Historic Trail, originating from the boundary of the park.
	ALKA_30km	Area of Analysis within a 30-kilometer buffer of Ala Kahakai National Historic Trail, originating from the boundary of the park.
Watershed	ALKA_200100000101	Hapahapai Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000601	Kaimu Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000602	Makaopuhi Crater-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000701	Kahele-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000702	Kau Desert-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000703	Southwest Rift Zone-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000801	Great Crack-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000805	Uewale Gulch watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000806	Punaluu Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.

Table 5 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Ala Kahakai National Historic Trail (ALKA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	ALKA_200100000807	Ninole Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000808	Hilea Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000901	Waiaele Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000902	Alapai Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000903	Hoonoua-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000904	Kahawaikolono-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000905	Paliokulani-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000906	Haliipalala-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100000907	Kanonone Waterhole-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001001	Hanakeaumoe-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001002	Town of Milolii-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001003	Hookena Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001004	Kiilae Watercourse-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.

Table 5 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Ala Kahakai National Historic Trail (ALKA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	ALKA_200100001101	Pali Kapu o Keoua-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001102	Makolea Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001103	Waiaha Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001104	Honokohau Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001105	Kaloko Fishpond-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001201	Opaepa Pond-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001202	Town of Kaupulehu-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001203	Wainanali Pond watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001204	Town of Keawaiki-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001301	Kaauau Point-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001302	Waipuhui Fishpond-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001304	Puuiwaiwa-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001405	Kamakoa Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.

Table 5 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Ala Kahakai National Historic Trail (ALKA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	ALKA_200100001406	Hapuna Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001407	Waiulaula Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001501	Makeahua Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001502	Honokoa Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001503	Kapole Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001504	Puakea Reservoir-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001600	Hilo Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001700	Honuapo Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.
	ALKA_200100001800	Kawaihae Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Ala Kahakai National Historic Trail.

Data Summary

Tables 6–8 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 6. Percent area covered by Level 2 land cover classes within the park boundary of Ala Kahakai National Historic Trail (ALKA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.99
Grassland/Herbaceous	1.87
Deciduous Forest	0.00
Evergreen Forest	3.23
Scrub/Shrub	2.88
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	39.78
Open Water	48.75
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 7. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Ala Kahakai National Historic Trail (ALKA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	14.45
Grassland/Herbaceous	12.03
Deciduous Forest	0.00
Evergreen Forest	10.47
Scrub/Shrub	14.69
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.01
Unconsolidated Shore	0.00
Bare Land	35.32
Open Water	7.28
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 8. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Ala Kahakai National Historic Trail (ALKA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	14.78
Grassland/Herbaceous	8.90
Deciduous Forest	0.00
Evergreen Forest	27.80
Scrub/Shrub	19.58
Palustrine Forested Wetland	0.94
Palustrine Emergent Wetland	0.03
Unconsolidated Shore	0.00
Bare Land	23.15
Open Water	1.26
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix D. American Memorial Park

American Memorial Park (AMME) is located in the Commonwealth of the Northern Mariana Islands. Figure 3 shows the location of AMME, along with the surrounding 3 km buffer and 30 km buffer AOAs.

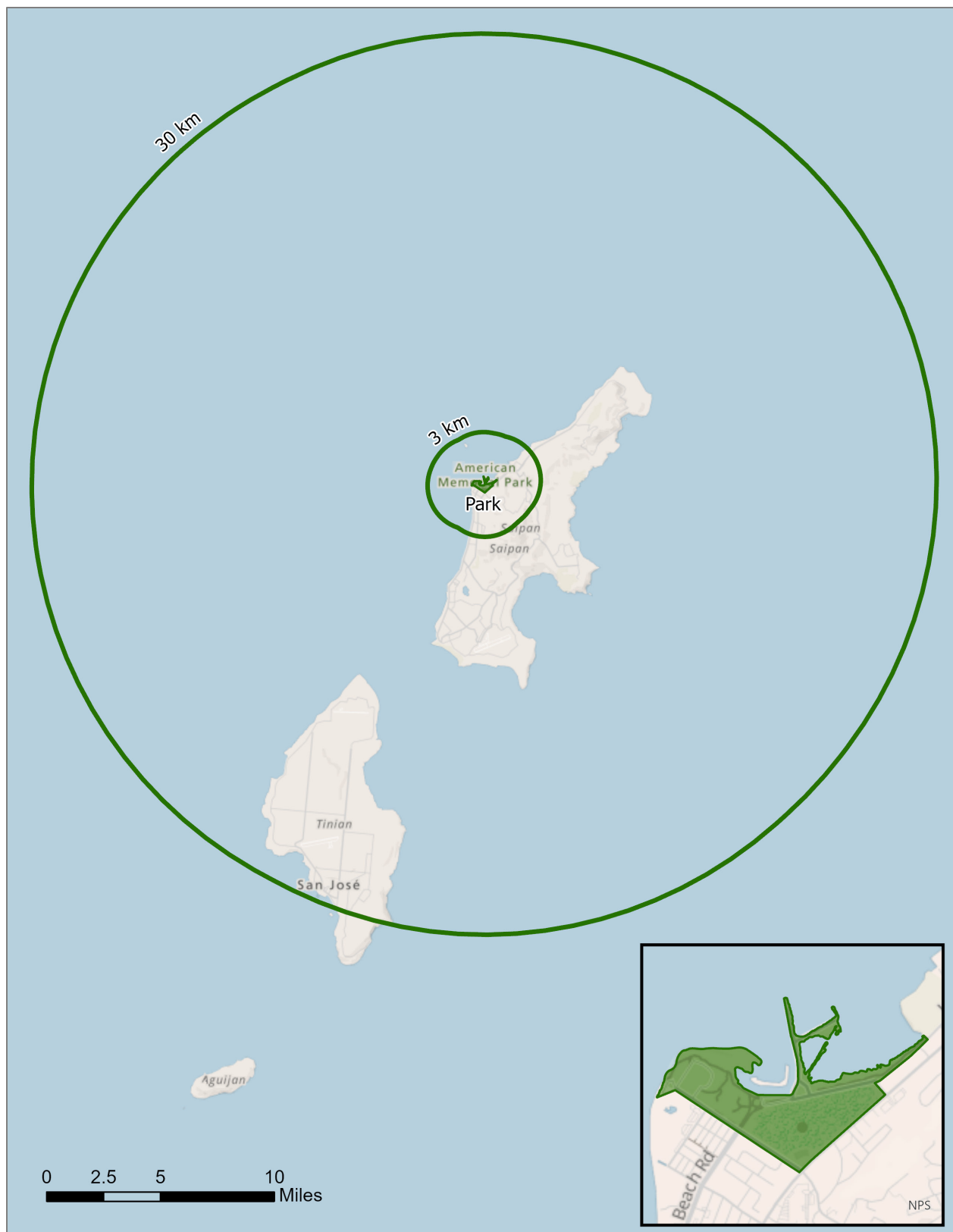


Figure 3. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for American Memorial Park (AMME). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for five AOAs relevant to AMME (Table 9).

Table 9. Area(s) of Analysis (AOAs) used to calculate land cover statistics for American Memorial Park (AMME). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	AMME_Park	Area of Analysis within the boundary of American Memorial Park.
Boundary Based AOA	AMME_3km	Area of Analysis within a three-kilometer buffer of American Memorial Park, originating from the boundary of the park.
	AMME_30km	Area of Analysis within a 30-kilometer buffer of American Memorial Park, originating from the boundary of the park.
Watershed	AMME_220201010104	Kannat Laremies-Frontal Philippine Sea watershed Area of Analysis boundary found to be intersecting with American Memorial Park.
	AMME_220201010200	Bahia Laolao-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with American Memorial Park.

