

# NatureServe Proposal for Vegetation Classification and Mapping Assistance for the Pacific Island I & M Network:

HAVO, NPSA, HALE, KALA & WAPA

*Prepared by*

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## **OVERVIEW**

The proposal in this document is for NatureServe to continue the work with Pacific Island Network (PACN) begun under a 2008 task agreement. It adds scope of work and funding to complete vegetation classifications for most of the remaining PACN Parks, including HAVO, HALE, KALA, NPSA & WAPA, as well as descriptions for the vegetation types found in those Parks. In addition it includes tasks to write dichotomous field keys, local descriptions, and to interact with the mappers of these Parks to assist with understanding the vegetation classification for these five parks as needed. Overall, NatureServe ecologists will help to ensure that national standards for the US National Vegetation Classification (NVC) and USGS-NPS Vegetation Inventory Program (VIP) are met.

In the long term, NatureServe (NS) proposes to continue as a member of the team that will include PACN staff, other NPS staff from individual Parks, Cogan Technology Inc (CTI), and any other mapping contractors. This team will collaborate to classify plant communities and assist with development of map legends for PACN parks. We propose that this project will utilize and apply the new NVC hierarchy, officially approved by the Federal Geographic Data Committee (FGDC) in February of 2008. All tasks will be conducted in close cooperation with locally knowledgeable ecologists, such as from the PACN staff, from either The Nature Conservancy of Hawai'i, or other agencies in Hawai'i and the Pacific with vegetation ecologists on staff.

Work funded in the first year task agreement included tasks to review “legacy” data from HAVO first and the other PACN parks as requested, finalize sampling protocols for the HI Parks, work on the vegetation classifications for the 3 small west Hawai'i parks (PUHE, PUHO and KAHO) and American Memorial (AMME), provide support to CTI as they develop mapping unit concepts and complete the mapping of the west Hawai'i parks and AMME, and complete portions of the final reports for each of the west Hawai'i Parks and AMME.

## **NVC BACKGROUND**

Under the direction of the FGDC Vegetation Committee, the National Vegetation Classification (NVC) has undergone a revision of the upper levels of the hierarchy (Formation Class to Group, see **Table 1**). The revisions have been developed by the Hierarchy Revisions Working Group (HRWG), co-chaired by the Forest Service and NatureServe, with members from multiple agencies, organizations, and countries. The new draft hierarchy was officially adopted by FGDC in February 2008, and will become the new standard for vegetation classification by Federal agencies and partners, including the Ecological Society of America and NatureServe. The revised standard includes a description and pilot examples of the new hierarchy, definitions and criteria for the levels, and establishes a peer-review process standard for ongoing revisions to the types at each level.

This new hierarchy will be well-developed by the summer of 2009 for natural vegetation in the lower 48 states, but will not comprehensively address vegetation found on the Pacific Islands (tropical Pacific). In addition, the primarily floristic levels of the NVC (“alliances” and

“associations”) are only partially developed for Hawai’i, and not at all for the three west Pacific park units in the Pacific Island Network.

The new “group” concept (the NVC level above alliance, see **Table 1**) is somewhat equivalent in scale, floristics, and ecology to the Terrestrial Ecological Systems units, developed by NatureServe for the lower 48 states (see the final report <http://www.natureserve.org/publications/usEcologicalsystems.jsp>). With support from the Inter-agency LANDFIRE effort, NatureServe has developed the Ecological Systems classification for Hawai’i, preparatory for mapping of such. This work was completed in the winter of 2008-2009, and combined with funding from PACN represents an important opportunity to advance vegetation classification for the state of Hawai’i. In addition, LANDFIRE has provided NatureServe with support to begin the work on the new NVC hierarchy for Hawai’i, and by fall of 2009 a draft hierarchy should be well-advanced.

**Table 1.**

<b>U.S. National Vegetation Classification</b>	
<b>Revised Hierarchy for Natural Vegetation</b>	<b>Example</b>
<b>Upper Levels</b>	
1 – Formation Class	<b>Scientific Name:</b> Mesomorphic Tree Vegetation <b>Colloquial Name:</b> Forest and Woodland
2 – Formation Subclass	<b>Scientific Name:</b> Tropical Moist Tree Vegetation <b>Colloquial Name:</b> Tropical Moist Forest
3 - Formation	<b>Scientific Name:</b> Tropical Lowland Evergreen Tree Vegetation <b>Colloquial Name:</b> Tropical Lowland Evergreen Rainforest
<b>Mid Levels</b>	
4 – Division	<b>Scientific Name:</b> Central American-Caribbean Lowland Evergreen Rainforest
5 – Macrogroup	<b>Scientific Name:</b> Caribbean - Central American Seasonal Evergreen Forest MG
6 - Group	<b>Scientific Name:</b> Caribbean Hardwood Hammock Forest Group
<b>Lower Levels</b>	
7 – Alliance	<b>Scientific Name:</b> <i>Bursera simaruba</i> - <i>Coccoloba diversifolia</i> - <i>Nectandra coriacea</i> - <i>Eugenia axillaris</i> Forest Alliance
8 – Association	<b>Scientific Name:</b> <i>Ficus aurea</i> - <i>Sideroxylon foetidissimum</i> - <i>Bursera simaruba</i> / <i>Eugenia foetida</i> - <i>Piscidia piscipula</i> / <i>Hymenocallis latifolia</i> Forest <b>Colloquial Name:</b> Southwest Florida Tropical Maritime Hammock

