

ERDC/CERL TR-04-27

Construction Engineering
Research Laboratory



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Monitoring of Federally Threatened and Endangered Species on U.S. Army Installations

Robert H. Melton, Harold E. Balbach, and Michael Ward

December 2004

Monitoring of Federally Threatened and Endangered Species on U.S. Army Installations

Robert H. Melton and Harold E. Balbach

*Construction Engineering Research Laboratory
PO Box 9005
Champaign, IL 61826-9005*

Michael Ward

*Department of Animal Biology
201 Shelford Vivarium
University of Illinois
Urbana, IL 61801*

Final Report

Approved for public release; distribution is unlimited.

Prepared for Department of the Army
 Office of the Director of Environmental Programs

Under Work Unit 00AB43

ABSTRACT: This report presents an examination of Federally listed Threatened and Endangered (T & E) species on United States Army installations, and the results of a survey conducted to ascertain the kinds and quality of efforts being made to monitor these species in compliance with the Endangered Species Act of 1973 and AR 200-3. The report summarizes some general aspects of T & E species on Army installations using information gleaned from previous reports and Internet sources, supplemented with the data collected during the monitoring survey. Data is presented on which installations have the largest numbers of T & E species, which T & E species affect the largest number of installations, and which T & E taxa are most prevalent on installations. The relationships of Federal listing as T & E to various alternative extinction risk classifications, and to State listing status, are explored. The report presents information on monitoring of T & E species collected during a survey of a selected sample of Army installations. The completeness, variability, and consistency of the monitoring techniques reported are analyzed.

DISCLAIMER: The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products. All product names and trademarks cited are the property of their respective owners. The findings of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.
DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED. DO NOT RETURN IT TO THE ORIGINATOR.

Contents

List of Figures and Tables	v
Conversion Factors	vi
Preface.....	vii
1 Introduction	1
Background.....	1
Objective	1
Approach	1
Mode of Technology Transfer	2
2 Definitions.....	3
Terms	3
Extinction Risk Classes	4
3 Methods.....	6
General T & E Species and Installation Data	6
Monitoring Activities Survey.....	7
4 Results.....	9
General Species and Installations Overall.....	9
<i>Basic information.....</i>	<i>9</i>
<i>Counts of T & E species on installations.....</i>	<i>9</i>
<i>Counts of installations affected by each species</i>	<i>10</i>
<i>Proportions of species occurrences among taxa.....</i>	<i>10</i>
<i>Species at risk under classifications by other agencies and by states.....</i>	<i>10</i>
Monitoring Survey Results.....	11
<i>Attempted contacts and responses</i>	<i>11</i>
<i>Active monitoring</i>	<i>11</i>
<i>Expenditures.....</i>	<i>12</i>
5 Discussion	13
General Questions.....	13
Monitoring Survey.....	14
Expenditures.....	15

6 Summary..... 17

References..... 38

Appendix A: Installations in the Study 39

Appendix B: Species Included in this Study 44

Appendix C: Federal Listing Status and Rank..... 51

Appendix D: Federal Listing Status, Heritage Subnational Rank, and State Status 57

Appendix E: Species Actively Monitored 64

REPORT DOCUMENTATION PAGE 67

List of Figures and Tables

Figures

Figure 1. Frequency counts (by Installation Management Agency region) of the number of Threatened and Endangered species found onsite for all installations in the study.	10
--	----

Tables

Table 1. Army installations sorted in descending order of the number of T & E species found onsite.	18
Table 2. Federally Threatened and Endangered species, sorted by the number of installations in which the species is found onsite.	22
Table 3. T & E onsite species occurrences, by geographic locality and taxon.	29
Table 4. Counts of species occurrences, and of distinct species, found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their Heritage Global Status status.	30
Table 5. Counts of species occurrences, and of distinct species, found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their IUCN extinction risk status.	30
Table 6. Counts of species occurrences found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their Heritage Subnational status.	31
Table 7. Counts of species occurrences found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their State listing or protection status.	31
Table 8. Attempts at contact, and the proportion of installations that responded to attempts for the monitoring survey.	32
Table 9. Counts of actively monitored vs. unmonitored (including “no data”) species occurrences vs. taxon for installations responding to the survey, by Federal status and location.	33
Table 10. Counts of actively monitored vs. unmonitored (including “no data”) species occurrences vs. taxon for installations responding to the survey, by State protection status and location.	34
Table 11. Methods used for T & E species reported to be actively monitored on their installations, by taxon.	35
Table 12. Approximate amounts spent per installation in the previous fiscal year (1999-2000), as reported by interviewees on installations conducting active species monitoring.	37

Conversion Factors

Non-SI* units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
acres	4,046.873	square meters
cubic feet	0.02831685	cubic meters
cubic inches	0.00001638706	cubic meters
degrees (angle)	0.01745329	radians
degrees Fahrenheit	$(5/9) \times (^\circ\text{F} - 32)$	degrees Celsius
degrees Fahrenheit	$(5/9) \times (^\circ\text{F} - 32) + 273.15$	kelvins
feet	0.3048	meters
gallons (U.S. liquid)	0.003785412	cubic meters
horsepower (550 ft-lb force per second)	745.6999	watts
inches	0.0254	meters
kips per square foot	47.88026	kilopascals
kips per square inch	6.894757	megapascals
miles (U.S. statute)	1.609347	kilometers
pounds (force)	4.448222	newtons
pounds (force) per square inch	0.006894757	megapascals
pounds (mass)	0.4535924	kilograms
square feet	0.09290304	square meters
square miles	2,589,998	square meters
tons (force)	8,896.443	newtons
tons (2,000 pounds, mass)	907.1847	kilograms
yards	0.9144	meters

* *Système International d'Unités* ("International System of Measurement"), commonly known as the "metric system."

Preface

This study was conducted for the Department of the Army, Office of the Director of Environmental Programs, under project A896, “Base Facilities Environmental Quality”; 00AB42, “Priority T&E Species Mitigation and Management.” The technical monitor was Bill Woodson, ACS-IM.

The work was performed by the Ecological Processes Branch (CN-N) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Dr. Robert H. Melton. Part of this work was done by Michael Ward, Department of Animal Biology, University of Illinois, under a student contract. The technical editor was Gloria J. Wienke, Information Technology Laboratory. Stephen E. Hodapp is Chief, CEERD-CN-N, and Dr. John T. Bandy is Chief, CEERD-CN. The associated Technical Director was William D. Severinghaus, CEERD-CV-T. The Director of CERL is Dr. Alan W. Moore.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Commander and Executive Director of ERDC is COL James R. Rowan, EN and the Director of ERDC is Dr. James R. Houston.

1 Introduction

Background

Monitoring of threatened and endangered species on United States Army lands is crucial to achieving full compliance with Army Regulation (AR) 200-3 (*Natural Resources — Land, Forest and Wildlife Management*), which specifies that Army personnel must carry out mission requirements in harmony with the requirements of the Endangered Species Act of 1973.

Objective

This report generally characterizes United States Army inventory and monitoring activities for Threatened and Endangered (T & E) species and other species of concern for conservation on Army lands. The first objective is to present some general aspects of T & E (and other sensitive) species on Army installations. The second objective is to present the results of a survey of selected Army installations conducted during the fall of 2000, including information on the methods, variability, and quality of T & E species monitoring being conducted (as of 2000).

Approach

The first section of this report summarizes some general aspects of T & E species on Army installations, using information gleaned from previous reports and other sources, supplemented with the data collected during the monitoring survey. Questions addressed are:

1. Which installations have the largest numbers of T & E species onsite?
2. Which T & E species affect the largest number of installations onsite?
3. Which taxa are most prevalent on installations?
4. How many T & E species protected on Army bases are also species that are considered at high extinction risk by other criteria such as:
 - a) Heritage Global, and Subnational risk status?
 - b) IUCN extinction risk class?
5. What proportion of T & E species on installations are also State-protected species?

The second part presents information on T & E species monitoring collected during a survey of Army installations in the fall of 2000. (An attempt was made to contact each installation. In some cases, the request for information was not answered.) Questions addressed are:

1. Are all T & E species monitored?
2. Are some species monitored more than others?
3. Are monitoring methods consistently/inconsistently applied?
4. Are State-listed as well as Federally listed species included in monitoring programs?
5. How much do installations spend annually on monitoring?

Mode of Technology Transfer

This report will be made accessible through the World Wide Web (WWW) at URL:

<http://www.cecer.army.mil>

2 Definitions

Terms

The following terms found in the subsequent sections warrant definition:

T & E Species – Threatened and Endangered Species. In this report, the term T & E species includes only species Federally listed as Threatened or Endangered. Proposed and Candidate species are not included under the T & E. The one experimental population (EXPN) is included here as a T & E species occurrence.

Contiguous – the species was not found on the installation, but was found in areas adjacent to it.

Distinct Species – The term distinct species refers to the fact that a species may occur on many installations, but it is only counted once for purposes of assessing the number of species found Army-wide. For example, species X may be found on five installations, but when the total number of distinct species is presented, species X is only counted once.

IMA Region – Installation Management Agency Region.

Installation – The term installation includes active military installations, State National Guard Bureau (NGB) offices, NGB training sites, depots, Army ammunition plants, and regional support centers for the Army Reserve. Analyses in this report do not make a distinction between the various types. In some cases it was difficult to define “installation” data because some NGB State offices, for example, reported on an individual basis, while others reported at the state level.

Onsite – Species known to occupy habitat within the installation boundary, but does not imply that it was not found in areas contiguous to the installation as well.

Potential – The species could potentially be found on the installation, but either (1) the species was not known to occur on the installation, with no reference in the data to any contiguous populations, or (2) it was not clear from the data

whether the species occurred on the installation or contiguous to it, but probably occurred one place or the other, or (3) the species had been reported onsite or contiguous to the installation in the past, but not in the most recent accounting by Rubinoff et al. (2004).