Data Summary

Tables 10–12 show how the percent area for each land cover class changed between 2005 and 2016 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 10. Percent area change over time of Level 2 land cover classes within the park boundary of American Memorial Park (AMME) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2005 (%)	2016 (%)	Change (%)
Pasture/Hay	0.00	0.00	0.00
Grassland/Herbaceous	2.38	0.79	-1.59
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	36.03	34.60	-1.43
Scrub/Shrub	7.14	7.78	0.63
Palustrine Forested Wetland	6.19	6.19	0.00
Palustrine Emergent Wetland	2.70	2.70	0.00
Unconsolidated Shore	0.00	0.00	0.00
Bare Land	1.43	1.27	-0.16
Open Water	7.46	7.14	-0.32
Palustrine Aquatic Bed	0.00	0.00	0.00
Estuarine Aquatic Bed	0.00	0.00	0.00
Upland Forest	0.00	0.00	0.00

Table 11. Percent area change over time of Level 2 land cover classes within the three-kilometer buffer boundary of American Memorial Park (AMME) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2005 (%)	2016 (%)	Change (%)
Pasture/Hay	0.00	0.00	0.00
Grassland/Herbaceous	2.82	2.81	-0.01
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	60.97	58.42	-2.55
Scrub/Shrub	4.61	4.66	0.05
Palustrine Forested Wetland	0.43	0.43	0.00
Palustrine Emergent Wetland	0.45	0.45	0.00
Unconsolidated Shore	0.00	0.00	0.00
Bare Land	0.68	1.35	0.66
Open Water	3.90	3.83	-0.07
Palustrine Aquatic Bed	0.00	0.00	0.00
Estuarine Aquatic Bed	0.00	0.00	0.00
Upland Forest	0.00	0.00	0.00

Table 12. Percent area change over time of Level 2 land cover classes within the 30-kilometer buffer boundary of American Memorial Park (AMME) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2005 (%)	2016 (%)	Change (%)
Pasture/Hay	0.35	0.39	0.04
Grassland/Herbaceous	5.55	5.78	0.24
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	58.84	57.37	-1.47
Scrub/Shrub	7.65	8.32	0.67
Palustrine Forested Wetland	0.44	0.44	0.00
Palustrine Emergent Wetland	1.10	1.11	0.01
Unconsolidated Shore	0.00	0.00	0.00
Bare Land	1.25	1.39	0.14
Open Water	3.90	3.88	-0.02
Palustrine Aquatic Bed	0.00	0.00	0.00
Estuarine Aquatic Bed	0.00	0.00	0.00

Appendix E. Haleakalā National Park

Haleakalā National Park (HALE) is located in the Hawai'i. Figure 4 shows the location of HALE, along with the surrounding 3 km buffer and 30 km buffer AOAs.

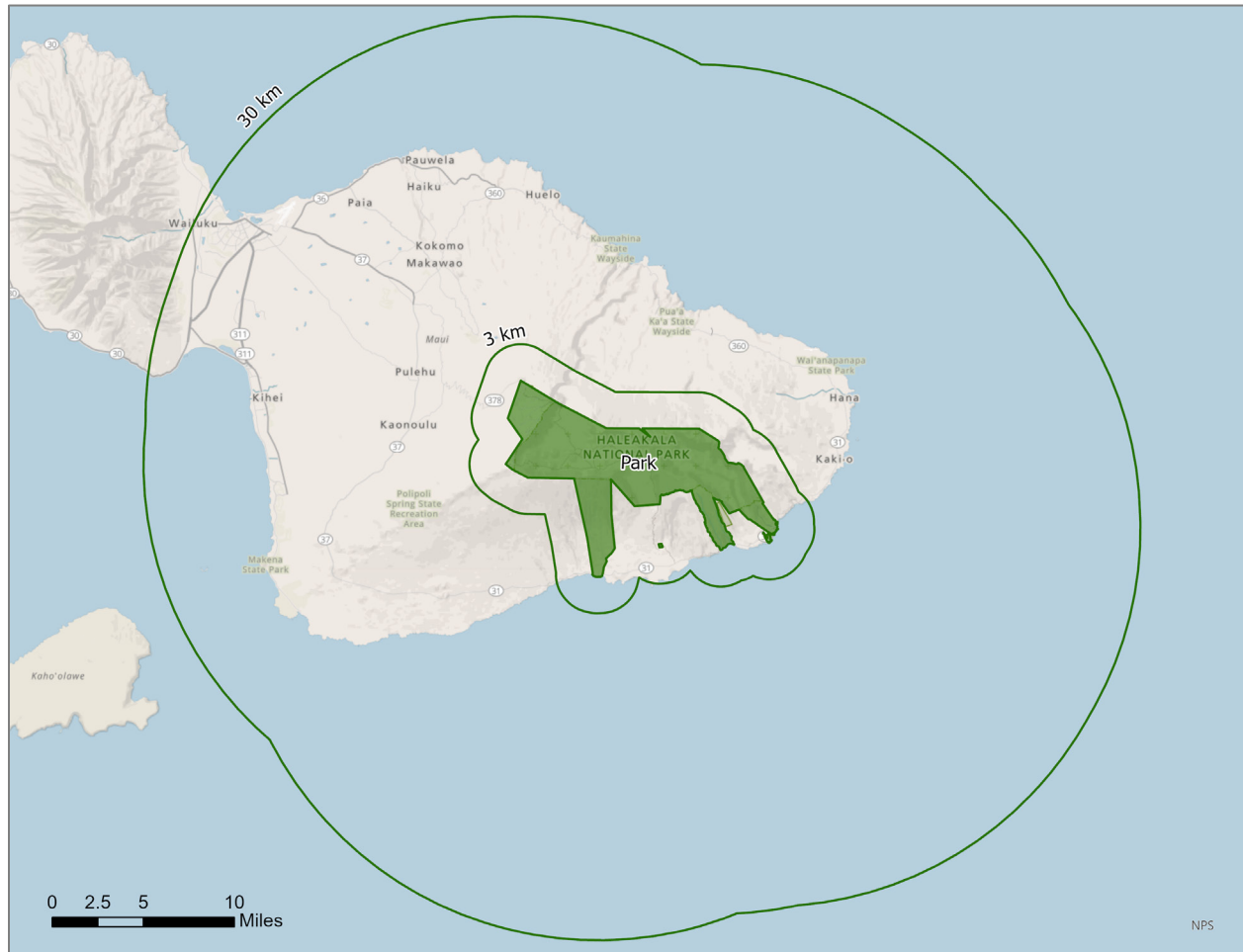


Figure 4. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Haleakalā National Park (HALE). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for 17 AOAs relevant to HALE (Table 13).

Table 13. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Haleakalā National Park (HALE). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	HALE_Park	Area of Analysis within the boundary of Haleakalā National Park.
Boundary Based AOA	HALE_3km	Area of Analysis within a three-kilometer buffer of Haleakalā National Park, originating from the boundary of the park.
	HALE_30km	Area of Analysis within a 30-kilometer buffer of Haleakalā National Park, originating from the boundary of the park.
Watershed	HALE_200200000201	Kalialinui Gulch watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000202	Kailua Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000303	Kailua Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000304	Honomanu Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000305	Piinaau Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000306	East Wailua Iki Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000307	Hanawi Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000308	Heleleoha Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000402	Waiohonu Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000403	Palikea Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000501	Kaupo Gap-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.

Table 13 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Haleakalā National Park (HALE). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	HALE_200200000502	Hawelewele Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000603	Waiakoa Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.
	HALE_200200000800	Maalaea Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Haleakalā National Park.

Data Summary

Tables 14–16 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 14. Percent area covered by Level 2 land cover classes within the park boundary of Haleakalā National Park (HALE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	8.25
Deciduous Forest	0.00
Evergreen Forest	15.52
Scrub/Shrub	34.34
Palustrine Forested Wetland	16.24
Palustrine Emergent Wetland	0.08
Unconsolidated Shore	0.00
Bare Land	24.16
Open Water	0.03
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 15. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Haleakalā National Park (HALE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	5.07
Grassland/Herbaceous	6.66
Deciduous Forest	0.00
Evergreen Forest	14.57
Scrub/Shrub	33.80
Palustrine Forested Wetland	19.85
Palustrine Emergent Wetland	0.08
Unconsolidated Shore	0.01
Bare Land	13.75
Open Water	1.91
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 16. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Haleakalā National Park (HALE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	7.48
Grassland/Herbaceous	8.75
Deciduous Forest	0.00
Evergreen Forest	17.17
Scrub/Shrub	24.68
Palustrine Forested Wetland	13.10
Palustrine Emergent Wetland	0.11
Unconsolidated Shore	0.10
Bare Land	5.95
Open Water	3.16
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix F. Hawai'i Volcanoes National Park

Hawai'i Volcanoes National Park (HAVO) is located in Hawai'i. Figure 5 shows the location of HAVO, along with the surrounding 3 km buffer and 30 km buffer AOAs.

