



Inventory & Monitoring Program

Pacific Island Network Monitoring Plan

Supporting Documents: Vital Signs Deleted as Inapplicable

30 September 2004

Pacific Island Network (PACN)

Territory of Guam

War in the Pacific National Historical Park (WAPA)

Commonwealth of the Northern Mariana Islands

American Memorial Park, Saipan (AMME)

Territory of American Samoa

National Park of American Samoa (NPSA)

State of Hawaii

USS Arizona Memorial, Oahu (USAR)

Kalaupapa National Historical Park, Molokai (KALA)

Haleakala National Park, Maui (HALE)

Ala Kahakai National Historic Trail, Hawaii (ALKA)

Puukohola Heiau National Historic Site, Hawaii (PUHE)

Kaloko-Honokohau National Historical Park, Hawaii (KAHO)

Puuhonua o Honaunau National Historical Park, Hawaii (PUHO)

Hawaii Volcanoes National Park, Hawaii (HAVO)

The following is a list of Vital Signs identified after the Vital Signs Workshop which were later deleted or merged into other existing Vital Signs. Also listed are reasons for removal. For further details see the complete Network Monitoring Plan at <http://science.nature.nps.gov/im/units/pacn/monitoring/plan/2004>

Level 1	Level 2	Level 3	Vital Sign	Network Rank	Monitoring Questions	Monitoring Method	Measures and Metrics	Notes
Air and Climate	Weather and Climate	Weather and Climate	Climate modeling	96	How do weather/climate parameters change over varying ranges in space and time?	modeling or mapping	trade-wind inversion, wind, temperature, precipitation, cloud patterns, radiation budgets	This Vital Sign was incorporated into "Weather/climate".
			Fog deposition	89	What are the concentrations of important nutrients and toxins? How much is deposited? How much do anthropogenic vs. volcanic vs. other natural sources contribute?	fog water samples	fog chemistry, concentrations/deposition estimates of major nutrients, toxins and trace species	This Vital Sign was incorporated into "Wet and dry deposition".
Biological Integrity	Focal Species or Communities	Vegetation communities	Response of native vegetation communities to management	15	What are trends in plant community composition and structure following management (including : Alien plant control, Small mammal control, Feral ungulate control or removal, Invasive alien invertebrate control, Plant biocontrol using either plant pathogens).	Transects, plots. Population surveys of native and alien invertebrates. Long term monitoring of biocontrol effects on populations	Cover, density, vigor, size classes, species composition, recruitment rates. Focal plant flower and seed production. Abundance and distribution of alien invertebrates and native pollinators.	This Vital Sign would essentially be monitored by "Focal terrestrial plant communities".
			Vegetation structure and composition	32	What are trends in plant community composition and structure of representative vegetation types (including epiphytic plants and both vascular and non-vascular plants), regardless of management treatment or land use?	Transects, permanent plots, mapping, remote sensing, long-term monitoring of tagged species	Cover, density, vigor, size classes, growth rates, species composition, long-term changes in structure, spatial relation of individuals	This Vital Sign would essentially be monitored by "Focal terrestrial plant communities".
		Terrestrial invertebrates	Effects of biocontrol on native invertebrates	101	What is the impact of biocontrol agents on native and non-native invertebrates (including moths, beetles, snails, and parasitoids)? What is the impact on target species?	Population surveys, transects, plots, mapping, rearing	Parasitism/predation rates; abundance/density, demographics, distribution of hosts and control agents	Deleted, as this is essentially a research question.
		Birds	Waterbird disease	81	Are diseases changing the demographics of selected seabird, shorebird, and waterbird species? If so, are changes deleterious, and can we control or reduce threats to these populations?	Population surveys, including demographic measures (size/age structure, reproduction, recruitment, etc.) and prevalence of disease, pathogens, and/or population threats. (Methods will differ for seabirds, shorebirds, and waterbirds.)	Population demographics, density, distribution. Prevalence of disease, pathogens, other population threats. (For seabirds, probably focusing on nesting or roosting habitat vs. at-sea habitat except possibly for near-shore feeders.)	This Vital Sign was incorporated into "Terrestrial vertebrate disease".
	Infestations and Disease	Insect pests	Invertebrate populations-agricultural pests	102	What are the abundance, distribution, and seasonal and year-to-year variations in populations? What are trends in impact? How effective is control?	Population surveys, transects, plots, mapping	Infestation rates of native and alien hosts	This Vital Sign was incorporated into "Exotic invertebrates- status and trends".
			Invertebrate populations-structural pests	103	What is the impact of invertebrate pests on historic and other culturally significant structures?	Periodic sampling of structures	Infestation rates, structural damage	This Vital Sign was incorporated into "Exotic invertebrates- status and trends".
	Invasive Species	Invasive plants and animals	Invasive species- early detection	17	How are invasive species getting to the country/state/island/park? What potential high-impact species have breached the border-protection system and have potential to reach the park?	Identify existing and new points & pathways of entry. Monitor for incipient species along known and suspected points / pathways of entry. Identify targeted "blacklist" species of concern that warrant eradication/containment.	Presence-absence, identification & distribution of targeted "blacklist" species & other novel (previously undetected) invasives.	Deleted- Similar Vital Signs exist for many organismal groups and these were ranked separately.