Species Occurrence – An occurrence is equivalent to an individual record. For example, a T & E species that occurs on three installations is recorded as having three occurrences.

Extinction Risk Classes

Species in this report are classified with respect to extinction risk using several different classification systems: (1) the Federal status codes as set forth by the U.S. Fish and Wildlife Service (USFWS), (2) the Heritage Global, and Subnational classification schemes put forward by NatureServe, (3) the extinction risk classification of The World Conservation Union (a.k.a. International Union for the Conservation of Nature, or IUCN), and (4) State-level listing and protection status.

Definitions for the Endangered Species Act status codes are available at http://ecos.fws.gov/tess_public/docs/db-status.html. Not all the codes listed there were used in this study. Additional information on the listing is available at <http://endangered.fws.gov/listing/listing.pdf>

- E – Endangered
- T – Threatened
- EXPN – Experimental Population, Non-Essential
- E(S/A) – Similarity of Appearance to an Endangered Taxon
- T(S/A) – Similarity of Appearance to a Threatened Taxon
- PE – Proposed Endangered
- PT – Proposed Threatened
- C – Candidate Taxon, Ready for Proposal

Definitions for the Heritage Global, and Subnational status codes are defined at website <http://www.natureserve.org/explorer/ranking.htm>. Rounding of complex Heritage codes in general means assumption of the highest level of threat. The rounded Heritage codes used in this study can be interpreted as follows:

- 0 = Believed Extinct or Nearly Extinct
[designation used in this study for categories X or H]
- 1 = Critically Imperiled
- 2 = Imperiled
- 3 = Vulnerable to Extirpation or Extinction

- 4 = Apparently Secure
- 5 = Demonstrably Widespread, Abundant, and Secure.

Definitions for the IUCN extinction risk status codes encountered in this study, available at website http://www.redlist.org/info/categories_criteria.html [click on the dated *Categories and Criteria*], were as follows:

- EX = Extinct
- CR = Critically Endangered
- EN = Endangered
- VU = Vulnerable
- NT* = Near Threatened

For this research, the class NT* includes the classes:

LR/cd and LR/nt (1994 *Categories & Criteria* (version 2.3)), and
NT (2001 *Categories & Criteria* (version 3.1)).

- NE = Not Yet Evaluated.

The most recent available class designation for each species was used. Generally, this meant the 1994 class designation.

Definitions for the “State Listing” status codes encountered during this analysis are similar to the Federal codes, with E = State endangered and T = State threatened, and C = State candidate for listing. SoSC denotes “Species of Special Concern.” Many states do not have an official state listing system, but have local classifications that indicate various, and sometimes ambiguous, degrees of protection and concern. Hawaiian species with Federal listings of “Endangered” are deemed to be “Endangered” under State listing, and a similar rule applies for Federal and State listings of “Threatened” Hawaiian species (Hawaii Revised Statutes Annotated, 1988, Title 12; 1992 Cumulative Supplement).

3 Methods

General T & E Species and Installation Data

This chapter summarizes some aspects of T & E species on Army installations in general, using information gleaned from previous reports and Internet sources, supplemented with the data collected during the monitoring survey described below. Data on the occurrence of species onsite and contiguous to installations, and the Federal listing status for each species, was taken from Rubinoff et al. (2004) while the potential for species occurrence in the vicinity was deduced from past reports by Watland et al. (2002), Schreiber and Reed (1998), and Bak et al. (2000). Federal listing status information was checked and updated using the information available by searching the USFWS website (<http://endangered.fws.gov>). Additional information on Heritage Global, and Subnational status was obtained by searching documents available at the website (<http://www.natureserve.org/explorer/>). The IUCN extinction risk classes were obtained from the IUCN Red List website http://www.redlist.org/info/categories_criteria.html. Note that the emphasis on species in Rubinoff et al. (2004) and the other reports cited above means that many non-listed species considered to be “species at risk” (or “species of concern”), by the definition given in the NatureServe report *Species of Concern (SOC) on Department of Defense Installations* are not included in the present study. In particular, SOC that do not have Federal listings of C, PT, PE, T(S/A), E(S/A), or EXPN (as defined above) are not considered in the present study. The SOC report can be obtained at the website <http://www.natureserve.org/prodServices/speciesatRiskdod.jsp>.

Data on the acreages and military population for each installation were obtained primarily from the Department of Defense *Base Structure Report* for Fiscal Year 2004, available at the website http://www.defenselink.mil/pubs/20040910_2004BaseStructureReport.pdf. Supplemental information was included from a number of additional sources (Evinger 1998; Rubenson et al. 1999; Army Green Book at <http://www.ausa.org/www/greenbook.nsf> [October 2002; click on the Post and Installations box in the lower right; data changes annually, current data is for 2004]).

Some data on installations were also obtained at:

<http://www.globalsecurity.org/military/facility/index.html> and at
<http://www.hqda.army.mil/acsimweb/installations.shtml>.

All statistical analyses presented were calculated using procedures in SAS® Release 8.02 SAS/BASE and SAS/STAT).

Monitoring Activities Survey

The second part of this study was primarily concerned with T & E species monitoring activities on Army installations. In the fall of 2000 Army installations across the United States were contacted to determine if, how, and to what extent Federally listed threatened and endangered species were monitored. An effort was made to contact the person responsible for management or monitoring at each installation via the telephone or if necessary e-mail. Not all attempts at contact were successful (see Table 8 page 32).

Once contacted, a series of standard questions was asked. Three primary questions were:

1. Are there T & E species on the installation?
2. Are these species monitored?
3. How are the species monitored?

If the interviewee answered “No” to the first question, the interviewer would ask “How was it determined that the T & E species found in the vicinity of the installation were not present on the installation?” If the interviewee answered “Yes” to the first question, the interviewer would proceed to question 2. If the interviewee answered “No” to the second question the interviewer would ask why the species were not being monitored, and whether there were plans to monitor the species in the future. If the interviewee answered “Yes” to question 2 the interviewer would move on the question three. Question three often required additional questions to clarify how the species were monitored and how frequently the monitoring occurred. Often monitoring was conducted by outside organizations. If the interviewee was not familiar with the methods being used, the interviewer would request contact information for the person who was familiar with the monitoring methods. Sometimes installations were conducting research along with monitoring the population. In these cases, additional questions were asked to determine what additional data was being collected on the T & E species. Additional data on monitoring or research of other species not currently listed as endangered or threatened but that occur on the installation was also

collected. Interviewees were not pressed for details on the monitoring, although all information volunteered was recorded.

The interviewer would conclude the interview by asking how much was spent annually to monitor the E & T species on the installation. Often this amount included research that was in addition to the monitoring of the population.

In order to determine if an installation was monitoring T & E species it was necessary to define the term “monitoring.” For the purposes of this survey we distinguished “passive” vs. “active” monitoring. The passive vs. active dichotomy for “monitoring” was necessary because at some installations monitoring was limited to nonsystematic recording of sightings of a species, what we defined as passive monitoring. Passive monitoring data are difficult to interpret, and are of limited use when developing management plans. Passive monitoring was defined to be when species were monitored only by anecdotal observations or documentation. Examples of passive monitoring included recording of Bald Eagles (or other bird species) seen flying around the installations during the course of other installation activities, and also the reporting of road killed mammals. We defined active monitoring as any systematic or active documentation of the presence or absence, abundance, density, reproductive success, and/or vigor of a species. This definition is somewhat liberal, encompassing methods ranging from periodic “look-see” scanning of appropriate habitats, to detailed monitoring of population survival and fecundity under rigorous protocols.

4 Results

General Species and Installations Overall

Basic information

Information regarding some basic features of the data set is presented in the appendices. Appendix A* lists all the installations in the present study, with information on Army-related and USFWS management regions. Appendix B lists all of the species in the study, along with the Federal listing status of each. Appendix C presents information regarding the species' Heritage Global ranks, and their IUCN extinction risk categories. Appendix D presents information on the species' State listing statuses (and various other conservation-related State categories), and their Heritage Subnational ranks.

Counts of T & E species on installations

Table 1† shows the Army installations sorted in descending order of the number of T & E species found onsite, reflecting the relative amount of responsibility for T & E species on site. Figure 1 illustrates the frequency distribution of the number of T & E species found onsite among the installations, divided by IMA region within each count bin.

The median number of T & E species among installations as a whole was 1 species, with 95 percent of the installations having T & E species counts of 5 or less. The number of T & E species onsite was significantly (at the .05 level), if not very strongly, rank-correlated with installation acreage (Spearman's $\rho=+.254$, $p=.0051$, $N=120$), with military (active duty) population (Spearman's $\rho=+.471$, $p<.0001$, $N=108$), with civilian population (Spearman's $\rho=+.373$, $p<.0001$, $N=107$) and with "other" population (Spearman's $\rho=+.489$, $p<.0001$, $N=88$). Corresponding Pearson correlations were not calculated, due to strong non-normality of the data.

* Appendixes begin on page 39.

† All tables are provided at the end of the text, starting on page 18.