### **SUMMARY OF PROPOSED SCOPE OF WORK**

This portion of the NatureServe proposal is for an approximately 4 year project, assumed to start in summer of 2009 and running through late calendar year 2013. The exact schedule of start and completion for each task is as yet undetermined. Although the tasks are provided in approximate sequential order, it is important to note that funding, logistics, and other complications can cause

changes in the scheduling of particular tasks. The exact schedule for completion will need to be determined by working with the PACN Coordinator, the mapping contractor(s), and with any other partners in these projects.

- A. One NatureServe ecologist will make a field familiarization trip to the Hawai'i Parks, particularly HAVO, HALE, and KALA;
- B. After field data are collected by NPS staff & provided to NatureServe, we propose to conduct quantitative analyses of the vegetation data for HAVO, HALE, KALA & NPSA;
- C. We will then develop floristic classifications for HAVO, NPSA, WAPA, HALE & KALA;
- D. NatureServe will write descriptions of the classified vegetation types occurring in these 5 parks;
- E. We will complete dichotomous field keys for all 5 parks;
- F. We propose to provide mapping support to the mapping contractor in the form of guidance on the classification, and discussion of the development of map classes (map legend) for each park;
- G. We will provide written sections of the final project reports for these parks, and also review sections written by the mapping team.

Detailed task descriptions & budgets are provided below.

### **Detailed Task Descriptions**

- **FY09 TASK 1. Ecologist Field Reconnaissance & Meeting: HI Parks**

Before NatureServe develops a vegetation classification for an area, it is important to become familiar with the vegetation “on the ground”. This task provides for one NatureServe staff person to travel to Hawai'i to spend time visiting each of the three big Parks: HAVO, HALE and KALA. During this trip, the ecologist will visit the parks and meet with the Natural Resource Managers or Park Ecologists, with the primary objective of attaining familiarity with that Park's vegetation patterns. In addition, a meeting with PACN staff at HAVO will allow establishment of a working relationship with the Network's staff.

This FY09 budget supplements funding already provided to NatureServe in our FY08 task agreement, which will be redirected from mapping support to CTI at the West Hawai'i parks to this field reconnaissance task, hence the 2 tasks together provide for “yy” days of travel and meeting time, plus travel expenses related to that (mainland to Hawai'i airfare, inter-island airfare, car rentals, per diem and lodging).

Our budget includes “yy” days of staff time (preparation and travel) and estimated travel expenses for one NatureServe ecologist.

#### **BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 2. Data Analysis: HAVO, HALE, KALA**

Under this task, NatureServe will prepare the plot data from these three Hawai'i Parks for quantitative analysis and will conduct an analysis of the data. This analysis will provide the basis for final classifications for each park, but all the data will not necessarily be combined into one dataset for analysis. The data analysis may be completed as 2 or even 3 different datasets, one from each park. This will add some inefficiency to the data preparation, but can be completed under this cost estimate. This does NOT include time to enter any legacy data; we assume legacy data will be entered by PACN staff; we will use it in quantitative analyses if we can for some parks (e.g. HAVO). Text and Figures describing the analysis will be provided for inclusion in the final project reports for each Park.

We estimate “yy” days total for this task for NatureServe ecologists, and time for a database specialist to assist with data preparation.

**BUDGET**

Personnel	\$	xx,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
<b>Total Direct Costs</b>	<b>\$</b>	<b>zz,zzz</b>
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>uu,uuu</b>

• **FY09 TASK 3. NPSA and WAPA Classifications**

Working with the preliminary classification developed under the previously funded FY08 Task Order and the plot data collected at NPSA in 2009, NatureServe will complete a data analysis and vegetation on classification, to alliances and associations, for NPSA. This classification will include a mix of natural, semi-natural and cultural vegetation types. As time allows, we will also develop the upper levels of the NVC hierarchy for tropical Pacific Islands as the context for this classification. This does NOT include time to enter any legacy data; we assume legacy data will be entered by PACN staff; we will use it in quantitative analyses if we can. Text and Figures describing the analysis will be provided for inclusion in the final project report for NPSA. We do not plan to conduct a data analysis for WAPA, since the area is small and likely to not be very diverse.