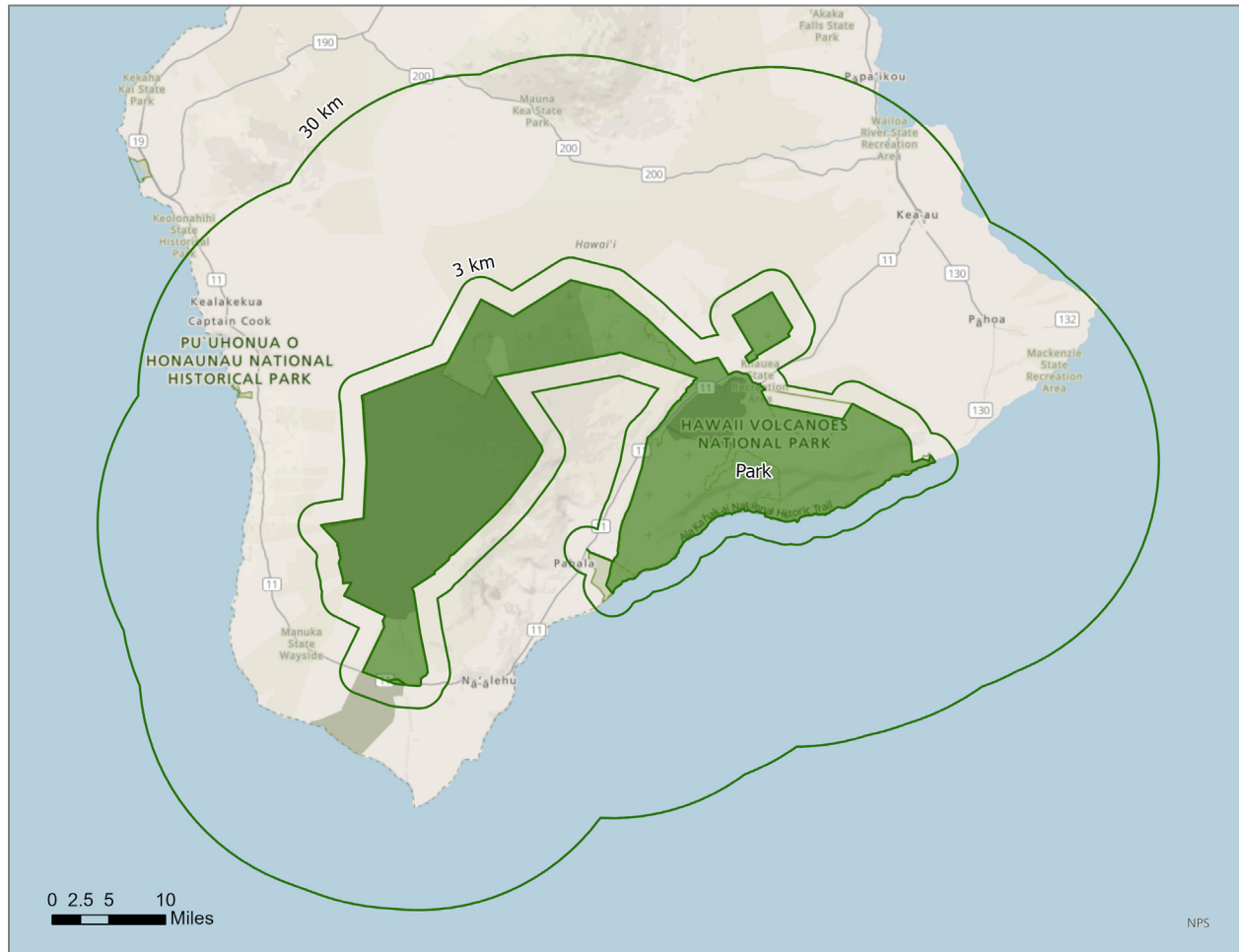


Figure 5. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Hawai'i Volcanoes National Park (HAVO). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for 36 AOAs relevant to HAVO (Table 17).

Table 17. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Hawai'i Volcanoes National Park (HAVO). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	HAVO_Park	Area of Analysis within the boundary of Hawai'i Volcanoes National Park.
Boundary Based AOA	HAVO_3km	Area of Analysis within a three-kilometer buffer of Hawai'i Volcanoes National Park, originating from the boundary of the park.
	HAVO_30km	Area of Analysis within a 30-kilometer buffer of Hawai'i Volcanoes National Park, originating from the boundary of the park.
Watershed	HAVO_200100000403	Ainahou watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000406	Upper Waiakea Forest Reserve watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000501	Pu'umakaala-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000502	Olaa Forest-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000503	Puna Forest Reserve-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000602	Makaopuhi Crater-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000701	Kahele-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000702	Kau Desert-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000703	Southwest Rift Zone-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000801	Great Crack-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000802	Waihaka Gulch watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.

Table 17 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Hawai'i Volcanoes National Park (HAVO). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	HAVO_200100000803	Piikea Gulch watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000804	Hionamoa Gulch watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000805	Uewale Gulch watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000806	Punaluu Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000807	Ninole Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000808	Hilea Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000901	Waialee Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000902	Alapai Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000903	Hoonoua-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000904	Kahawaikolono-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000905	Paliokulani-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000906	Haliipalala-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100000907	Kanonone Waterhole-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.

Table 17 (continued). Area(s) of Analysis (AOAs) used to calculate land cover statistics for Hawai'i Volcanoes National Park (HAVO). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Watershed (continued)	HAVO_200100001001	Hanakeaumoe-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001002	Town of Milolii-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001003	Hookena Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001004	Kiilae Watercourse-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001101	Pali Kapu o Keoua-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001102	Makolea Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001204	Town of Keawaiki-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001303	Pohakuloa Gulch watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.
	HAVO_200100001700	Honuapo Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Hawai'i Volcanoes National Park.

Data Summary

Tables 18–20 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 18. Percent area covered by Level 2 land cover classes within the park boundary of Hawai'i Volcanoes National Park (HAVO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	1.43
Grassland/Herbaceous	5.33
Deciduous Forest	0.00
Evergreen Forest	10.06
Scrub/Shrub	15.75
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	67.31
Open Water	0.01
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 19. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Hawai'i Volcanoes National Park (HAVO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	1.96
Grassland/Herbaceous	4.67
Deciduous Forest	0.00
Evergreen Forest	19.26
Scrub/Shrub	17.34
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	55.39
Open Water	0.48
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 20. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Hawai'i Volcanoes National Park (HAVO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	5.35
Grassland/Herbaceous	5.35
Deciduous Forest	0.00
Evergreen Forest	31.47
Scrub/Shrub	22.35
Palustrine Forested Wetland	0.20
Palustrine Emergent Wetland	0.05
Unconsolidated Shore	0.00
Bare Land	30.76
Open Water	0.84
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix G. Honouliuli National Monument

Honouliuli National Monument (HONO) is located in Hawai'i. Figure 6 shows the location of HONO, along with the surrounding 3 km buffer and 30 km buffer AOAs.



Figure 6. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Honouliuli National Monument (HONO). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for five AOAs relevant to HONO (Table 21).

Table 21. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Honouliuli National Monument (HONO). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	HONO_Park	Area of Analysis within the boundary of Honouliuli National Historic Site.
Boundary Based AOA	HONO_3km	Area of Analysis within a three-kilometer buffer of Honouliuli National Historic Site, originating from the boundary of the park.
	HONO_30km	Area of Analysis within a 30-kilometer buffer of Honouliuli National Historic Site, originating from the boundary of the park.
Watershed	HONO_200600000404	Honouliuli Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Honouliuli National Historic Site.
	HONO_200600000405	Kaloi Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Honouliuli National Historic Site.

Data Summary

Tables 22–24 show the percent area covered by each land cover class in 2011 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 22. Percent area covered by Level 2 land cover classes within the park boundary of Honouliuli National Monument (HONO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	1.14
Deciduous Forest	0.00
Evergreen Forest	33.10
Scrub/Shrub	59.91
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	0.29
Open Water	0.00
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 23. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Honouliuli National Monument (HONO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	11.25
Deciduous Forest	0.00
Evergreen Forest	14.49
Scrub/Shrub	25.18
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.04
Unconsolidated Shore	0.00
Bare Land	3.00
Open Water	0.14
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 24. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Honouliuli National Monument (HONO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.02
Grassland/Herbaceous	7.95
Deciduous Forest	0.00
Evergreen Forest	44.90
Scrub/Shrub	12.64
Palustrine Forested Wetland	0.10
Palustrine Emergent Wetland	0.18
Unconsolidated Shore	0.09
Bare Land	1.47
Open Water	9.78
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix H. Kalaupapa National Historical Park

Kalaupapa National Historical Park (KALA) is located in the Hawai'i. Figure 7 shows the location of KALA, along with the surrounding 3 km buffer and 30 km buffer AOAs.