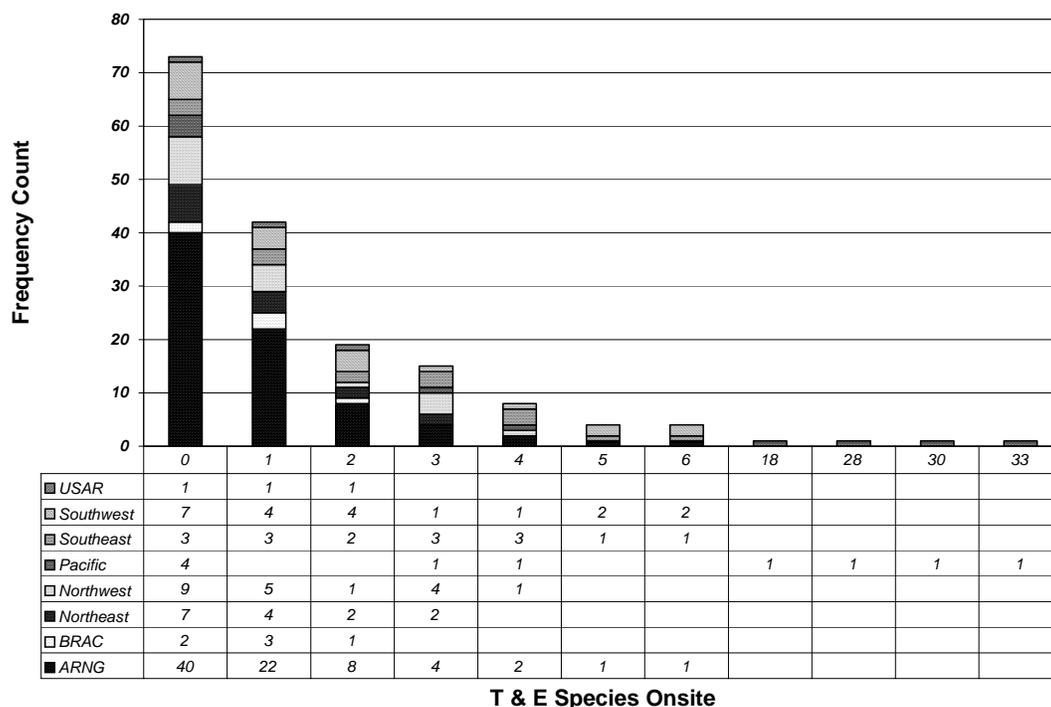


Figure 1. Frequency counts (by Installation Management Agency region) of the number of Threatened and Endangered species found onsite for all installations in the study.

See Appendix A. Note that the values on the horizontal axis do not increase at equal intervals.

Counts of installations affected by each species

Table 2 shows a list of T & E species found on the installations, sorted in descending order of the number of installations on which the each species is found onsite.

Proportions of species occurrences among taxa

Table 3 lists the proportional representation of onsite T & E species occurrences among taxonomic groups for the Army installations in the continental United States, with Hawaiian and Puerto Rican species occurrences shown separately.

Species at risk under classifications by other agencies and by states

T & E species on military bases also include species that are considered at risk of extinction by classifications of agencies other than the USFWS. When such species are also Federally listed species, the management of these species on Army lands automatically functions to assist in their conservation. The species occurrences on installations (all taxa) within each Federal Listing Status are shown cross-classified with respect to their Heritage Global Status (Table 4), their

IUCN Extinction Risk Status (Table 5), their local Heritage Subnational Status (Table 6), and their local State Listing Status (Table 7). Counts for distinct species are also given, where appropriate.

The percentage of species occurrences considered at high extinction risk under the Heritage Global ranking system, which were also Federally listed T & E species (see bolded numbers in Table 4), was 80 percent (249/310). Similar percentages calculated from bolded numbers in Tables 5 and 6 were 32 percent (98/310) for IUCN risk status, and 94 percent (291/310) for Heritage Subnational rank.

With respect to State laws, the percentage of Federally listed T & E species occurrences that were also considered legally protected under State law, (see bolded numbers in Table 7), was 83 percent (258/310).

Monitoring Survey Results

Attempted contacts and responses

Table 8A shows the number of installations contacted for interview regarding T & E species monitoring, and Table 8B shows the number of contacted installations for which a successful response was achieved, by IMA Region.

Active monitoring

Table 9 shows counts of actively monitored vs. unmonitored species occurrences (and values of “No Data” for species not included in the survey) vs. taxon for installations responding to the survey, and how these numbers relate to Federal status and location. Most of the numbers per taxon were too small to calculate percentages. In order to test whether the proportion monitored varied significantly among taxa, the survey count data for T & E onsite species occurrences was treated as a 9 x 2 contingency table for “Taxon” vs. “Actively Monitored” species occurrences. Fisher’s exact test on this data yielded a 2-sided p-value of .1029, not significant at the .05 level.

On an individual species basis, the percent of known monitored onsite T & E species occurrences was 15 percent for *Haliaeetus leucocephalus* (Bald Eagle, N=41), 38 percent for *Myotis sodalis* (Indiana Bat, N=8), 44 percent for *Picoides borealis* (Red-cockaded Woodpecker, N=9), 29 percent for *Myotis grisescens* (Gray Bat, N=8), and 40 percent for *Vireo atricapillus* (Black-capped Vireo, N=5). Other species had sample sizes too small to yield meaningful proportions (see Table 2 for values of N).

With respect to State laws, Table 10 shows counts of actively monitored vs. unmonitored (including “no data”) species occurrences vs. taxon for the installations, and how these numbers relate to State protection status and location for the species listed in Appendix B.

A number of methods used on installations to actively monitor species are shown in Table 11. The methods are rather varied. Noteworthy is the relatively common use of nest monitoring reported for bird species, and the use of mist netting for the monitoring of certain mammals (bats).

Expenditures

Amounts of money spent on monitoring were not rigorously estimated, and so these data should be interpreted with some caution. Table 12 shows the approximate amounts spent on monitoring per installation from 1999 through 2000), as reported by the interviewees on installations conducting active species monitoring. The median amount spent per installation for the data in Table 12 was \$2000, with \$0 at the 25th percentile and \$40,000 at the 75th percentile. The amount spent was positively correlated with the number of species monitored (Spearman’s $\rho = +.647$, $p = .0002$, $N=28$).

5 Discussion

General Questions

Which installations have the largest numbers of T & E species?

The distribution of T & E species onsite among installations was quite uneven and highly positively skewed, with most installations having none or one species, but a few installations having many species onsite. The six installations with the most T & E species onsite are all in Hawaii (in the Pacific IMA Region), illustrating the fragility of the endemic island flora and fauna. National Guard installations tended to have few T & E species, probably because of their relatively small areas. The number of T & E species onsite was weakly but significantly correlated with installation area and population, which is not surprising, since larger areas can support more both more species and larger military and civilian populations.

Which species affected the largest number of installations?

Table 2 illustrates the extent of influence exerted by each distinct species, as evidenced by the number of installations each species affects onsite. Among T & E species, the Bald Eagle, Red-cockaded Woodpecker, Indiana Bat, Gray Bat, and Black-capped Vireo topped the list, each affecting five or more installations.

Which taxa are most prevalent on installations?

Birds (43%), plants (23%), and mammals (11%) comprised the most common taxa among onsite T & E species occurrences in the continental United States. The pattern was different for the Hawaiian T & E onsite species occurrences, for which plants (74%), birds (12%), and snails (12%) were the most prevalent taxa, and a tiny percentage of mammals, entirely comprised of *Lasiurus cinereus semotus*, the Hawaiian Hoary bat.

How many T & E species on Army bases are also species considered at high extinction risk by other criteria?

A high percentage of T & E onsite species occurrences were also deemed to be at high risk under the Heritage Global and Subnational extinction risk classifications. As such, they are protected under the ESA, and thus automatically qualify for management under AR 200-3. The proportion of T & E onsite species occurrences considered at risk by the IUCN risk classification was relatively small by comparison.

What proportion of Federally listed protected species on installations are also State-protected?

AR 200-3 mandates protection and management of species protected by State law when feasible. The present study found that 83 percent of T & E species occurrences were also protected under State laws. Thus, management of T & E species on installations under the ESA also covers a substantial number of State-protected species as well.

Monitoring Survey

Are all T & E species monitored?

No. The survey results presented in Table 9 suggest that, in general, 59 percent of onsite T & E species occurrences were being actively monitored in some fashion, as well as 24 percent of contiguous T & E species occurrences for which some sort of active search was done. Of the species occurrences in this study not listed as T & E, 46 percent of onsite and 0 percent of contiguous species occurrences were actively monitored or searched for. These percentages are reduced substantially when species occurrences for which no data were available are taken into account.

Note that monitoring related to contiguous T & E species occurrences refers mainly to survey efforts aimed at ascertaining the presence or absence of the species within the installation boundary, often in conjunction with monitoring activities for other species onsite. Such activities were not conducted outside of installation boundaries.

Are State-listed as well as Federally listed species included in monitoring programs?

Yes, to some extent. Table 10 suggests that, in general, 52 percent of onsite State-protected species occurrences were being actively monitored, as well as 9 percent of contiguous State-protected species occurrences for which some sort of active search was done. Of the species in this study not State-protected, 61 percent of onsite and 38 percent of contiguous species were actively monitored or searched for. These fairly high percentages are probably due to the species' Federal listing status. Again, these percentages are reduced when species occurrences with no data available are included.

Are some species monitored more than others?

The count data for T & E onsite species occurrences in Table 9 comprised the best data to test whether taxa were differentially monitored. When a Fisher exact test was performed on this data, no significant statistical interaction was detected. However, with such small sample sizes, the test may not be powerful enough to detect differences in monitoring among the taxa. No useful conclusions can be drawn from the data on an individual species basis, due to small sample sizes.

Are methods consistently or inconsistently applied?

It is difficult to determine, from this data set, whether any particular monitoring method was being applied consistently over all installations for similar species or taxa. The monitoring methods listed in Table 11 suggest, however, that there was substantial variability in the kinds and amounts of effort applied to monitoring T & E species on the installations. Specific protocols were followed relatively rarely, and "unspecified" methods appeared too often. Birds and mammals (particularly bats) appeared to show the most variety in monitoring methods, with some relatively well-specified monitoring techniques (e.g., USFWS protocols, banding, line transects, point counts, nest monitoring, bat counters, roost counts, live trapping, mist netting, and telemetry). In general, however, there would appear to be much room for improvement in the quality and consistency of monitoring efforts on installations.

