RESULTS AND DISCUSSION

Checklist

The 266 moss specimens in the HAVO Herbarium were examined to verify identification. Of these, 39 had not been identified beforehand and 17 had been misidentified resulting in a list of 68 species in the park. Nine species previously unrecorded for the park were found. The HAVO Herbarium specimens were entered into the National Park Service biodiversity database NPSpecies. Labels and acid-free specimen packets were made for 71 of the specimens.

The Bishop Museum provided a listing of moss specimens in their database from Hawaii Island. Of 1926 records, 506 came from HAVO or the Kilauea vicinity. These were edited for compatibility with NPSpecies and the species names were updated to currently accepted names as provided by the online WMOST nomenclatural database of moss taxonomy maintained by the Missouri Botanical Garden (www.mobot.org). In this process 159 moss synonyms were identified and the list of mosses updated to 110 species for HAVO. In addition, 230 species names derived from several reports (Higashino *et al*. 1988, Hoe 1967, Hoe and Smith 1980, Smith 1975) for Haleakala National Park (HALE) were similarly reduced to 154 currently accepted moss taxa and entered into NPSpecies. The 110 HAVO species names are in agreement with the names in the newly published checklist of Hawaiian mosses (Staples *et al*. 2004) except in the following six cases which are accepted as valid taxa for this report:

1) *Anoectangium haleakalae* was submerged into *A. aestivum* by Zander & Vitt (1979). It is still listed as an accepted name in the online WMOST database and the two can normally be separated in the field.

2) *Didymodon vinealis*, in its current circumscription, is a new record for the Hawaiian Islands and not in the current Hawaiian mosses checklist. Old concepts of *D. vinealis* included a taxon already recorded from the Hawaiian Islands as a variety but now classified as the separate species *D. insulanus*.

3) The type specimen of *Grimmia haleakalae* was determined to be *Amphidium tortuosum* (Staples, pers. comm.) but the species portrayed in Bartram's Manual is not *Amphidium tortuosum* and is instead *Grimmia longirostris* (Kortselius pers. comm. to Staples).

4) *Taxiphyllum laevifolium* is listed by Staples *et al*. (2004) as the accepted name for *Glossadelphus baldwinii.* However, Kis (2002) synonymized *G. balwinii* with *Phyllodon lingulatus* found in Africa and Asia. Buck (1998) states that *T. laevifolium* is often confused (including by Bartram) with *Phyllodon* species but can be distinguished by the shape of the teeth on the leaf margins wherein *T. laevifolium* has simple teeth and *Phyllodon* species have bifid teeth. The Hawaii specimens have bifid teeth and are therefore included here as *P. lingulatus.*

5) Kopponen (1982) split part of *Plagiomnium rostratum* (including all those in Hawaii) into *P. rhynchophorum*.

6) *Pyrrhobryum pungens* is listed as the accepted name for *Rhizogonium pungens* in the online WMOST database, putting it into the same genus as the closely related *P. spiniforme*.

One potential new record (*Neckera lepineana*) for HAVO at Bishop Museum was examined and found to be a misidentification of a species (*Baldwiniella kealeensis)* already known from the park.

One hundred and thirteen taxa (110 species, one subspecies, and two varieties) of mosses are recorded from Hawaii Volcanoes National Park (Appendix). Three species are included based on specimens collected outside the park boundary. *Calymperes tenerum* and *Macromitrium emersulum* are both native species that were collected outside the park in Kalapana in the 1960s and 1980s, before the current eruption of Kilauea volcano which started in 1983, covered so much of Kalapana. These two species may still survive within the park in low elevation kipukas (a Hawaiian term that describes islands of vegetation surrounded by lava). *Sematophyllum subpinnatum* is an invasive species very widespread in the lower elevation wet forests that is likely to occur in lower elevation East Rift forests. So far, *S. subpinnatum* does not appear to be very invasive at elevations above 700 m (2300 ft), based on personal observation on Oahu and Hawaii Island. About one-third of the species (37) are currently considered endemic to the Hawaiian Islands. Most of the other two-thirds are indigenous to the Hawaiian Islands. Taxonomic revisions will mostly likely reduce the number considered endemic as many modern revisions of genera have lumped Hawaiian taxa with more widespread taxa (Hoe 1974, Hoe 1979, Touw 2001). A recent revision of the genus *Thuidium,* Touw (2001) sank what had been previously considered to be two endemic species (*T. hawaiiense* and *T. plicatum*) into a single species (*T. cymbifolium*) widespread in South East Asia. Nevertheless, Touw (2001) commented that the Hawaiian specimens had more morphological variation than found in South East Asia. Vitt & Marsh (1988) similarly noted that Hawaiian specimens of the cosmopolitan *Racomitrium lanuginosum* var. *lanuginosum* were unusually variable compared to specimens from elsewhere. *Leucobryum gracile* is an example of an endemic taxon that will likely be sunk into a more widespread taxon (Hoe 1979). Four species in HAVO are non-indigenous, all of which are invasive to some extent.

Twenty eight species are known only from a single specimen from HAVO or cited in one publication only (Table 1). Future work should verify the presence of each of these species, their abundance and distribution. One species, *Breutelia affinis*, was collected once from Kilauea, Hawaii Island, more than 100 years ago and has never been collected since in the Hawaiian Islands (Virtanen 1997). Eight species (Table 2.) are new records for the Island of Hawaii. The species *Didymodon vinealis* is new to the Hawaiian Islands.