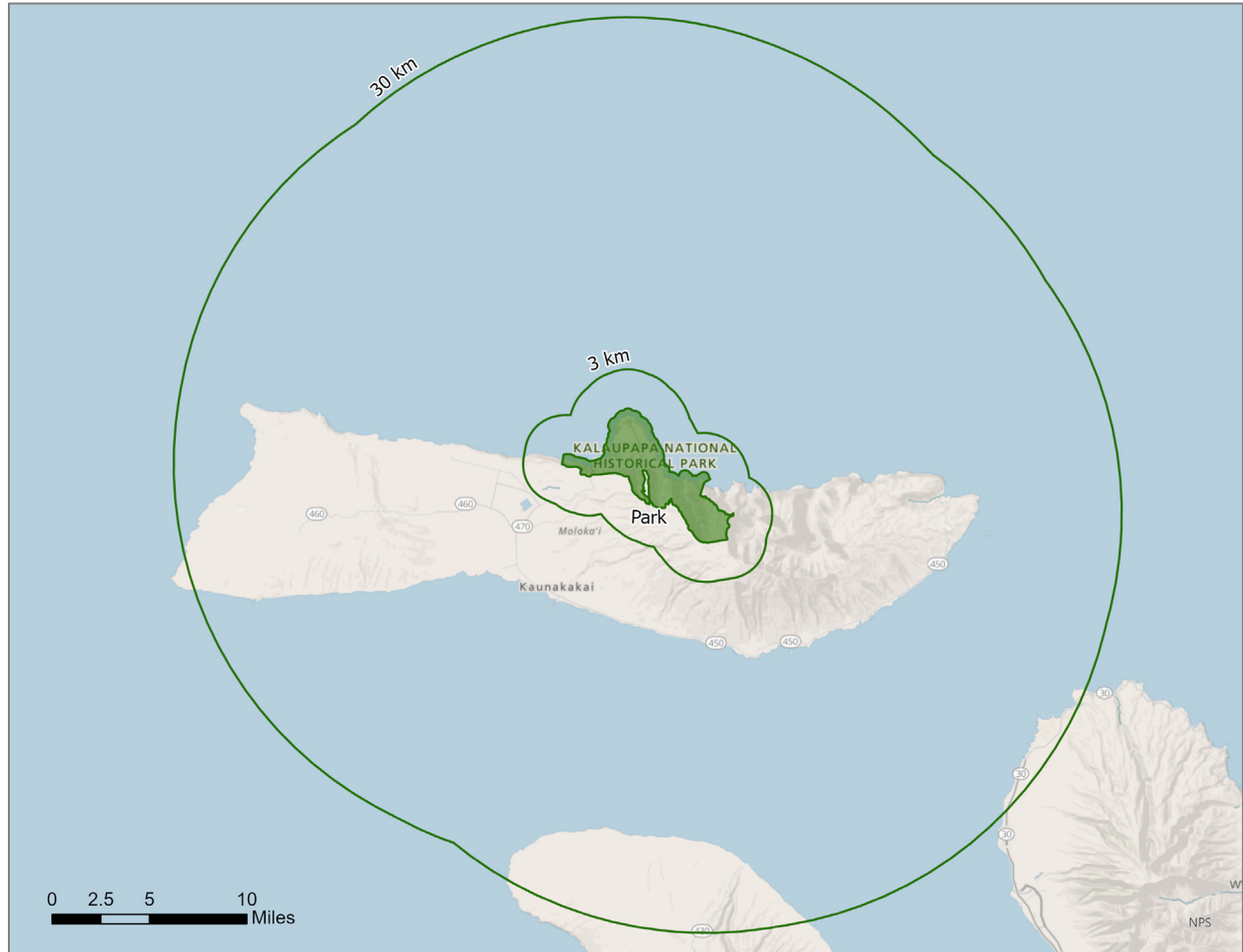


Figure 7. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Kalaupapa National Historical Park (KALA). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for six AOAs relevant to KALA (Table 25).

Table 25. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Kalaupapa National Historical Park (KALA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	KALA_Park	Area of Analysis within the boundary of Kalaupapa National Historical Park.
Boundary Based AOA	KALA_3km	Area of Analysis within a three-kilometer buffer of Kalaupapa National Historical Park, originating from the boundary of the park.
	KALA_30km	Area of Analysis within a 30-kilometer buffer of Kalaupapa National Historical Park, originating from the boundary of the park.
Watershed	KALA_200500000103	Kakaauuku Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kalaupapa National Historical Park.
	KALA_200500000201	Waihaanau Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kalaupapa National Historical Park.
	KALA_200500000202	Pelekunu Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kalaupapa National Historical Park.
	KALA_200500000500	Halawa Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kalaupapa National Historical Park.

Data Summary

Tables 26–28 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 26. Percent area covered by Level 2 land cover classes within the park boundary of Kalaupapa National Historical Park (KALA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.51
Grassland/Herbaceous	6.03
Deciduous Forest	0.00
Evergreen Forest	39.08
Scrub/Shrub	27.37
Palustrine Forested Wetland	4.49
Palustrine Emergent Wetland	0.05
Unconsolidated Shore	0.05
Bare Land	2.63
Open Water	18.28
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 27. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Kalaupapa National Historical Park (KALA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	2.60
Grassland/Herbaceous	3.88
Deciduous Forest	0.00
Evergreen Forest	48.47
Scrub/Shrub	25.85
Palustrine Forested Wetland	4.97
Palustrine Emergent Wetland	0.07
Unconsolidated Shore	0.02
Bare Land	1.68
Open Water	10.88
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 28. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Kalaupapa National Historical Park (KALA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	6.16
Grassland/Herbaceous	15.67
Deciduous Forest	0.00
Evergreen Forest	21.98
Scrub/Shrub	33.58
Palustrine Forested Wetland	1.20
Palustrine Emergent Wetland	0.23
Unconsolidated Shore	0.19
Bare Land	3.86
Open Water	11.29
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix I. Kaloko-Honokōhau National Historical Park

Kaloko-Honokōhau National Historical Park (KAHO) is located in the Hawai'i. Figure 8 shows the location of KAHO, along with the surrounding 3 km buffer and 30 km buffer AOAs.

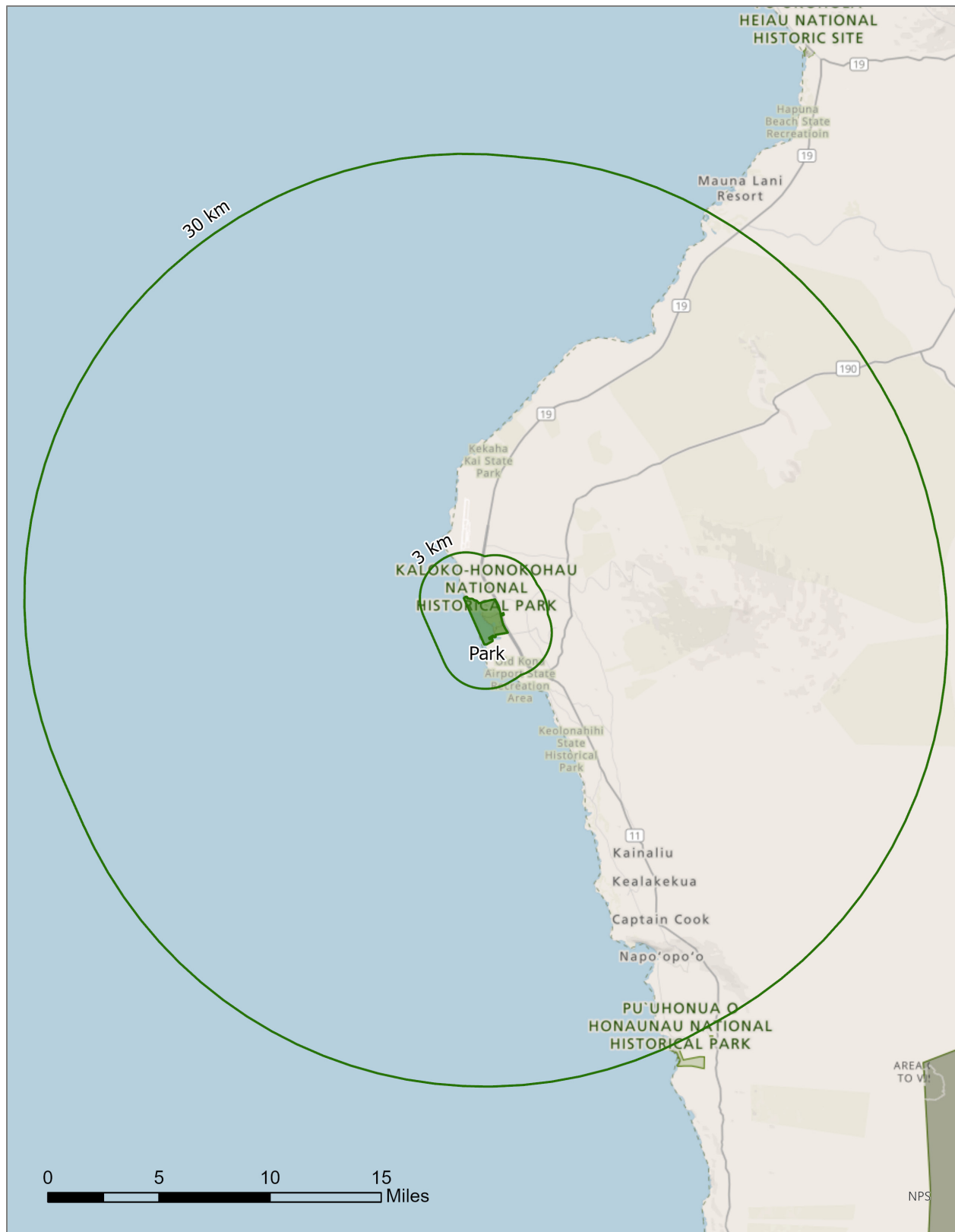


Figure 8. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Kaloko-Honokōhau National Historical Park (KAHO). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for seven AOAs relevant to KAHO (Table 29).