Expenditures

The data in Table 11 suggest that there was a great deal of variability among installations in the amount of money spent on monitoring T & E species. Fort Hood, TX, and Fort Irwin, CA, spent substantially more on monitoring than

other installations considered. The positive overall rank correlation between the number of species monitored and the amount expended on a given installation suggests that monitoring costs increase with the number of species monitored.

6 Summary

Most Army installations had a median of 1 T & E species onsite, with a range of 0 to 34. The Bald Eagle, Red-cockaded Woodpecker, Indiana Bat, Gray Bat, and Black-capped Vireo each affected five or more installations, but most T & E species affected fewer than four installations. Among installations on the continental United States, onsite T & E species were comprised predominantly of birds, followed by plants and mammals. Among Hawaiian installations, plants comprised the greatest portion of T & E species recorded onsite, followed by birds and snails. A high percentage of T & E onsite species occurrences were also deemed at high risk under the Heritage extinction risk classification, and a smaller but substantial percentage were considered at high risk under the IUCN risk classification. As such, they are protected under the ESA, and thus automatically qualify for management under AR 200-3. Approximately 83 percent of T & E onsite species occurrences were also considered protected under various State laws. The monitoring survey said that:

1. In general, 60 percent of onsite T & E species occurrences were being actively monitored in some fashion, and 50 percent of onsite State-protected species occurrences were being actively monitored.
2. It was not possible, from the data, to determine whether some taxa were monitored more than others.
3. There was substantial variability in the kinds and amounts of effort applied to monitoring T & E species on the installations. Specific protocols were followed relatively rarely, and “unspecified” methods appeared too often. In general, there would appear to be room for improvement in the quality and consistency of monitoring efforts on installations.
4. The amount of money spent annually on T & E monitoring varied greatly among installations, and monitoring costs tended to increase with the number of T & E species monitored.

Table 1. Army installations sorted in descending order of the number of T & E species found onsite.

Installation	State	IMA Region	FWS Region	T & E Species Onsite	T & E Species Contiguous	T & E Species Potential	Acres Owned	Military Personnel	Civilian Personnel	Other Personnel
Makua Military Reservation	HI	Pacific	1	33	0	3	3413			
Schofield Barracks Military Reservation	HI	Pacific	1	30	0	10	13607	9529	866	1236
Kawailoa TA	HI	Pacific	1	28	1	3	23348			
Pohakuloa TA	HI	Pacific	1	18	0	4	84816	21	104	28
Fort Hunter Liggett	CA	Southwest	1	6	3	0	164099	30	134	55
Camp Blanding TS	FL	ARNG	4	6	0	2	76000	41	50	
POM Annex	CA	Southwest	1	6	0	1	795	2500		
Fort Stewart	GA	Southeast	4	6	0	0	279270	13628	1611	1562
Fort Huachuca	AZ	Southwest	2	5	3	1	71623	6212	2190	1422
Camp Roberts TS	CA	ARNG	1	5	1	1	42814	428	185	168
Fort Bragg	NC	Southeast	4	5	0	0	152843	38684	3787	4714
Fort Sam Houston	TX	Southwest	2	5	0	0	3106	9946	3784	2504
Sunny Point	NC	Southeast	4	4	7	3	11274	100	237	1
Redstone Arsenal	AL	Southeast	4	4	2	1	37910	1730	8220	4099
Camp San Luis Obispo	CA	ARNG	1	4	2	0	4160	0	47	
Dillingham Military Reservation	HI	Pacific	1	4	0	5	628			
Fort Benning	GA	Southeast	4	4	0	2	183821	23423	2809	2539
Fort Hood	TX	Southwest	2	4	0	0	214562	37269	3327	3537
Fort Riley	KS	Northwest	6	4	0	0	100652	8949	1718	1586
Fort Ruger	HI	ARNG	1	4	0	0	8	3126	0	
Fort Carson	CO	Northwest	6	3	2	0	137404	13127	1680	1414
Aberdeen Proving Ground	MD	Northeast	5	3	1	2	72229	4842	6224	1118
Yakima TC	WA	Northwest	1	3	1	0	323249	534	15	0
Kahuku TA	HI	Pacific	1	3	0	8	8241			
Fort Bliss	TX	Southwest	2	3	0	4	122098	10587	2202	2816
Fort McClellan	AL	ARNG	4	3	0	3	28005	2433	2301	
Fort Gordon	GA	Southeast	4	3	0	1	55596	10464	1738	1648
Fort Jackson	SC	Southeast	4	3	0	1	52301	22100	1380	2180
Camp Grayling	MI	ARNG	3	3	0	0	147000	22	193	
Fort A. P. Hill	VA	Northeast	5	3	0	0	75794	408	249	84
Fort Knox	KY	Southeast	4	3	0	0	109054	14724	2574	2226
Fort Leonard Wood	MO	Northwest	3	3	0	0	62897	21066	2016	1857
Fort McCoy	WI	Northwest	3	3	0	0	127190	1812	1083	608
Fort Pickett	VA	ARNG	5	3	0	0	44235	950	178	277
Ukumehame Firing Range	HI	ARNG	1	3	0	0				
Camp Rilea	OR	ARNG	1	2	4	0	402000	72	0	
Fort Campbell	KY	Southeast	4	2	2	8	35985	21443	1993	2381
63rd RRC HQ	CA	USAR	1	2	2	0				

Installation	State	IMA Region	FWS Region	T & E Species Onsite	T & E Species Contiguous	T & E Species Potential	Acres Owned	Military Personnel	Civilian Personnel	Other Personnel
White Sands Missile Range	NM	Southwest	2	2	1	8	2281558	204	2010	524
Camp Shelby	MS	ARNG	4	2	1	2	134820	217	616	
ARDEC (Picatinny)	NJ	Northeast	5	2	1	0	5853	267	2840	554
Camp Adair	OR	ARNG	1	2	1	0				
Fort Lewis	WA	Northwest	1	2	1	0	84341	19161	2920	2989
Leesburg TS	SC	ARNG	4	2	1	0	15000			
Parks RFTA	CA	Southwest	1	2	1	0	2478	976	106	1565
Savanna Army Depot	IL	BRAC	3	2	0	1	9818	0	10	2
Camp Atterbury	IN	ARNG	3	2	0	0	33139	838	81	80
Camp Ripley	MN	ARNG	3	2	0	0	53000	0	530	
Fort Buchanan	PR	Southeast	4	2	0	0	746	1862	840	1781
Fort Chaffee	AR	ARNG	4	2	0	0	64632	276	3	68
Fort Irwin	CA	Southwest	1	2	0	0	636181	4340	607	1019
POM	CA	Southwest	1	2	0	0	392	3219	1363	491
Sea Girt TS	NJ	ARNG	5	2	0	0				
West Point Military Reservation	NY	Northeast	5	2	0	0	16081	5458	2222	855
Tullahoma TS	TN	ARNG	4	1	2	0				
Camp Crowder	MO	ARNG	3	1	1	1	4362	0	15	23
Holston AAP	TN	Southeast	4	1	1	1	6024	0	20	124
Camp Navajo	AZ	ARNG	2	1	1	0	28345	10	110	
Fort Belvoir	VA	Northeast	5	1	1	0	8656	3167	5062	7360
Ike Skelton Training Site	MO	ARNG	3	1	1	0				
Macon Training Site	MO	ARNG	3	1	1	0				
Newport Chemical Activity	IN	Northwest	3	1	1	0	7098	1	46	54
STARC-HI	HI	ARNG	1	1	0	12				
Anniston Army Depot	AL	Southeast	4	1	0	2	15243	20	3110	314
Rock Island Arsenal	IL	Northwest	3	1	0	2	891	386	4472	786
State Wide Regulatory	NV	ARNG	1	1	0	2				
Camp Grafton	ND	ARNG	6	1	0	1	12100	302	140	
Indiana AAP	IN	BRAC	3	1	0	1	9790	0	66	
Rocky Mountain Arsenal	CO	BRAC	6	1	0	1	17056	0	8	55
81st RRC HQ	GA	USAR	4	1	0	0				
Adelphi Army Research Lab	MD	Northeast	5	1	0	0	207	53	682	83
Blue Grass Army Depot	KY	Southeast	4	1	0	0	14596	47	529	78
Camp Barkeley	TX	ARNG	2	1	0	0				
Camp Bowie	TX	ARNG	2	1	0	0				
Camp Gruber	OK	ARNG	2	1	0	0	33027	25	20	28
Camp Guernsey	WY	ARNG	6	1	0	0	34000	63	80	
Camp Perry	OH	ARNG	3	1	0	0				
Catoosa Range TS	TN	ARNG	4	1	0	0				
Cornhusker AAP	NE	Northwest	6	1	0	0	5166	0	3	28

