The Nature Conservancy of Hawai`i Landfire – SWARS Final Report

In Fall 2009, The Nature Conservancy of Hawai`i collaborated with the Landfire program to evaluate the utility of Landfire's Exiting Vegetation map layer to develop a current vegetation condition spatial mapping layer for use in the State of Hawaii's Statewide Assessment and Resource Strategy (SWARS) analysis. Toward that end, a series of meetings were conducted from August – December 2009, including partners from the State of Hawaii Department of Land and Natural Resources, Division of Forestry and Wildlife, US Geological Survey and University of Hawaii at Hilo. This report summarizes to product of these meetings by focusing on the following 4 issues, which are associated directly with the project deliverables:

1. Lessons learned from the analysis and use of Landfire data;
2. Opportunities for future improvement of Landfire's EVT layer;
3. Identification of fire-suppression priority areas for biodiversity protection (HI-MED-LOW) for strategies like hazardous fuel reduction and ecosystem integrity restoration; and
4. Identification of biodiversity conservation priority areas (HI-MED-LOW)

1. Lessons learned from the analysis and use of Landfire data

- Using pre-existing data and experts, we were able to create in a short series of intensive workshops, a map that rivaled the HIGAP effort requiring 5 years of interagency work. This method promises to supplant GAP for rapid and periodic assessments of biodiversity and fire risk mapping.
- Because of the speed at which the units were defined and mapped, some relatively small but very important errors exist in the Landfire product (see #2 for a more detailed description of these inaccuracies). However, the major mappings are very useful at broader scale.
- In particular, the characterization of developed/urban areas in Landfire is a significant improvement to the existing statewide layer that used to characterize land cover.
- Because of an explicit effort to characterize fire risk and incorporate successional states, the Landfire units are fewer and ecologically meaningful, providing a potential crosswalk with the finer HIGAP units.
- We consciously made an effort to build on the HIGAP product with Landfire, so the two are largely consistent. We believe that expert workshops could even further improve on both products given support.

2. Opportunities for future improvement of Landfire's EVT layer

- Figures 1 (Statewide) and 2 (Hawai`i Island) provide illustrative examples of a pixel-by-pixel comparison between the Landfire map and the HIGAP map. We ended up utilizing a final vegetation map that was a combination of the two. Without displaying the underlying classifications (which becomes unwieldy in a display format) the appended figures highlight geographies where there were significant differences in assessment of habitat quality.
- *Complete mapping of Hawaii Wet Cliff and Ridgecrest shrubland.*

A revision would require that we apply consistent cliff definitions (e.g., >60% slope) on areas that are current described as lowland mesic shrubland and lowland rainforest.

- *Redefine boundary between lowland and montane as 1000 m instead of the default of 4000 ft. or unspecified and variable elevation boundaries.*
  This would ensure a congruent crosswalk between GAP and Landfire units. No current HIGAP vegetation classifications use a 4000 ft elevation boundary to distinguish between lowland and montane.
- *Review consistency of use of "lowland" or "montane-subalpine"*
  (e.g., montane rainforest, subalpine mesic shrubland)
- *Separate HIGAP moist/mesic areas from Landfire's dry shrubland.*
  Some Landfire montane-subalpine dry shrublands violated their own definition my mistakenly including some HIGAP mesic forests. These would need to be remapped.
- *Re-characterize barren areas to distinguish between native- and nonnative-dominated barren areas*
  The category of "Barren" provides a passable corollary to HIGAP's "Very Sparse to Unvegetated" category. It does not however, distinguish between native- and nonnative-dominated barren areas. We attempted to do this by delineating areas above 900m (~3000 ft) as native-dominated barren systems, since lowland barren areas currently exist largely as a result of disturbance (fire, overgrazing, etc.). This still did not account however, for fresh lava flows and sand dune systems, which are naturally barren in their native state.
- *Reclassify "Managed Tree Plantations" with an intactness factor considered.*
  While Landfire provided a good accounting for tree plantations, not all of them were identical. We ended up splitting this layer at the 2,000 ft elevation level, with higher elevation tree plantations accruing a more native matrix and therefore higher habitat quality.
- *"Agriculture-Cultivated Crops and Irrigated Agriculture" can be broadened or enhanced by delineating revegetated former agriculture.*
  Land recently cultivated for agriculture, even if now revegetated was ascribed to have no habitat quality, since there was complete destruction of the native matrix at some point in the near past.