Table 29. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Kaloko-Honokōhau National Historical Park (KAHO). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	KAHO_Park	Area of Analysis within the boundary of Kaloko-Honokōhau National Historical Park.
Boundary Based AOA	KAHO_3km	Area of Analysis within a three-kilometer buffer of Kaloko-Honokōhau National Historical Park, originating from the boundary of the park.
	KAHO_30km	Area of Analysis within a 30-kilometer buffer of Kaloko-Honokōhau National Historical Park, originating from the boundary of the park.
Watershed	KAHO_200100001104	Honokohau Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kaloko-Honokōhau National Historical Park.
	KAHO_200100001105	Kaloko Fishpond-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kaloko-Honokōhau National Historical Park.
	KAHO_200100001800	Kawaihae Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Kaloko-Honokōhau National Historical Park.

Data Summary

Tables 30–32 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 30. Percent area covered by Level 2 land cover classes within the park boundary of Kaloko-Honokōhau National Historical Park (KAHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	6.93
Deciduous Forest	0.00
Evergreen Forest	10.11
Scrub/Shrub	23.38
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	28.80
Open Water	28.14
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 31. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Kaloko-Honokōhau National Historical Park (KAHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	21.26
Deciduous Forest	0.00
Evergreen Forest	1.58
Scrub/Shrub	35.39
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	25.71
Open Water	7.45
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 32. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Kaloko-Honokōhau National Historical Park (KAHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	8.67
Grassland/Herbaceous	15.82
Deciduous Forest	0.00
Evergreen Forest	24.56
Scrub/Shrub	27.23
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	16.76
Open Water	1.61
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix J. National Park of American Samoa

National Park of American Samoa (NPSA) is located in the American Samoa. Figure 9 shows the location of NPSA, along with the surrounding 3 km buffer and 30 km buffer AOAs.

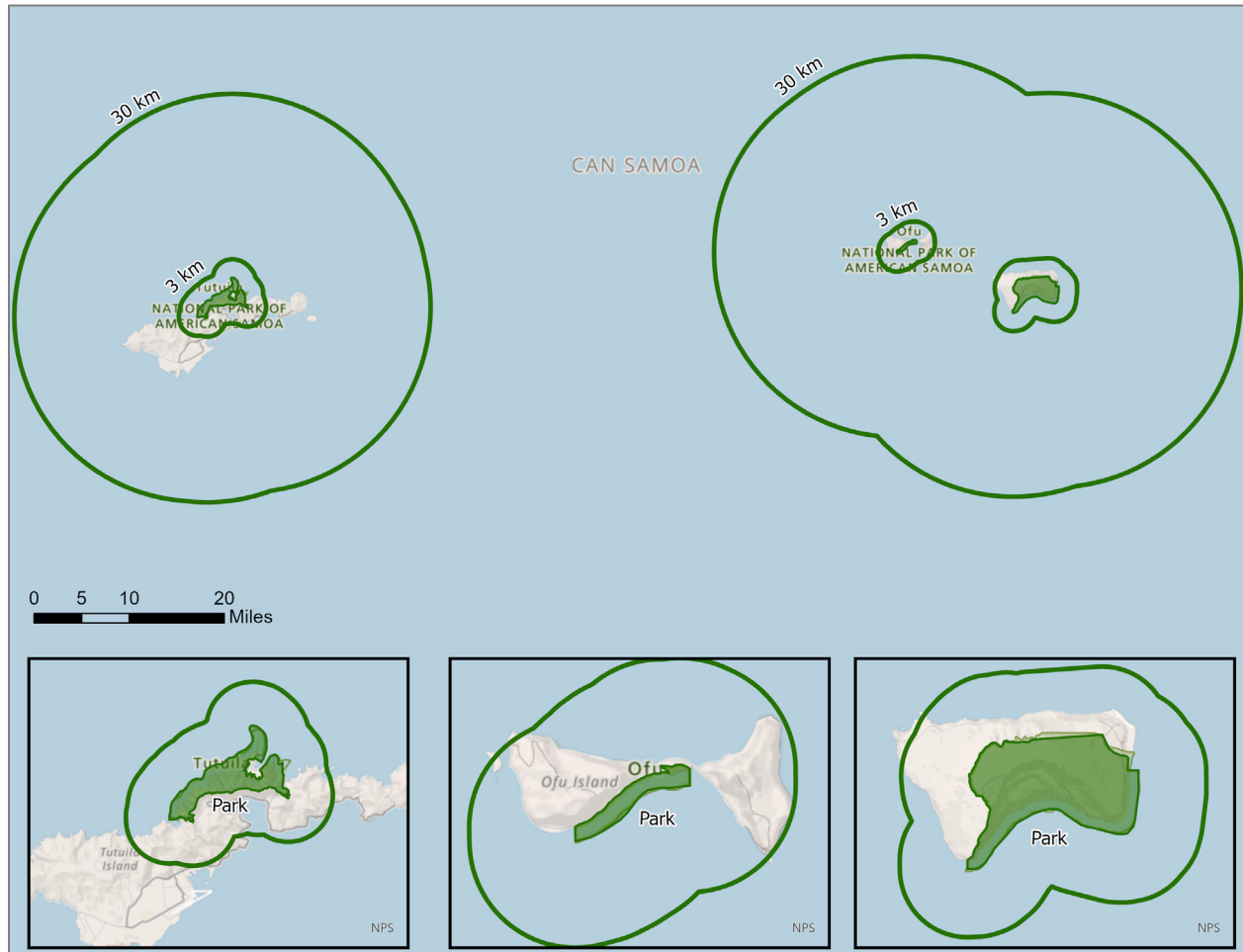


Figure 9. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for National Park of American Samoa (NPSA). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for nine AOAs relevant to NPSA (Table 33).

Table 33. Area(s) of Analysis (AOAs) used to calculate land cover statistics for National Park of American Samoa (NPSA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	NPSA_Park	Area of Analysis within the boundary of National Park of American Samoa.
Boundary Based AOA	NPSA_3km	Area of Analysis within a three-kilometer buffer of National Park of American Samoa, originating from the boundary of the park.
	NPSA_30km	Area of Analysis within a 30-kilometer buffer of National Park of American Samoa, originating from the boundary of the park.
Watershed	NPSA_220300010100	Tutuila Island watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.
	NPSA_220300010200	Pago Pago Harbor-South Pacific Ocean watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.
	NPSA_220300020100	Ofu Island-Olosega Island watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.
	NPSA_220300020200	Asaga Strait-South Pacific Ocean watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.
	NPSA_220300030100	Ta'u Island watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.
	NPSA_220300030200	Lavania Cove-South Pacific Ocean watershed Area of Analysis boundary found to be intersecting with National Park of American Samoa.

Data Summary

Tables 34–36 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 34. Percent area covered by Level 2 land cover classes within the park boundary of National Park of American Samoa (NPSA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	0.14
Deciduous Forest	0.00
Evergreen Forest	53.72
Scrub/Shrub	28.57
Palustrine Forested Wetland	0.06
Palustrine Emergent Wetland	0.02
Unconsolidated Shore	0.00
Bare Land	1.03
Open Water	16.27
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 35. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of National Park of American Samoa (NPSA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	0.44
Deciduous Forest	0.00
Evergreen Forest	68.88
Scrub/Shrub	10.36
Palustrine Forested Wetland	0.05
Palustrine Emergent Wetland	0.04
Unconsolidated Shore	0.02
Bare Land	1.02
Open Water	16.32
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 36. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of National Park of American Samoa (NPSA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.09
Grassland/Herbaceous	0.83
Deciduous Forest	0.00
Evergreen Forest	64.22
Scrub/Shrub	6.74
Palustrine Forested Wetland	0.08
Palustrine Emergent Wetland	0.09
Unconsolidated Shore	0.01
Bare Land	1.18
Open Water	17.67
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix K. Pu‘uhonua o Hōnaunau National Historical Park

Pu‘uhonua o Hōnaunau National Historical Park (PUHO) is located in the Hawai‘i. Figure 10 shows the location of PUHO, along with the surrounding 3 km buffer and 30 km buffer AOAs.