Level 1	Level 2	Level 3	Vital Sign	Network Rank	Monitoring Questions	Monitoring Method	Measures and Metrics	Notes
Ecosystem Pattern and Processes	Extreme Disturbance Events	Extreme disturbance events	Extreme weather events	33	How frequently do extreme events occur, and at what intensity? What are temporal trends? What is the spatial extent?	data from weather stations in parks, in addition to data mining, sources: NOAA, USGS, NWS, PEAC	hurricanes/typhoons, ENSO, PDO, droughts, floods	This Vital Sign was incorporated into "Weather/climate".
	Land Cover / Land Use	Land Cover / Land Use	Subsistence agriculture	94	What areas are affected by subsistence farming and how are these practices modifying plant communities?	Mapping/GPS perimeter of farmed areas, aerial photos	area covered by disturbance, distribution	This Vital Sign was incorporated into "Land use".
			Landscape pattern- effects of severe weather events	82	What are the impacts of severe weather events (e.g. hurricane, typhoon, drought) on vegetation communities and focal species? What are the implications to plant community composition and structure? What are impacts on Threatened , Endangered and SOC. species?	Transects, plots, population surveys of focal plant vertebrate and invertebrate species. Erosion pins, sediment collectors, and mapping for erosion monitoring.	Change in vegetation structure, cover, density, erosion, nutrient loss, species composition	This Vital Sign will be incorporated into "Terrestrial landscape pattern" in an opportunistic fashion.
			Intertidal landscape pattern	44	What are the trends and change in the large scale biotic assemblages and/or substrate type? At the landscape level are biological communities in the intertidal zone closely associated with substrate type (e.g. sandy beaches, basalt boulders)?	Mapping	Distribution of biological flora/fauna by physical surroundings	This Vital Sign was incorporated into "Intertidal community".
			Landscape pattern- ecotone boundaries	93	Are locations of ecotones changing due to long term natural/unnatural perturbations? Are the communities that comprise ecological boundary zones changing (increasing/decreasing in size)?	vegetation mapping, landscape photography, high spatial resolution plots	change detection maps	This Vital Sign was incorporated into "Terrestrial landscape pattern".
			Landscape pattern- forest dieback	98	What percentage of the native components of natural vegetation in a population are declining or dying due to natural trends (including native diseases or non-native influences)? What are temporal trends?	Transects, plots, population surveys, mapping of affected areas.	Plant cover, density, vigor, size classes, species composition, density of stressor relative to degree of dieback, history of disturbance, landscape history, stand history, extent and distribution of dieback	This question's scope was partially incorporated into "Terrestrial landscape pattern". The disease component was deleted, as it is a research question.
			Paleolandscapes	68	Do the parks contain intact paleolandscapes? Are these resources being altered or disturbed? Are species represented in the pollen record that are now absent from the park? What is the relative sensitivity of natural landscapes to disturbance?	Mapping, pollen and charcoal assemblages, macrofossils, soil horizons, etc.	Species composition, rate of change?	Deleted- this is a research question.
			Geology and Soils	Soil Quality	Soil function and dynamics	Soil structure and stability	80	Are physical soil properties changing?
Soil chemistry	90	Are soil buffering and filtering qualities changing?				Soil sampling and analysis	appropriate WQ measures, cations, pH, soil composition, total Nitrogen & total Carbon	All soil composition Vital Signs were merged into "Soil structure and chemistry".

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Geology and Soils	Soil Quality	Soil function and dynamics	Soil biota	97	What are soil communities, and are they changing?	Soil sampling and analysis	bacteria, fungal/microrrhizal, worms/nematodes/arthropods, bulk density	All soil composition Vital Signs were merged into "Soil structure and chemistry".
			Permafrost	100	Is extent of permafrost declining? What is the influence on ground subsidence, slope failure, etc?	Remote Sensing (ground penetrating radar), satellite thermal analysis, drilling	temperature, volcanic activity (heating), permafrost thickness, rainfall	Deleted- research needs to be done to determine whether permafrost exists within HAVO.
Human Use	Visitor and Recreation Use	Visitor usage	Visitor usage	46	Are locations, extent and/or intensity in use areas (visitor or management) changing? Are use levels associated w/detectable levels of resource change?	mapping	quantify and qualify uses and extent(s)	Deleted- this Vital Sign duplicated part of "Terrestrial visitor usage".
	Consumptive Use	Consumptive use	Coral & sand mining	99	What are annual harvest levels of sand/coral? Is human harvest changing distribution, abundance, or other population characteristics of harvested resources? At what rate (% decrease)? What are current trends (commercial activities) in bioprospecting?	Survey in various targeted habitats: pharmaceutical plants, thermal pools, coral reefs, intertidal zones, etc. Quantification of commercial activity, harvest levels, and of targeted population characteristics. Plot/transects and remote sensing	harvest composition, harvest quantity, rate or % of decrease, commercial activity	Deleted- as it is not certain whether this is occurring at the present time within the parks.
Water	Hydrology	Marine hydrology	Extreme hydrological events	61	What area the frequency, magnitude, and distribution of marine inundation events? What park resources are subject to inundation during tsunamis and large storms or big wave events?	Tide gauges, seismic networks, oceanic buoys, field mapping of water and debris lines (both horizontal incursion and vertical elevation) after an event, photograph damage and changes to park resources	sea and storm surge levels, erosion/deposition, extent, discharge	This Vital Sign was incorporated into "Marine hydrography".