3. **Identification of fire-suppression priority areas for biodiversity protection (HI-MED-LOW) for strategies like hazardous fuel reduction and ecosystem integrity restoration**
   - The collaborating partner PI for this component of the project has only started to compile analyses for fire-suppression priority areas. TNC is prepared to review Dawn Greenlee (USFWS)'s assessment of risk to biodiversity.
   - In general, we would give priority to suppression in and adjacent to remaining native lowland dry forest, shrubland and grassland, dry cliffs, and lowland mesic forest and shrubland. We do this on the basis of a historical trend of accelerating decline and loss of these ecosystems, and their higher vulnerability to fire.

4. **Identification of biodiversity conservation priority areas (HI-MED-LOW).**

- Landfire EVT data was utilized to modify the existing HIGAP vegetation assessment in order to develop a “habitat quality” or HABQUAL layer, which combined with layers describing “species richness” and “uniqueness” helped to inform biodiversity conservation priority areas. This report only describes the ratings for the habitat quality layer, as Landfire was only utilized to develop the “habitat quality” layer.
- Habitat Quality:
    - HI priority is given to areas of high habitat quality, medium quality areas at lower elevations (below ca 1000 m), and all dry and mesic native forest, shrubland, and grassland areas.
    - MED priority is given to medium quality areas, especially managed tree plantations receiving secondary quality rankings and older fallow agriculture immediately adjacent to areas of poor quality.
    - LOW priority goes to poor quality areas, except when these are immediately adjacent to or in relative proximity to HI quality areas. These should receive medium priority.

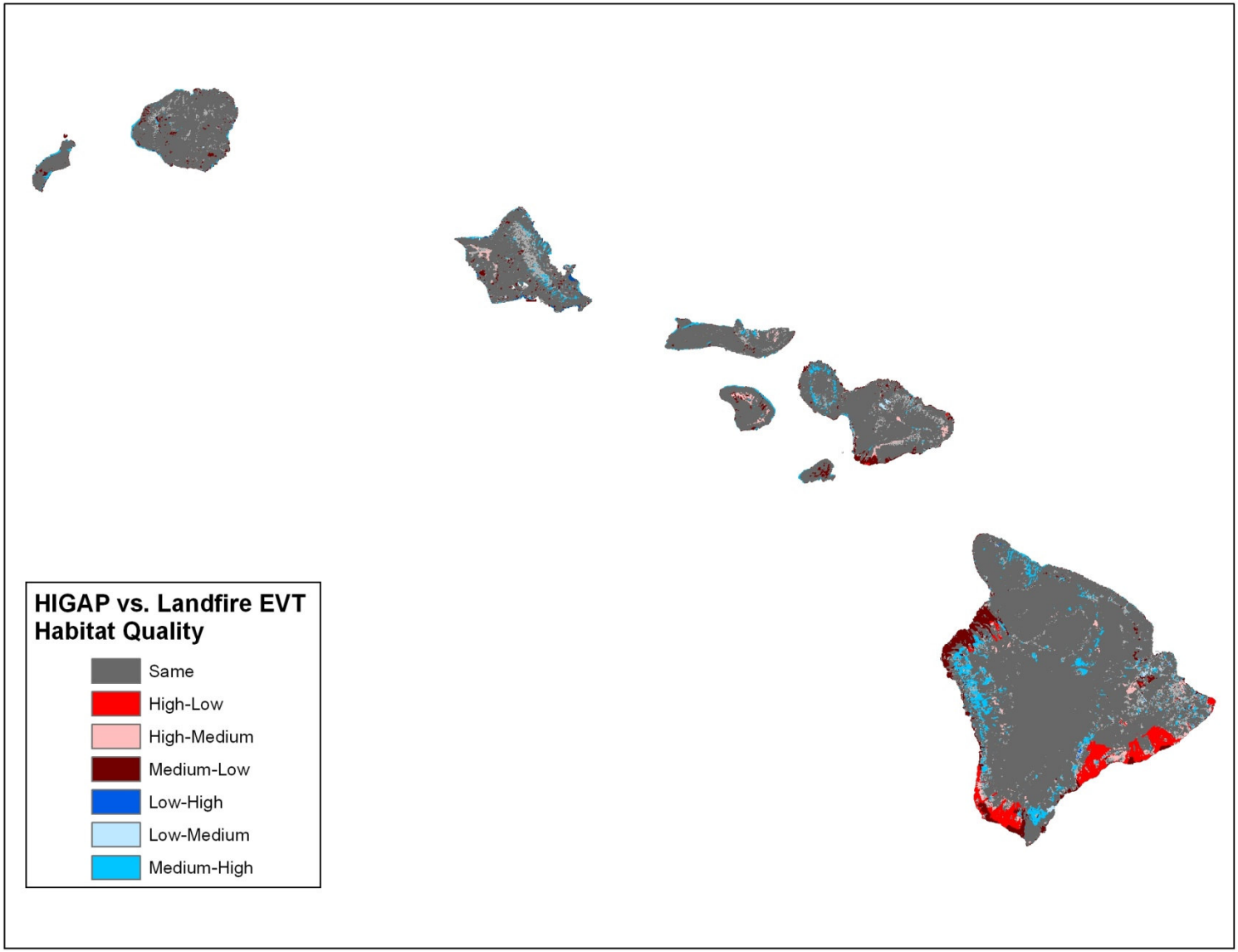

Figure 1: Statewide comparison between habitat quality ratings derived from both HIGAP and Landfire EVT layers.