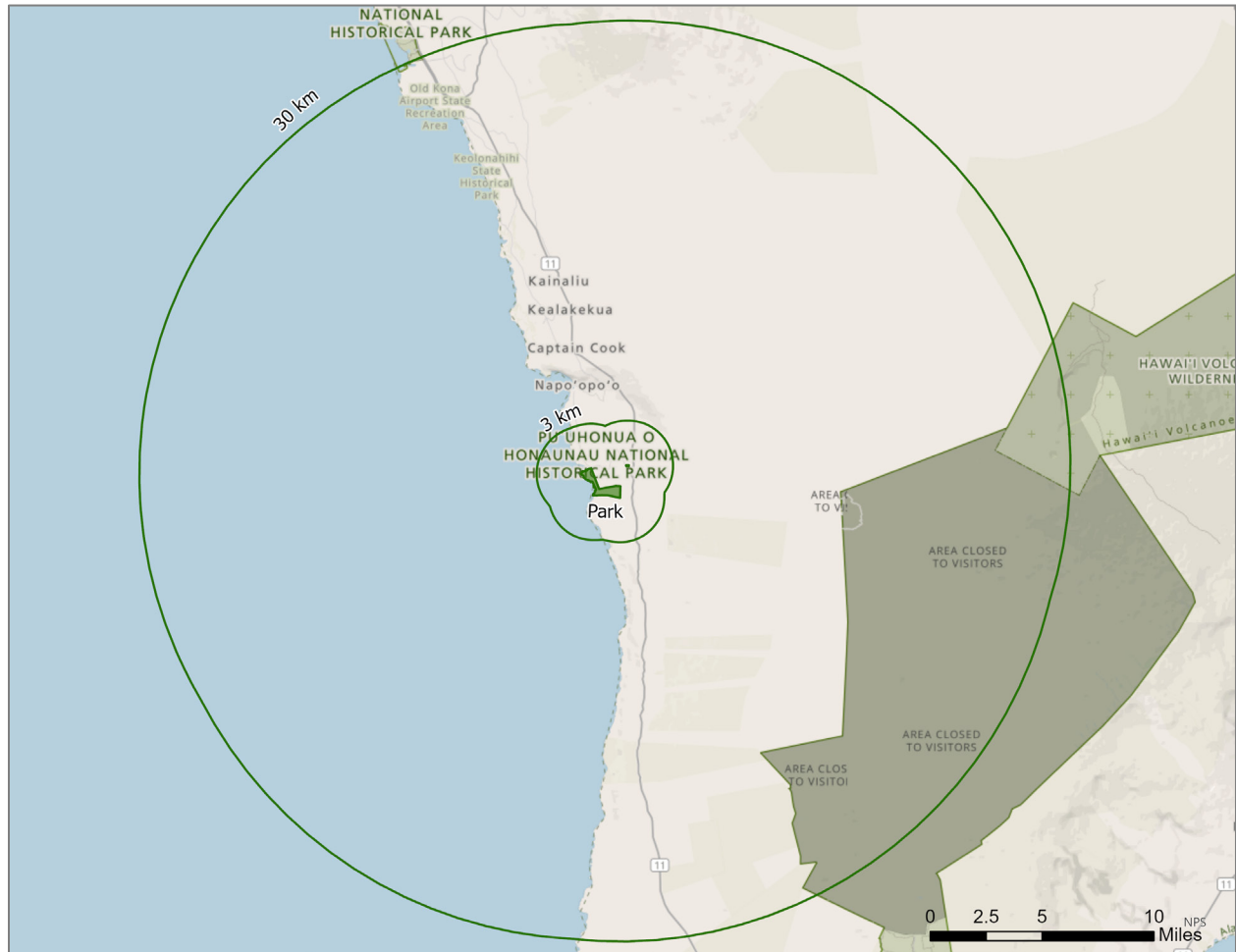


Figure 10. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Pu‘uhonua o Hōnaunau National Historical Park (PUHO). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for five AOAs relevant to PUHO (Table 37).

Table 37. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Pu'uhonua o Hōnaunau National Historical Park (PUHO).
 [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	PUHO_Park	Area of Analysis within the boundary of Pu'uhonua o Hōnaunau National Historical Park.
Boundary Based AOA	PUHO_3km	Area of Analysis within a three-kilometer buffer of Pu'uhonua o Hōnaunau National Historical Park, originating from the boundary of the park.
	PUHO_30km	Area of Analysis within a 30-kilometer buffer of Pu'uhonua o Hōnaunau National Historical Park, originating from the boundary of the park.
Watershed	PUHO_200100001003	Hookena Beach-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'uhonua o Hōnaunau National Historical Park.
	PUHO_200100001004	Kiilae Watercourse-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'uhonua o Hōnaunau National Historical Park.
	PUHO_200100001800	Kawaihae Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'uhonua o Hōnaunau National Historical Park.

Data Summary

Tables 38–40 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 38. Percent area covered by Level 2 land cover classes within the park boundary of Pu‘uhonua o Hōnaunau National Historical Park (PUHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	0.74
Deciduous Forest	0.00
Evergreen Forest	9.97
Scrub/Shrub	76.66
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	9.92
Open Water	1.49
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 39. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Pu‘uhonua o Hōnaunau National Historical Park (PUHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	1.10
Grassland/Herbaceous	6.12
Deciduous Forest	0.00
Evergreen Forest	47.43
Scrub/Shrub	26.58
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	2.18
Open Water	4.59
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 40. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Pu‘uhonua o Hōnaunau National Historical Park (PUHO) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	5.38
Grassland/Herbaceous	4.19
Deciduous Forest	0.00
Evergreen Forest	27.04
Scrub/Shrub	26.53
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	31.92
Open Water	0.94
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix L. Pu‘ukoholā Heiau National Historic Site

Pu‘ukoholā Heiau National Historic Site (PUHE) is located in the Hawai‘i. Figure 11 shows the location of PUHE, along with the surrounding 3 km and 30 km buffer AOAs.

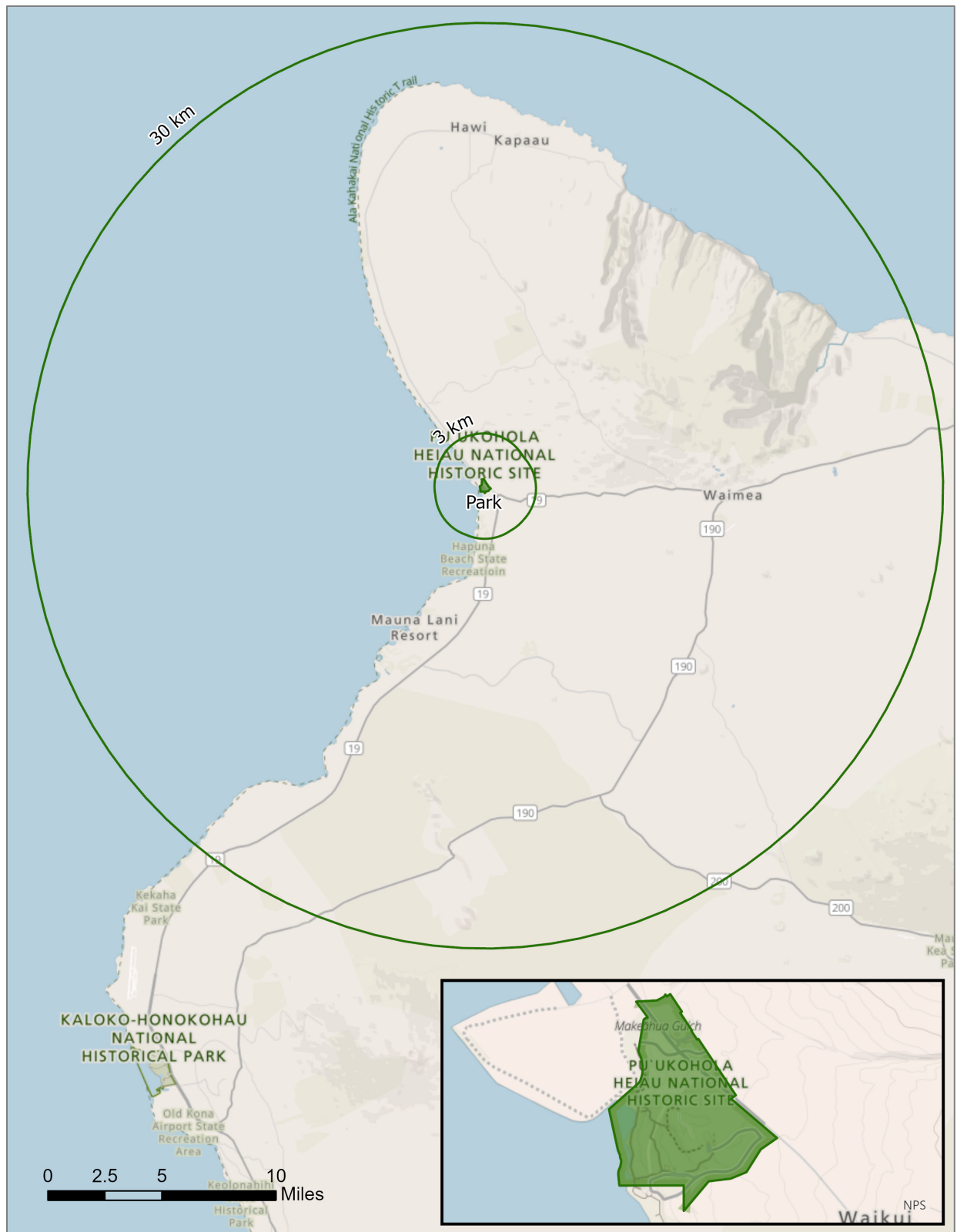


Figure 11. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Pu'ukoholā Heiau National Historic Site (PUHE). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for six AOAs relevant to PUHE (Table 41).