We estimate about “yy” days total for this task for NatureServe ecologists. We also estimate about “yy” days for a NatureServe data manager to enter the classifications to our database, Biotics, where the NVC is managed.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
<b>Total Direct Costs</b>	<b>\$</b>	<b>z,zzz</b>
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 4. HAVO Classification**

Working with the preliminary classification developed under the previously funded FY08 Task Order, the results of the data analysis conducted in Task 2, and the plot data collected at HAVO in 2009, NatureServe will complete the final vegetation classification, to Groups, Alliances and some

Associations, for HAVO. This classification will include a mix of natural, semi-natural and cultural vegetation types. The classification will be sent to NPS- HAVO staff, and local vegetation experts for their review, and a final version will be provided to PACN in an excel spreadsheet version.

We estimate about “yy” days total for this task for NatureServe ecologists, which includes time for coordinating a review process.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

**• FY09 TASK 5. NPSA and WAPA Descriptions**

NatureServe proposes to write descriptions of the vegetation types found in NPSA and WAPA. This task will need to be coordinated with PACN & Park staff if someone else is also tasked to write descriptions. NatureServe will seek input from PACN and Park staff to determine which vegetation types should be described (e.g. the most common? All the native/natural vegetation types? The most rare or unusual? The most invasive?) if there are too many to complete with this funding. Our budget is for completion of approximately 35 descriptions, and they will be a mix of Group, Alliance and Association-level, as desired by the Park and PACN staff. NatureServe will be responsible for ensuring all descriptions follow standards established for vegetation type descriptions. “Decision-rules” and mapping concepts developed in Task 7 will also be incorporated.

This task budget provides for “yy” days of ecologist time, and “yy” days of data management time to enter the classification and accompanying descriptions to the NVC databases.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

**• FY09 TASK 6 HAVO, HALE, KALA Descriptions**

NatureServe proposes to write descriptions of the vegetation types found in HAVO, HALE and KALA. This task will need to be coordinated with PACN & Park staff if someone else is also tasked to write descriptions. NatureServe will seek input from PACN and Park staff to determine which vegetation types should be described (e.g. the most common? All the native/natural vegetation types? The most rare or unusual? The most invasive?) if there are too many to complete with this funding. In addition, whether these are “local” or “global” descriptions remains to be determined, but most likely these will be local descriptions for associations and global for any alliances or groups described. The mix of which types will get descriptions will be determined by working with the project team, and should be related to what vegetation types are on the mapping legends for each of these parks.

Our budget is for completion of approximately 100 descriptions, and they will be a mix of Group, Alliance and Association-level, as desired by the Park and PACN staff. NatureServe will be responsible for ensuring all descriptions follow standards established for vegetation type descriptions. “Decision-rules” and mapping concepts developed in Task 7 will also be incorporated.

This task budget provides for “yy” days of ecologist time, and “yy” days of data management time to enter the descriptions to the NVC databases. Descriptions will be provided in MS Word documents for review by staff, and for inclusion in final reports for each park.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 7 HAVO Dichotomous Field Keys**

Under this task, NatureServe will write dichotomous field keys for HAVO. The keys will be structured to include relevant NVC hierarchy units (Group, Alliance or Association), and will key to the finest floristic units necessary for each Park, based on the plot data collected. Each key will be tested against the plot data if funding allows (random selection of plots, then test them against the key); this testing could be completed by PACN or park staff. Review of the keys by knowledgeable experts will be solicited and incorporated. The keys will allow NPS staff or others studying the vegetation to key in the field to the vegetation types classified for each Park.

We estimate “yy” days of NatureServe ecologist time for this task.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 8 Mapping Support: All Parks**

The implementation of the vegetation classification in the vegetation mapping process requires close communication between those developing the vegetation classification and those completing the mapping. This task provides for NatureServe to assist PACN and Park staff, and the vegetation mapping team in the development of the map unit concepts that will match the vegetation classification as closely as possible. This may include providing mapping guidelines, input to models used in the mapping, and participating in email or phone discussions of mapping issues.