Installation	State	IMA Region	FWS Region	T & E Species Onsite	T & E Species Contiguous	T & E Species Potential	Acres Owned	Military Personnel	Civilian Personnel	Other Personnel
Fort Dix	NJ	Northeast	5	1	0	0	30698	1322	616	2553
Fort Eustis	VA	Northeast	5	1	0	0	8227	7645	2119	1343
Fort Leavenworth	KS	Northwest	6	1	0	0	5637	1382	1412	1567
Fort Polk	LA	Southwest	4	1	0	0	197930	7692	1898	1235
Fort Sill	OK	Southwest	2	1	0	0	93829	16774	1480	2161
Hilo (Keaukaha Military Reserve)	HI	ARNG	1	1	0	0				
Iowa AAP	IA	Northwest	3	1	0	0	19011	0	27	14
Jefferson Proving Ground	IN	BRAC	3	1	0	0	54012	0	1	0
Keaukaha Military Reservation	HI	ARNG	1	1	0	0				
Kekaha WETS	HI	ARNG	1	1	0	0				
Lil Aaron Straus Wilderness Area	MD	ARNG	5	1	0	0				
McAlester AAP	OK	Southwest	2	1	0	0	44964	12	1192	467
Santa Cruz Armory	CA	ARNG	1	1	0	0				
St. George Armory	UT	ARNG	6	1	0	0				
Stead Training Site	NV	ARNG	1	1	0	0	360	12	3	
Truman Reservoir Training Site	MO	ARNG	3	1	0	0				
Yuma Proving Ground	AZ	Southwest	2	1	0	0	829882	107	599	453
Camp Ashland	NE	ARNG	6	0	3	1	980	317	7	6
70th RRC HQ	WA	USAR	1	0	2	0				
Camp Smith	NY	ARNG	5	0	2	0	1970	5	190	
Hawthorne AAP	NV	Southwest	1	0	2	0	147189	1	30	0
MO ARNG HQ	MO	ARNG	3	0	1	10				
Sierra Army Depot	CA	Southwest	1	0	1	1	37937	0	442	101
Sunflower AAP	KS	BRAC	6	0	1	1	9063	0	0	6
Camp Beauregard	LA	ARNG	4	0	1	0	700	0	451	
Camp Joseph T. Robinson	AR	ARNG	4	0	1	0	48188	523	148	
Cedar City Armory	UT	ARNG	6	0	1	0				
Chevak Armory	AK	ARNG	7	0	1	0				
Clark County Training Area	NV	ARNG	1	0	1	0				
Deseret Chemical Depot	UT	Northwest	6	0	1	0	19362	0	466	4
Dugway Proving Ground	UT	Northwest	6	0	1	0	798214	47	561	288
Elim Armory	AK	ARNG	7	0	1	0				
Florence Military Reservation	AZ	ARNG	2	0	1	0	25752			
Fort Lee	VA	Northeast	5	0	1	0	5496	7778	1569	1667
Hastings Training Site	NE	ARNG	6	0	1	0	3211			
Kwigillingok Armory	AK	ARNG	7	0	1	0				
New Hampshire National Guard Training Site	NH	ARNG	5	0	1	0				
NH State Military Reservation	NH	ARNG	5	0	1	0				
Shaktoolik Armory	AK	ARNG	7	0	1	0				

Installation	State	IMA Region	FWS Region	T & E Species Onsite	T & E Species Contiguous	T & E Species Potential	Acres Owned	Military Personnel	Civilian Personnel	Other Personnel
St. Michael Armory	AK	ARNG	7	0	1	0				
Stebbins Armory	AK	ARNG	7	0	1	0				
TS Garrison	ND	ARNG	6	0	1	0				
Unalakleet Armory	AK	ARNG	7	0	1	0				
STARC-CA	CA	ARNG	1	0	0	9				
Military Ocean Terminal - Bayonne	NJ	Northeast	5	0	0	6	679	94	1700	
Camp Bullis	TX	Southwest	2	0	0	3	27993	459	2	0
Kanaio Weekend Training Site	HI	ARNG	1	0	0	3				
Ravenna AAP	OH	Northwest	3	0	0	3	42824	193	15	23
STARC-NE	NE	ARNG	6	0	0	3				
Camp Williams	UT	ARNG	6	0	0	2	28000	300	85	
Fort Rucker	AL	Southeast	4	0	0	2	57772	4420	1837	908
Marana SBAH Facilities	AZ	ARNG	2	0	0	2	2304000			
Pinon Canyon Maneuver Site	CO	Northwest	6	0	0	2	235896	0	6	0
Radford AAP	VA	Northeast	5	0	0	2	6883	0	100	3
STARC-TX	TX	ARNG	2	0	0	2				
STARC-UT	UT	ARNG	6	0	0	2				
Addicks Reservoir WTS	TX	ARNG	2	0	0	1	26	508	8	0
Badger AAP	WI	Northwest	3	0	0	1	7354	0	0	54
Barker Dam WTS	TX	ARNG	2	0	0	1				
Camp Murray	WA	ARNG	1	0	0	1				
Chas E. Kelly (Oakdale SPT FAC)	PA	Northeast	5	0	0	1	118	120	150	
Devens RFTA	MA	Northeast	5	0	0	1	7518	381	68	0
Fort Drum	NY	Northeast	5	0	0	1	107265	10322	1487	1122
Kansas AAP	KS	Northwest	6	0	0	1	13727	0	8	3
Letterkenny Army Depot	PA	Northeast	5	0	0	1	18638	2	1225	315
Perrine Reserve Center	FL	Southeast	4	0	0	1				
Pine Bluff Arsenal	AR	Southwest	4	0	0	1	13426	27	1020	138
Regional Training Institute	NH	ARNG	5	0	0	1				
Riverbank AAP	CA	Southwest	1	0	0	1	171	0	4	171
STARC-AK	AK	ARNG	7	0	0	1				
STARC-KS	KS	ARNG	6	0	0	1				
Tooele Army Depot	UT	Northwest	6	0	0	1	23063	57	471	134
Twin Cities AAP	MN	Northwest	3	0	0	1	813	0	33	0
Volunteer AAP	TN	Southeast	4	0	0	1	6444	0	0	315
Wendell H. Ford RTC	KY	ARNG	4	0	0	1	8500			
Wisconsin Military Academy	WI	ARNG	3	0	0	1				
Fort Greely	AK	Pacific	7	0	0	0	8213	8	99	11
Fort Harrison	MT	ARNG	6	0	0	0	3625	667	206	72

Installation	State	IMA Region	FWS Region	T & E Species Onsite	T & E Species Contiguous	T & E Species Potential	Acres Owned	Military Personnel	Civilian Personnel	Other Personnel
Fort Richardson	AK	Pacific	7	0	0	0	71437	2400	920	732
Fort Wainwright	AK	Pacific	7	0	0	0	656241	3842	653	840
Georgia ARNG TC	GA	ARNG	4	0	0	0				
Lonestar AAP	TX	Southwest	2	0	0	0	15699	0	18	0
Longhorn AAP	TX	BRAC	2	0	0	0	8492	0	0	12
Louisiana AAP	LA	Southwest	4	0	0	0	1283	234	3	235
Orchard Range TS	ID	ARNG	1	0	0	0	138051			
Pueblo Depot Activity	CO	Northwest	6	0	0	0	23121	0	181	53
Salina Smokey Hill TA	KS	ARNG	6	0	0	0	34000			
Sheridan LTA	WY	ARNG	6	0	0	0	3960			
Tripler Army Medical Center	HI	Pacific	1	0	0	0	358	794	1054	984

Table 2. Federally Threatened and Endangered species, sorted by the number of installations in which the species is found onsite.

The number of installations for which each species is found contiguous to the installation, and potentially found in the general vicinity, are also given.

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	41	10	19
<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	9	2	1
<i>Myotis sodalis</i>	Indiana Bat	Mammal	E	8	3	12
<i>Myotis grisescens</i>	Gray Bat	Mammal	E	7	1	6
<i>Vireo atricapillus</i>	Black-capped Vireo	Bird	E	5	0	2
<i>Sterna antillarum</i>	Least Tern	Bird	E	4	2	5
<i>Lasiurus cinereus semotus</i>	Hawaiian Hoary Bat	Mammal	E	4	0	3
<i>Ambystoma californiense</i>	California Tiger Salamander	Amphibian	T	4	0	0
<i>Fulica americana alai</i>	Hawaiian Coot	Bird	E	4	0	0
<i>Mycteria americana</i>	Wood Stork	Bird	E	4	0	0
<i>Charadrius melodus</i>	Piping Plover	Bird	T	3	3	1
<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Fish	E	3	2	1
<i>Rana aurora draytonii</i>	California Red-legged Frog	Amphibian	T	3	1	1
<i>Lysimachia asperulaefolia</i>	Rough-leaved Loosestrife	Plant	E	3	1	0
<i>Nicrophorus americanus</i>	American Burying Beetle	Insect	E	3	0	2
<i>Oncorhynchus mykiss</i>	Steelhead	Fish	T	3	0	1
<i>Cyanea koolauensis</i>	Haha	Plant	E	3	0	0
<i>Lepidium arbuscula</i>	`Anaunau	Plant	E	3	0	0
<i>Tetraplasandra gymnocarpa</i>	`Ohe`ohe	Plant	E	3	0	0
<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	Bird	T	2	1	2