Table 41. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Pu'ukoholā Heiau National Historic Site (PUHE). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	PUHE_Park	Area of Analysis within the boundary of Pu'ukohola Heiau National Historic Site.
Boundary Based AOA	PUHE_3km	Area of Analysis within a three-kilometer buffer of Pu'ukohola Heiau National Historic Site, originating from the boundary of the park.
	PUHE_30km	Area of Analysis within a 30-kilometer buffer of Pu'ukohola Heiau National Historic Site, originating from the boundary of the park.
Watershed	PUHE_200100001407	Waiulaula Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'ukohola Heiau National Historic Site.
	PUHE_200100001501	Makeahua Gulch-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'ukohola Heiau National Historic Site.
	PUHE_200100001800	Kawaihae Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pu'ukohola Heiau National Historic Site.

Data Summary

Tables 42–44 show the percent area covered by each land cover class in 2010 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 42. Percent area covered by Level 2 land cover classes within the park boundary of Pu'ukoholā Heiau National Historic Site (PUHE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	0.26
Grassland/Herbaceous	54.01
Deciduous Forest	0.00
Evergreen Forest	13.70
Scrub/Shrub	8.53
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	2.07
Open Water	6.98
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 43. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Pu'ukoholā Heiau National Historic Site (PUHE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	55.43
Grassland/Herbaceous	13.10
Deciduous Forest	0.00
Evergreen Forest	4.27
Scrub/Shrub	5.15
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	5.31
Open Water	8.17
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 44. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Pu'ukoholā Heiau National Historic Site (PUHE) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2010 (%)
Pasture/Hay	44.99
Grassland/Herbaceous	15.60
Deciduous Forest	0.00
Evergreen Forest	12.53
Scrub/Shrub	7.30
Palustrine Forested Wetland	4.02
Palustrine Emergent Wetland	0.13
Unconsolidated Shore	0.00
Bare Land	10.56
Open Water	1.66
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Appendix M. War in the Pacific National Historical Park

War in the Pacific National Historical Park (WAPA) is located in Guam. Figure 12 shows the location of WAPA, along with the surrounding 3 km buffer and 30 km buffer AOAs.

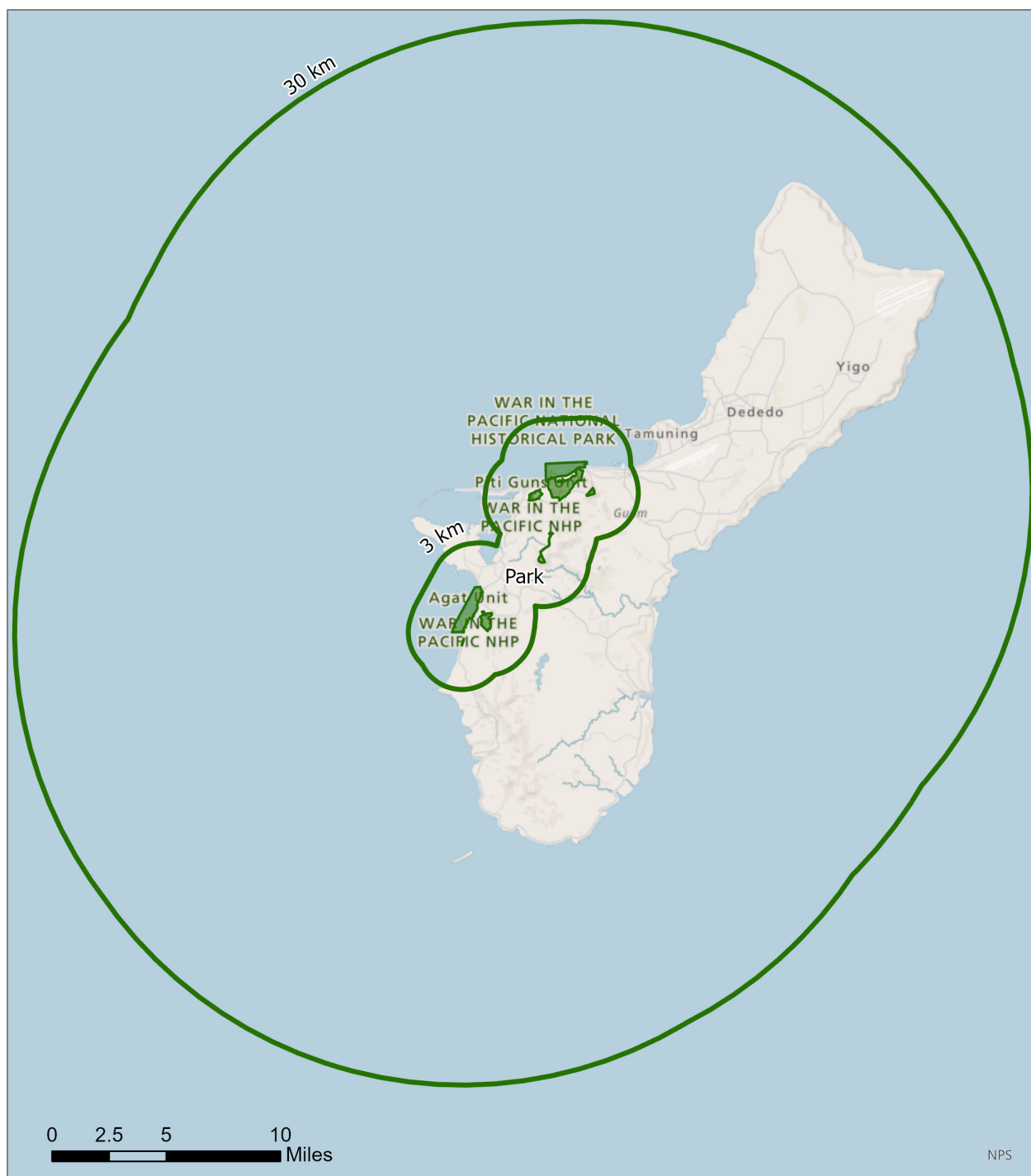


Figure 12. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for War in the Pacific National Historical Park (WAPA). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for six AOAs relevant to WAPA (Table 45).

Table 45. Area(s) of Analysis (AOAs) used to calculate land cover statistics for War in the Pacific National Historical Park (WAPA). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	WAPA_Park	Area of Analysis within the boundary of War in the Pacific National Historic Park.
Boundary Based AOA	WAPA_3km	Area of Analysis within a three-kilometer buffer of War in the Pacific National Historic Park, originating from the boundary of the park.
	WAPA_30km	Area of Analysis within a 30-kilometer buffer of War in the Pacific National Historic Park, originating from the boundary of the park.
Watershed	WAPA_220100000201	Pago River-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.
	WAPA_220100000202	Ylig River-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.
	WAPA_220100000302	Namo River-Frontal Agat Bay watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.
	WAPA_220100000303	Atantano River-Frontal Apra Harbor watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.
	WAPA_220100000304	Fonte River-Frontal Hagatna Bay watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.
	WAPA_220100000400	Apra Harbor-Philippine Sea watershed Area of Analysis boundary found to be intersecting with War in the Pacific National Historic Park.