We estimate “yy” days of NatureServe ecologist time for this task, for HAVO, HALE, KALA, NPSA & WAPA. No travel is included.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 9 NPSA and WAPA Dichotomous Field Keys**

Under this task, NatureServe will write dichotomous field keys for NPSA and WAPA. The keys will be structured to include relevant NVC hierarchy units (Group, Alliance or Association), and will key to the finest floristic units necessary for each Park, based on the plot data collected. Each key will be tested against the plot data if funding allows (random selection of plots, then test them against the key); this testing could be completed by PACN or park staff. Review of the keys by knowledgeable experts will be solicited and incorporated. The keys will allow NPS staff or others studying the vegetation to key in the field to the vegetation types classified for each Park.

We estimate about “yy” days of NatureServe ecologist time for this task.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 10. HALE and KALA Classifications**

Working with the preliminary classification developed under the previously funded FY08 Task Order, the results of the data analysis conducted in Task 2, and the plot data collected at HALE or KALA in 2010 or 2011, NatureServe will complete the final vegetation on classification, to alliances and associations, for each of these parks. This classification will include a mix of natural, semi-natural and cultural vegetation types. The classification will be sent to NPS- HALE or KALA staff, and local vegetation experts for their review, and a final version will be provided to PACN in an excel spreadsheet version.

We estimate about “yy” days total for this task for NatureServe ecologists, which includes time for coordinating a review process. We also include time for a data manager to begin entry of the classifications to Biotics (“yy” days).

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 11 HALE and KALA Dichotomous Field Keys**

Under this task, NatureServe will write dichotomous field keys for HALE and KALA. The dichotomous key completed for HAVO will provide a starting point, as we anticipate shared vegetation types across

these 3 Parks. The keys will be structured to include relevant NVC hierarchy units (Group, Alliance or Association), and will key to the finest floristic units necessary for each Park, based on the plot data collected. Each key will be tested against the plot data if funding allows (random selection of plots, then test them against the key); this testing could be completed by PACN or park staff. Review of the keys by knowledgeable experts will be solicited and incorporated. The keys will allow NPS staff or others studying the vegetation to key in the field to the vegetation types classified for each Park.

We estimate “yy” days of NatureServe ecologist time for this task (“yy” days per key).

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

• **FY09 TASK 12 Final Report Contributions: All Parks**

Under this task, NatureServe will write sections of the final project reports for HAVO, NPSA, WAPA, HALE and KALA. These sections will include a description of the field data collection methods, a description of the methods used to develop the vegetation classification for each Park, and a section detailing the classification results for each Park. These sections will include Tables and Figures as needed. In addition, NatureServe will provide final versions of the dichotomous field keys, and the descriptions of vegetation types for inclusion in the report appendices. NatureServe will also review other sections of the final reports, as requested (e.g. the vegetation mapping, and accuracy assessment sections).

We estimate “yy” days of NatureServe ecologist time for this task, about “yy” days per Park. We also include “yy” days of data management time to provide reports of the descriptions from Biotics, or to complete other assistance with the reports, such as species lists. Completion of this task will be determined through coordination with PACN and the mapping team, it is projected to be in early summer of 2010 for WAPA but will likely extend into 2012 or 2013 for some of the other Parks.

**BUDGET**

Personnel	\$	x,xxx
Other Direct Costs	\$	y,yyy
Subcontracts	\$	-
Total Direct Costs	\$	z,zzz
Indirect Costs	\$	k,kkk
<b>Total for Task</b>	<b>\$</b>	<b>u,uuu</b>

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NatureServe will accomplish all of the above tasks according to the protocols and standards of the USGS/NPS National Vegetation Mapping Program, including those identified in the following documents (all of which are available on the USGS-NPS Vegetation Mapping Program website at <http://biology.usgs.gov/npsveg/>):

- Standardized National Vegetation Classification System
- Field Methods for Vegetation Mapping
- Accuracy Assessment Procedures

## Methodology for Assessing the Utility of Existing Data for Vegetation Mapping

### List of Deliverables

1. Final NVC Classifications for HAVO, HALE, KALA, NPSA & WAPA, in MS Excel files;
2. At least 100 local descriptions for the 3 large Hawai'i Parks (HAVO, HALE, KALA), in MS Word format documents;
3. At least 35 local descriptions for NPSA & WAPA, in MS Word format documents;
4. Dichotomous field keys for all 5 parks in this proposal (HAVO, HALE, KALA, NPSA & WAPA), in MS Word format documents;
5. Descriptions of field methods, methods used to classify the vegetation of these Parks, & classification results;
6. Contribution to well-defined mapping concepts for implementation in these parks;
7. Contributions as required to the final project reports, including description of field and classification methods, results, figures, tables, and review of the mapping and accuracy assessment report sections;
8. Implementation of the classifications for these Parks in the National Vegetation Classification databases, served on NatureServe Explorer.