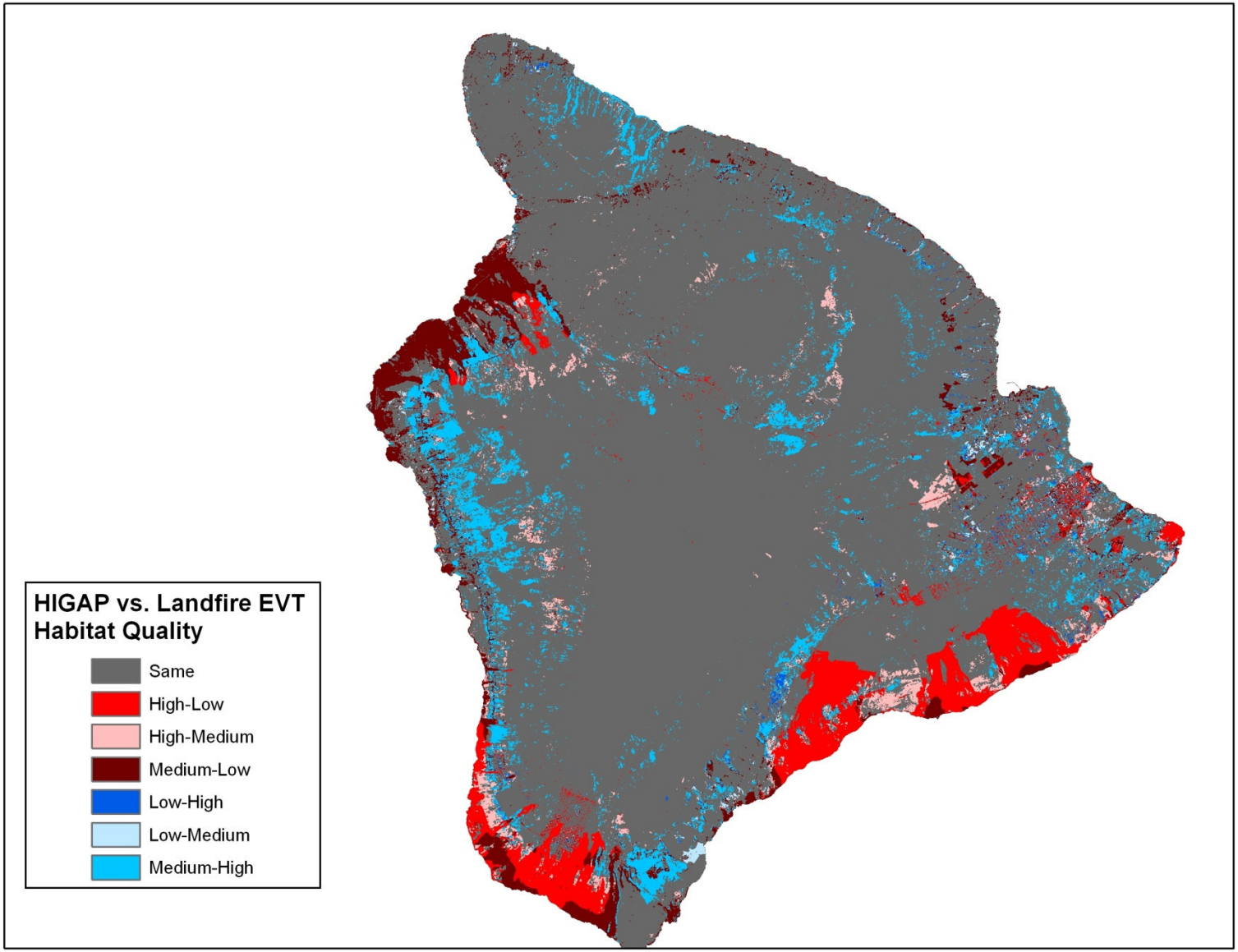

Figure 2: Hawaii Island comparison between habitat quality ratings derived from both HIGAP and Landfire EVT layers.