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Chasiempis sandwichensis ibidis</i>	Oahu Elepaio	Bird	E	2	1	1
<i>Gopherus agassizii</i>	Desert Tortoise	Reptile	T	2	1	0
<i>Achatinella sowerbyana</i>	Pupu Kuahiwi	Snail	E	2	0	1
<i>Branchinecta lynchi</i>	Vernal Pool Fairy Shrimp	Crustacean	T	2	0	1
<i>Buteo solitarius</i>	Hawaiian Hawk	Bird	E	2	0	1
<i>Chlorogalum purpureum</i> var. <i>purpureum</i>	Purple Amole	Plant	T	2	0	1
<i>Dendroica chrysoparia</i>	Golden-cheeked Warbler	Bird	E	2	0	1
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	Reptile	T	2	0	1
<i>Echinacea laevigata</i>	Smooth Coneflower	Plant	E	2	0	1
<i>Gardenia mannii</i>	Nanu	Plant	E	2	0	1
<i>Hesperomannia arborescens</i>	None	Plant	E	2	0	1
<i>Nototrichium humile</i>	Kulu'i	Plant	E	2	0	1
<i>Phyllostegia hirsuta</i>	None	Plant	E	2	0	1
<i>Achatinella byronii</i>	Pupu Kuahiwi	Snail	E	2	0	0
<i>Achatinella decipiens</i>	Pupu Kuahiwi	Snail	E	2	0	0
<i>Achatinella leucorraphe</i>	Pupu Kuahiwi	Snail	E	2	0	0
<i>Alectryon macrococcus</i>	Mahoe	Plant	E	2	0	0
<i>Branta (=Nesochen) sandvicensis</i>	Hawaiian Goose	Bird	E	2	0	0
<i>Canis lupus</i>	Gray Wolf	Mammal	T	2	0	0
<i>Chorizanthe pungens</i> var. <i>pungens</i>	Monterey Spineflower	Plant	T	2	0	0
<i>Cyanea acuminata</i>	Haha	Plant	E	2	0	0
<i>Diellia falcata</i>	None	Plant	E	2	0	0
<i>Falco femoralis septentrionalis</i>	Northern Aplomado Falcon	Bird	E	2	0	0
<i>Flueggea neowawraea</i>	Mehamehame	Plant	E	2	0	0
<i>Lobelia niihauensis</i>	None	Plant	E	2	0	0
<i>Lycopodium nutans</i>	Wawae'iole	Plant	E	2	0	0
<i>Plantago princeps</i>	Laukahi kuahiwi	Plant	E	2	0	0
<i>Pteris lidgatei</i>	Lydgate's Brake	Plant	E	2	0	0
<i>Rhus michauxii</i>	Michaux's Sumac	Plant	E	2	0	0
<i>Sanicula purpurea</i>	Purple-flowered Sanicle	Plant	E	2	0	0
<i>Silene lanceolata</i>	Lanceolate Catchfly	Plant	E	2	0	0
<i>Spermolepis hawaiiensis</i>	Hawaiian Spermolepis	Plant	E	2	0	0
<i>Viola chamissoniana</i> ssp. <i>chamissoniana</i>	Pamakani	Plant	E	2	0	0
<i>Xyris tennesseensis</i>	Tennessee Yellow-eyed Grass	Plant	E	2	0	0
<i>Isotria medeoloides</i>	Small Whorled Pogonia	Plant	T	1	2	1
<i>Vulpes macrotis mutica</i>	San Joaquin Kit Fox	Mammal	E	1	2	1
<i>Grus americana</i>	Whooping Crane	Bird	E	1	1	4
<i>Gymnogyps californianus</i>	California Condor	Bird	E	1	1	2
<i>Lycaeides melissa samuelis</i>	Karner Blue Butterfly	Insect	E	1	1	1
<i>Charadrius alexandrinus nivosus</i>	Western Snowy Plover	Bird	T	1	1	0

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Oncorhynchus tshawytscha</i>	Chinook Salmon	Fish	T	1	1	0
<i>Arctomecon humilis</i>	Dwarf Bear Poppy	Plant	E	1	0	2
<i>Chamaesyce rockii</i>	'Akoko	Plant	E	1	0	2
<i>Clemmys muhlenbergii</i>	Bog Turtle	Reptile	T	1	0	2
<i>Cyperus trachysanthos</i>	Pu'uka'a	Plant	E	1	0	2
<i>Gallinula chloropus sandvicensis</i>	Hawaiian Common Moorhen	Bird	E	1	0	2
<i>Himantopus mexicanus knudseni</i>	Hawaiian Stilt	Bird	E	1	0	2
<i>Achatinella curta</i>	Pupu Kuahiwi	Snail	E	1	0	1
<i>Achatinella mustelina</i>	Pupu Kuahiwi	Snail	E	1	0	1
<i>Amaranthus pumilus</i>	Seabeach Amaranth	Plant	T	1	0	1
<i>Apios priceana</i>	Price's Potato Bean	Plant	T	1	0	1
<i>Bufo californicus (=microscaphus)</i>	Arroyo Southwestern Toad	Amphibian	E	1	0	1
<i>Chamaesyce deltoidea ssp. deltoidea</i>	Deltoid Spurge	Plant	E	1	0	1
<i>Chelonia mydas</i>	Green Sea Turtle	Reptile	T	1	0	1
<i>Cicurina madla</i>	Madla's Cave Spider	Arachnid	E	1	0	1
<i>Cirsium fontinale var. obispoense</i>	Chorro Creek Bog Thistle	Plant	E	1	0	1
<i>Cyrtandra dentata</i>	Ha'iwale	Plant	E	1	0	1
<i>Haplostachys haplostachya</i>	Honohono	Plant	E	1	0	1
<i>Hedeoma todsenii</i>	Todsen's Pennyroyal	Plant	E	1	0	1
<i>Hibiscus brackenridgei</i>	Ma'o Hau Hele	Plant	E	1	0	1
<i>Lampsilis higginsii</i>	Higgins Eye Pearlymussel	Clam	E	1	0	1
<i>Leptonycteris curasoae yerbabuena</i>	Lesser Long-nosed Bat	Mammal	E	1	0	1
<i>Lobelia gaudichaudii ssp. koolauensis</i>	None	Plant	E	1	0	1
<i>Lobelia oahuensis</i>	None	Plant	E	1	0	1
<i>Neraudia angulata</i>	None	Plant	E	1	0	1
<i>Notropis topeka</i>	Topeka Shiner	Fish	E	1	0	1
<i>Piperia yadonii</i>	Yadon's Piperia	Plant	E	1	0	1
<i>Pritchardia kaalae</i>	Loulu	Plant	E	1	0	1
<i>Schiedea adamantis</i>	Diamond Head schiedea	Plant	E	1	0	1
<i>Schiedea hookeri</i>	None	Plant	E	1	0	1
<i>Scutellaria montana</i>	Large-flowered Skullcap	Plant	T	1	0	1
<i>Viola oahuensis</i>	Forbes Violet	Plant	E	1	0	1
<i>Achatinella apexfulva</i>	Pupu Kuahiwi	Snail	E	1	0	0
<i>Achatinella lila</i>	Pupu Kuahiwi	Snail	E	1	0	0
<i>Achatinella livida</i>	Pupu Kuahiwi	Snail	E	1	0	0
<i>Achatinella pulcherrima</i>	Pupu Kuahiwi	Snail	E	1	0	0
<i>Alsinidendron obovatum</i>	None	Plant	E	1	0	0
<i>Alsinidendron trinerve</i>	None	Plant	E	1	0	0
<i>Ambystoma cingulatum</i>	Flatwoods Salamander	Amphibian	T	1	0	0
<i>Ambystoma tigrinum stebbinsi</i>	Sonoran Tiger Salamander	Amphibian	E	1	0	0
<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	Bird	T	1	0	0

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Asplenium fragile</i> var. <i>insulare</i>	Rhombic Spleenwort	Plant	E	1	0	0
<i>Astragalus jaegerianus</i>	Lane Mountain Milk-vetch	Plant	E	1	0	0
<i>Bonamia menziesii</i>	None	Plant	E	1	0	0
<i>Cenchrus agrimonoides</i>	Kamanomano	Plant	E	1	0	0
<i>Chamaesyce celastroides</i> var. <i>kaenana</i>	'Akoko	Plant	E	1	0	0
<i>Coryphantha sneedii</i> var. <i>sneedii</i>	Sneed Pincushion Cactus	Plant	E	1	0	0
<i>Ctenitis squamigera</i>	Pauoa	Plant	E	1	0	0
<i>Cyanea crispa</i>	Crimped Rollandia	Plant	E	1	0	0
<i>Cyanea grimesiana</i> ssp. <i>grimesiana</i>	Haha	Plant	E	1	0	0
<i>Cyanea humboldtiana</i>	Haha	Plant	E	1	0	0
<i>Cyanea st-johnii</i>	Haha	Plant	E	1	0	0
<i>Cyanea superba</i>	Haha	Plant	E	1	0	0
<i>Cyrtandra subumbellata</i>	Ha`iwale	Plant	E	1	0	0
<i>Cyrtandra viridiflora</i>	Ha`iwale	Plant	E	1	0	0
<i>Delissea subcordata</i>	`Oha	Plant	E	1	0	0
<i>Dendroica kirtlandii</i>	Kirtland's Warbler	Bird	E	1	0	0
<i>Dubautia herbstobatae</i>	Na`ena`e	Plant	E	1	0	0
<i>Echinocactus horizontalonius</i> var. <i>nicholii</i>	Nichol's Turk's Head Cactus	Plant	E	1	0	0
<i>Epicrates inornatus</i>	Puerto Rican Boa	Reptile	E	1	0	0
<i>Eugenia koolauensis</i>	Nioi	Plant	E	1	0	0
<i>Euphilotes enoptes smithi</i>	Smith's Blue Butterfly	Insect	E	1	0	0
<i>Euphorbia haeleeleana</i>	`Akoko	Plant	E	1	0	0
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>	Monterey Gilia	Plant	E	1	0	0
<i>Gopherus polyphemus</i>	Gopher Tortoise	Reptile	T	1	0	0
<i>Hedyotis coriacea</i>	Kio`ele	Plant	E	1	0	0
<i>Hedyotis degeneri</i>	None	Plant	E	1	0	0
<i>Hedyotis parvula</i>	None	Plant	E	1	0	0
<i>Helianthus eggertii</i>	Eggert's Sunflower	Plant	T	1	0	0
<i>Helminthoglypta walkeriana</i>	Morro Shoulderband Snail	Snail	E	1	0	0
<i>Helonias bullata</i>	Swamp Pink	Plant	T	1	0	0
<i>Hemignathus munroi</i>	`Akiapola`au	Bird	E	1	0	0
<i>Holocarpha macradenia</i>	Santa Cruz Tarplant	Plant	T	1	0	0
<i>Howellia aquatilis</i>	Water Howelia	Plant	T	1	0	0
<i>Isodendron laurifolium</i>	Aupaka	Plant	E	1	0	0
<i>Isoetes louisianensis</i>	Louisiana Quillwort	Plant	E	1	0	0
<i>Labordia cyrtandrae</i>	Kamakahala	Plant	E	1	0	0
<i>Lasthenia conjugens</i>	Contra Costa Goldfields	Plant	E	1	0	0
<i>Lilaeopsis schaffneriana</i> var. <i>recurva</i>	Huachuca Water-umbel	Plant	E	1	0	0
<i>Lipochaeta tenuifolia</i>	Slender-leaved Nehe	Plant	E	1	0	0
<i>Loxioides bailleui</i>	Palila	Bird	E	1	0	0