Data Summary

Tables 46–48 show how the percent area for each land cover class changed between 2011 and 2016 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 46. Percent area change over time of Level 2 land cover classes within the park boundary of War in the Pacific National Historical Park (WAPA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)	2016 (%)	Change (%)
Pasture/Hay	0.00	0.00	0.00
Grassland/Herbaceous	22.18	22.03	-0.16
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	25.72	25.75	0.03
Scrub/Shrub	7.36	7.55	0.20
Palustrine Forested Wetland	0.44	0.44	0.00
Palustrine Emergent Wetland	0.01	0.01	0.00
Unconsolidated Shore	0.94	0.94	0.00
Bare Land	1.23	1.04	-0.18
Open Water	37.34	37.36	0.03
Palustrine Aquatic Bed	0.00	0.00	0.00
Estuarine Aquatic Bed	0.00	0.00	0.00
Upland Forest	0.00	0.00	0.00

Table 47. Percent area change over time of Level 2 land cover classes within the three-kilometer buffer boundary of War in the Pacific National Historical Park (WAPA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)	2016 (%)	Change (%)
Pasture/Hay	0.00	0.00	0.00
Grassland/Herbaceous	28.79	28.48	-0.32
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	28.89	28.61	-0.29
Scrub/Shrub	9.13	9.39	0.26
Palustrine Forested Wetland	2.82	2.80	-0.01
Palustrine Emergent Wetland	0.83	0.85	0.01
Unconsolidated Shore	0.21	0.20	-0.01
Bare Land	1.81	1.94	0.14
Open Water	10.04	10.04	0.00
Palustrine Aquatic Bed	0.00	0.00	0.00

Table 47 (continued). Percent change over time of Level 2 land cover classes within the three-kilometer buffer boundary of War in the Pacific National Historical Park (WAPA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)	2016 (%)	Change (%)
Estuarine Aquatic Bed	0.00	0.00	0.00
Upland Forest	0.00	0.00	0.00

Table 48. Percent area change over time of Level 2 land cover classes within the 30-kilometer buffer boundary of War in the Pacific National Historical Park (WAPA) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)	2016 (%)	Change (%)
Pasture/Hay	0.02	0.02	0.00
Grassland/Herbaceous	18.07	17.55	-0.52
Deciduous Forest	0.00	0.00	0.00
Evergreen Forest	41.42	40.65	-0.77
Scrub/Shrub	7.89	8.06	0.17
Palustrine Forested Wetland	1.62	1.62	0.00
Palustrine Emergent Wetland	0.66	0.67	0.01
Unconsolidated Shore	0.08	0.08	-0.01
Bare Land	1.82	2.27	0.45
Open Water	8.87	8.87	0.00
Palustrine Aquatic Bed	0.00	0.00	0.00
Estuarine Aquatic Bed	0.00	0.00	0.00
Upland Forest	0.00	0.00	0.00

Appendix N. Pearl Harbor National Memorial

Pearl Harbor National Memorial (PERL) is located in the Hawai'i. Figure 13 shows the location of PERL, along with the surrounding 3 km buffer and 30 km buffer AOAs.

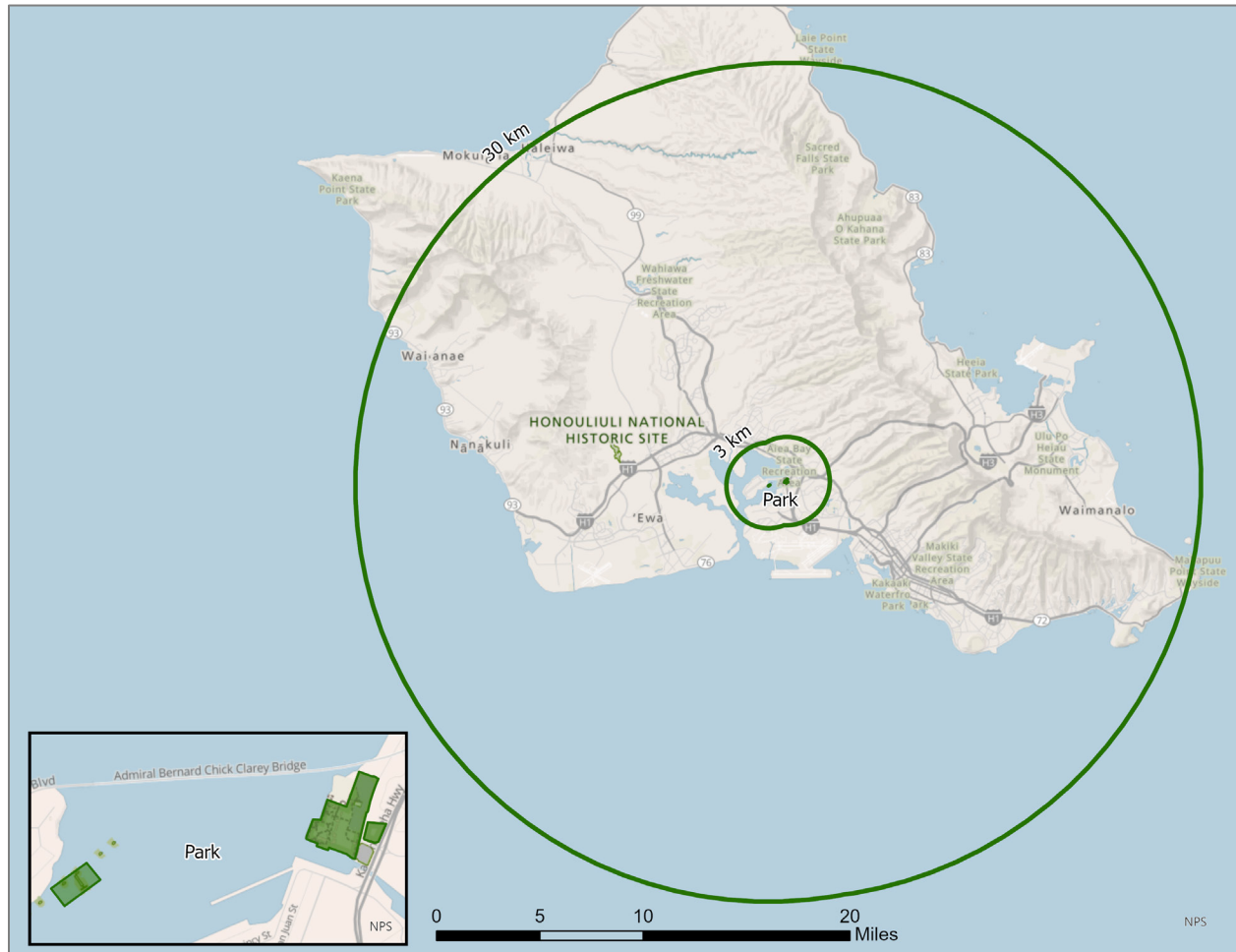


Figure 13. Park, 3 km, and 30 km buffer areas of analysis (AOAs) used in calculating land cover summary statistics for Pearl Harbor National Memorial (PERL). Basemap is NPS Park Tiles Standard.

Areas of Analysis

Land cover statistics were calculated for nine AOAs relevant to PERL (Table 49).

Table 49. Area(s) of Analysis (AOAs) used to calculate land cover statistics for Pearl Harbor National Memorial (PERL). [Boundary Type: Indicator of the type of AOA, whether the park itself, a watershed, or an AOA calculated from the boundary or the park. AOA Code: Four letter park code accompanied by a unique AOA identifier code. Description: Definition and description of the AOA and the area it covers.]

Boundary Type	AOA Code	Description
Boundary	PERL_Park	Area of Analysis within the boundary of Pearl Harbor National Memorial.
Boundary Based AOA	PERL_3km	Area of Analysis within a three-kilometer buffer of Pearl Harbor National Memorial, originating from the boundary of the park.
	PERL_30km	Area of Analysis within a 30-kilometer buffer of Pearl Harbor National Memorial, originating from the boundary of the park.
Watershed	PERL_200600000401	Halawa Stream-Frontal Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pearl Harbor National Memorial.
	PERL_200600000600	Mamala Bay-Pacific Ocean watershed Area of Analysis boundary found to be intersecting with Pearl Harbor National Memorial.

Data Summary

Tables 50–52 show the percent area covered by each land cover class in 2011 for the Park, 3 km buffer, and 30 km buffer AOAs using Level 2 land cover data from C-CAP rasters.

Table 50. Percent area covered by Level 2 land cover classes within the park boundary of Pearl Harbor National Memorial (PERL) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	0.00
Deciduous Forest	0.00
Evergreen Forest	6.38
Scrub/Shrub	3.19
Palustrine Forested Wetland	0.00
Palustrine Emergent Wetland	0.00
Unconsolidated Shore	0.00
Bare Land	0.00
Open Water	30.85
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 51. Percent area covered by Level 2 land cover classes within the three-kilometer buffer boundary of Pearl Harbor National Memorial (PERL) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.00
Grassland/Herbaceous	0.77
Deciduous Forest	0.00
Evergreen Forest	10.87
Scrub/Shrub	4.90
Palustrine Forested Wetland	0.01
Palustrine Emergent Wetland	0.03
Unconsolidated Shore	0.03
Bare Land	0.82
Open Water	26.79
Palustrine Aquatic Bed	0.00
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

Table 52. Percent area covered by Level 2 land cover classes within the 30-kilometer buffer boundary of Pearl Harbor National Memorial (PERL) based on data from the Coastal Change Analysis Program (C-CAP).

Land Cover Class	2011 (%)
Pasture/Hay	0.02
Grassland/Herbaceous	6.65
Deciduous Forest	0.00
Evergreen Forest	42.41
Scrub/Shrub	13.62
Palustrine Forested Wetland	0.10
Palustrine Emergent Wetland	0.33
Unconsolidated Shore	0.10
Bare Land	1.43
Open Water	10.90
Palustrine Aquatic Bed	0.01
Estuarine Aquatic Bed	0.00
Upland Forest	0.00

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