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Lupinus oreganus</i> var. <i>kincaidii</i>	Kincaid's Lupine	Plant	T	1	0	0
<i>Marshallia mohrii</i>	Mohr's Barbara's Buttons	Plant	T	1	0	0
<i>Melicope lydgatei</i>	Lydgate's Pelea	Plant	E	1	0	0
<i>Myrsine juddii</i>	Kolea	Plant	E	1	0	0
<i>Neonympha mitchellii francisci</i>	Saint Francis' Satyr	Insect	E	1	0	0
<i>Neraudia ovata</i>	None	Plant	E	1	0	0
<i>Oncorhynchus clarki stomias</i>	Greenback Cutthroat Trout	Fish	T	1	0	0
<i>Ottoschulzia rhodoxylon</i>	Palo de Rosa	Plant	E	1	0	0
<i>Palaemonias alabamiae</i>	Alabama Cave Shrimp	Crustacean	E	1	0	0
<i>Panicum niihauense</i>	Lau'ehu	Plant	E	1	0	0
<i>Percina rex</i>	Roanoke Log Perch	Fish	E	1	0	0
<i>Phlegmariurus nutans</i>	Wawae`iole	Plant	E	1	0	0
<i>Phyllostegia mollis</i>	Velvety Phyllostegia	Plant	E	1	0	0
<i>Portulaca sclerocarpa</i>	Po`e	Plant	E	1	0	0
<i>Pterodroma phaeopygia sandwichensis</i>	Hawaiian Dark-rumped Petrel	Bird	E	1	0	0
<i>Ptilimnium nodosum</i>	Harperella	Plant	E	1	0	0
<i>Rana chiricahuensis</i>	Chiricahua Leopard Frog	Amphibian	T	1	0	0
<i>Rhadine exilis</i>	None	Insect	E	1	0	0
<i>Rhadine infernalis</i>	None	Insect	E	1	0	0
<i>Rhododendron chapmanii</i>	Chapman Rhododendron	Plant	E	1	0	0
<i>Sanicula marivera</i>	None	Plant	E	1	0	0
<i>Schiedea kealiae</i>	Ma`oli`oli	Plant	E	1	0	0
<i>Schiedea nuttallii</i>	Nuttall Schiedea	Plant	E	1	0	0
<i>Schwalbea americana</i>	American Chaffseed	Plant	E	1	0	0
<i>Sidalcea nelsoniana</i>	Nelson's Checker-mallow	Plant	T	1	0	0
<i>Silene hawaiiensis</i>	Sherff's Catchfly	Plant	T	1	0	0
<i>Solanum incompletum</i>	Popolo Ku Mai	Plant	E	1	0	0
<i>Solidago houghtonii</i>	Houghton's Goldenrod	Plant	T	1	0	0
<i>Speyeria zerene hippolyta</i>	Oregon Silverspot Butterfly	Insect	T	1	0	0
<i>Stenogyne angustifolia</i>	None	Plant	E	1	0	0
<i>Tetramolopium arenarium</i>	None	Plant	E	1	0	0
<i>Tetramolopium filiforme</i>	None	Plant	E	1	0	0
<i>Trifolium stoloniferum</i>	Running Buffalo Clover	Plant	E	1	0	0
<i>Trillium reliquum</i>	Relict Trillium	Plant	E	1	0	0
<i>Urera kaalae</i>	Opuhe	Plant	E	1	0	0
<i>Zanthoxylum hawaiiense</i>	A`e	Plant	E	1	0	0
<i>Somateria fischeri</i>	Spectacled Eider	Bird	T	0	5	1
<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Bird	E	0	3	1
<i>Strix occidentalis caurina</i>	Northern Spotted Owl	Bird	T	0	3	0
<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	Bird	E	0	2	2
<i>Amblyopsis rosae</i>	Ozark Cavefish	Fish	T	0	2	0

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Polysticta stelleri</i>	Steller's Eider	Bird	T	0	2	0
<i>Salvelinus confluentus</i>	Bull Trout	Fish	T	0	2	0
<i>Scaphirhynchus albus</i>	Pallid Sturgeon	Fish	E	0	1	2
<i>Caretta caretta</i>	Loggerhead Sea Turtle	Reptile	T	0	1	1
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	Reptile	E	0	1	1
<i>Glaucidium brasilianum cactorum</i>	Cactus Ferruginous Pygmy Owl	Bird	E	0	1	1
<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	Reptile	E	0	1	1
<i>Spiranthes diluvialis</i>	Ute Ladies'-tresses	Plant	T	0	1	1
<i>Zapus hudsonius preblei</i>	Preble's Meadow Jumping Mouse	Mammal	T	0	1	1
<i>Brachyramphus marmoratus marmoratus</i>	Marbled Murrelet	Bird	T	0	1	0
<i>Cynomys parvidens</i>	Utah Prairie Dog	Mammal	T	0	1	0
<i>Cyprogenia stegaria</i>	Fanshell	Clam	E	0	1	0
<i>Dipodomys stephensi</i>	Stephen's Kangaroo Rat	Mammal	E	0	1	0
<i>Dromus dromas</i>	Dromedary Pearlymussel	Clam	E	0	1	0
<i>Epioblasma florentina walkeri</i>	Tan Riffleshell	Clam	E	0	1	0
<i>Etheostoma sellare</i>	Maryland Darter	Fish	E	0	1	0
<i>Lanius ludovicianus mearnsi</i>	San Clemente Loggerhead Shrike	Bird	E	0	1	0
<i>Meda fulgida</i>	Spikedace	Fish	T	0	1	0
<i>Onchorhynchus clarki henshawi</i>	Lahontian cutthroat trout	Fish	T	0	1	0
<i>Pelecanus occidentalis</i>	Brown Pelican	Bird	E	0	1	0
<i>Pseudocopaesodes eunus obscurus</i>	Carson Wandering Skipper	Insect	E	0	1	0
<i>Thalictrum cooleyi</i>	Cooley's Meadowrue	Plant	E	0	1	0
<i>Tiaroga cobitis</i>	Loach Minnow	Fish	T	0	1	0
<i>Trichechus manatus</i>	West Indian Manatee	Mammal	E	0	1	0
<i>Hymenoxys texana</i>	Texas Prairie Dawn-flower	Plant	E	0	0	3
<i>Paroreomyza maculata</i>	Oahu Creeper	Bird	E	0	0	3
<i>Anas wyvilliana</i>	Hawaiian Duck	Bird	E	0	0	2
<i>Lampsilis abrupta</i>	Pink Mucket Pearlymussel	Clam	E	0	0	2
<i>Manduca blackburni</i>	Blackburns Hawk Moth	Insect	E	0	0	2
<i>Sesbania tomentosa</i>	`Ohai	Plant	E	0	0	2
<i>Abutilon sandwicense</i>	None	Plant	E	0	0	1
<i>Aconitum noveboracense</i>	Northern Wild Monkshood	Plant	T	0	0	1
<i>Asclepias meadii</i>	Mead's Milkweed	Plant	T	0	0	1
<i>Caesalpinia kavaiense</i>	Uhiuhi	Plant	E	0	0	1
<i>Canis lupus baileyi</i>	Mexican Wolf	Mammal	EXPN	0	0	1
<i>Cicindela puritana</i>	Puritan Tiger Beetle	Insect	T	0	0	1
<i>Clematis morefieldii</i>	Morefield's Leather-flower	Plant	E	0	0	1
<i>Colubrina oppositifolia</i>	Kaulia	Plant	E	0	0	1
<i>Corvus hawaiiensis</i>	Hawaiian Crow	Bird	E	0	0	1

Scientific Name	Common Name	Taxon	Federal Status	Onsite	Contiguous	Potential
<i>Cyprinella caerulea</i>	Blue Shiner	Fish	T	0	0	1
<i>Desmocerus californicus dimorphus</i>	Valley Elderberry Longhorn Beetle	Insect	T	0	0	1
<i>Echinocereus fendleri var. kuenzleri</i>	Kuenzler Hedgehog Cactus	Plant	E	0	0	1
<i>Isodendron spp.</i>	Aupaka	Plant	E	0	0	1
<i>Lespedeza leptostachya</i>	Prairie Bush-clover	Plant	T	0	0	1
<i>Lindera melissifolia</i>	Pondberry	Plant	E	0	0	1
<i>Loxops coccineus coccineus</i>	Hawaii `Akepa	Bird	E	0	0	1
<i>Mustela nigripes</i>	Black-footed Ferret	Mammal	E	0	0	1
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Water Snake	Reptile	T	0	0	1
<i>Obovaria retusa</i>	Ring Pink Mussel	Clam	E	0	0	1
<i>Oreomystis mana</i>	Hawaii Creeper	Bird	E	0	0	1
<i>Phyllostegia kaalaensis</i>	None	Plant	E	0	0	1
<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback Pearly-mussel	Clam	E	0	0	1
<i>Pleurobema plenum</i>	Rough Pigtoe	Clam	E	0	0	1
<i>Polygyriscus virginianus</i>	Virginia Fringed Mountain Snail	Snail	E	0	0	1
<i>Psittirostra psittacea</i>	`O'u	Bird	E	0	0	1
<i>Puma concolor coryi</i>	Florida Panther	Mammal	E	0	0	1
<i>Puma concolor cougar</i>	Eastern Puma	Mammal	E	0	0	1
<i>Quadrula fragosa</i>	Winged Mapleleaf Mussel	Clam	E	0	0	1
<i>Rana capito sevosa</i>	Dusky Gopher Frog	Reptile	E	0	0	1
<i>Spiranthes delitescens</i>	Canelo Hills Ladies'-tresses	Plant	E	0	0	1
<i>Sterna dougallii dougallii</i>	Roseate Tern	Bird	E	0	0	1

Table 3. T & E onsite species occurrences, by geographic locality and taxon.

Locality	Taxon	Total	Locality Percentage
Continental US	Amphibian	11	6.1
	Arachnid	1	0.6
	Bird	77	42.5
	Clam	1	0.6
	Crustacean	3	1.7
	Fish	10	5.5
	Insect	9	5.0
	Mammal	19	10.5
	Plant	42	23.2
	Reptile	7	3.9
	Snail	1	0.6
	Continental US Total		181
Hawaii	Bird	15	11.8
	Mammal	4	3.1
	Plant	94	74.0
	Snail	14	11.0
Hawaiian Total		127	
Puerto Rico	Plant	1	50.0
	Reptile	1	50.0
Puerto Rican Total		2	
Grand Total		310	

Table 4. Counts of species occurrences, and of distinct species, found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their Heritage Global Status status.

Bolded numbers represent species occurrences that are both Federally listed and also deemed at high extinction risk by the alternative classification. Status symbols are as defined in the text.

Units Counted	Federal Status	Heritage Global Status						Grand Total
		1	2	3	4	5	None	
Species Occurrences	E	121	60	25	8	4	1	219
	T	4	22	17	45	3		91
	PE		1					1
	C	22	2	10				34
	T(S/A)				2	9		11
Species Occurrences Total		147	85	52	55	16	1	356
Distinct Species	E	98	33	7	2	1	1	142
	T	3	15	13	3	1		35
	PE		1					1
	C	17	2	5				24
	T(S/A)				1	1		2
Distinct Species Total		118	51	25	6	3	1	204

Table 5. Counts of species occurrences, and of distinct species, found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their IUCN extinction risk status.

Bolded numbers represent species occurrences that are both Federally listed and also deemed at high extinction risk by the alternative classification. Status symbols are as defined in the text.

Units Counted	Federal Status	IUCN Status						Grand Total
		EX	CR	EN	VU	NT*	None	
Species Occurrences	E	1	31	26	24	3	134	219
	T			2	14	2	73	91
	PE						1	1
	C			4	10	7	13	34
	T(S/A)				2		9	11
Species Occurrences Total		1	31	32	50	12	230	356
Distinct Species	E	1	20	12	8	2	99	142
	T			2	7	1	25	35
	PE						1	1
	C			3	7	2	12	24
	T(S/A)				1		1	2
Distinct Species Total		1	20	17	23	5	138	204
* NT = Near Threatened. The class includes LR/cd and LR/nt (1994 Categories and Criteria) and NT (2001 Categories and Criteria).								

Table 6. Counts of species occurrences found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their Heritage Subnational status.

Bolded numbers represent species occurrences that are both Federally listed and also deemed at high extinction risk by the alternative classification. Status symbols are as defined in the text.

Units Counted	Federal Status	Heritage Subnational Status							Grand Total
		0	1	2	3	4	5	None	
Species Occurrences	E	1	136	64	3			15	219
	T		17	50	20	1	3		91
	PE			1					1
	C		22	5	5	2			34
	T(S/A)				1	10			11
Species Occurrences Total		1	175	120	29	13	3	15	356

Table 7. Counts of species occurrences found onsite on installations (all taxa) within each Federal listing status, cross-classified with respect to their State listing or protection status.

Bolded numbers represent species occurrences that are both Federally listed and also legally protected under the alternative classification. Status symbols are as defined in the text.

Units Counted	Federal Status	State Status										Grand Total
		Endangered	Threatened	Highly Safeguarded	Protected	Candidate	Inventory Element	Rare	Species of Special Concern	Not Listed	No List	
Species Occurrences	E	186	5	2	3		2	1		14	6	219
	T	25	33		4	1			2	19	7	91
	PE										1	1
	C		3	1		19			4	4	3	34
	T(S/A)		1		2		1		2	3	2	11
Species Occurrences Total		211	42	3	9	20	3	1	8	40	19	356

Table 8. Attempts at contact, and the proportion of installations that responded to attempts for the monitoring survey.

A: Attempted

IMA Region	No	Yes	Proportion Attempted
ARNG	46	31	0.40
BRAC	1	5	0.83
Northeast	3	12	0.80
Northwest	5	15	0.75
Pacific	1	9	0.90
Southeast	1	15	0.94
Southwest	6	15	0.71
USAR	3		0.00
Grand Total	66	102	

B: Responded

IMA Region	No	Yes	Proportion Responding
ARNG	10	21	0.68
BRAC	3	2	0.40
Northeast	4	8	0.67
Northwest	8	7	0.47
Pacific	6	3	0.33
Southeast	8	7	0.47
Southwest	6	9	0.60
Grand Total	45	57	

Table 9. Counts of actively monitored vs. unmonitored (including “no data”) species occurrences vs. taxon for installations, by Federal status and location.

Federal Protection Status	Location	Taxon	Actively Monitored?			Grand Total	Percentage Monitored	
			No	Yes	No Data		Year 2000 Survey Data (No, Yes)	All Data
T & E	Onsite	Amphibian		4	7	11	100%	36%
		Arachnid			1	1		0%
		Bird	21	17	54	92	45%	18%
		Clam	1			1	0%	0%
		Crustacean		1	2	3	100%	33%
		Fish	2	3	5	10	60%	30%
		Insect	1	3	5	9	75%	33%
		Mammal	1	6	16	23	86%	26%
		Plant	2	8	127	137	80%	6%
		Reptile	3	3	2	8	50%	38%
		Snail			15	15		0%
	Onsite Total		31	45	234	310	59%	15%
	Contiguous	Amphibian	1			1	0%	0%
		Bird	14	3	24	41	18%	7%
		Clam		2	1	3	100%	67%
		Fish	4		8	12	0%	0%
		Insect	1		1	2	0%	0%
		Mammal	1	2	7	10	67%	20%
		Plant	1	1	3	5	50%	20%
		Reptile	3		1	4	0%	0%
	Contiguous Total		25	8	45	78	24%	10%
T & E Total			56	53	279	388	49%	14%
Other	Onsite	Amphibian		1		1	100%	100%
		Bird	13	3	30	46	19%	7%
		Crustacean			1	1		0%
		Fish		1		1	100%	100%
		Insect		1	1	2	100%	50%
		Mammal	1	2	8	11	67%	18%
		Plant	1	6	20	27	86%	22%
		Reptile	5	2	27	34	29%	6%
		Snail		1		1	100%	100%
	Onsite Total		20	17	87	124	46%	14%
	Contiguous	Bird	14		6	20	0%	0%
		Mammal			3	3		0%
		Reptile			1	1		0%
	Contiguous Total		14		10	24	0%	0%
Other Total			34	17	97	148	33%	11%
Grand Total			90	70	376	536	44%	13%

Table 10. Counts of actively monitored vs. unmonitored (including “no data”) species occurrences vs. taxon for installations, by State protection status and location.

State Protection Status	Location	Taxon	Actively Monitored?			Grand Total	Percentage Monitored	
			No	Yes	No Data		Year 2000 Survey Data (No, Yes)	All Data
Protected	Onsite	Amphibian		1		1	100%	100%
		Bird	24	15	55	94	38%	16%
		Clam	1			1	0%	0%
		Fish	2	4	1	7	67%	57%
		Insect		2		2	100%	100%
		Mammal	2	7	15	24	78%	29%
		Plant	3	6	114	123	67%	5%
		Reptile	5	5	8	18	50%	28%
		Snail			14	14		0%
		Onsite Total			37	40	207	284
	Contiguous	Bird	21	1	18	40	5%	3%
		Fish	4		3	7	0%	0%
		Insect	1			1	0%	0%
		Mammal	1	2	7	10	67%	20%
		Plant	1		3	4	0%	0%
		Reptile	3		2	5	0%	0%
		Contiguous Total			31	3	33	67
Protected Total			68	43	240	351	39%	12%
Other	Onsite	Amphibian		4	7	11	100%	36%
		Arachnid			1	1		0%
		Bird	10	5	29	44	33%	11%
		Crustacean		1	3	4	100%	25%
		Fish			4	4		0%
		Insect	1	2	6	9	67%	22%
		Mammal		1	9	10	100%	10%
		Plant		8	33	41	100%	20%
		Reptile	3		21	24	0%	0%
		Snail		1	1	2	100%	50%
Onsite Total			14	22	114	150	61%	15%
	Contiguous	Amphibian	1			1	0%	0%
		Bird	7	2	12	21	22%	10%
		Clam		2	1	3	100%	67%
		Fish			5	5		0%
		Insect			1	1		0%
		Mammal			3	3		0%
		Plant		1		1	100%	100%
Contiguous Total			8	5	22	35	38%	14%
Other Total			22	27	136	185	55%	15%
Grand Total			90	70	376	536	44%	13%

Table 11. Methods used for T & E species reported to be actively monitored on their installations, by taxon.

Some species on an installation may be monitored using more than one of these methods.

Taxon	Monitoring Activity	Total
Amphibian	Counts: Unspecified	2
	Habitat Monitoring: Unspecified	1
	Presence/Absence	3
	Reproduction: Unspecified	1
Amphibian Total		7
Bird	Banding	3
	Counts: Line Transect	1
	Counts: Point Counts	5
	Counts: USFS Protocol	1
	Habitat Monitoring: Unspecified	1
	Habitat Monitoring: USFWS Protocol	1
	Monitoring: Unspecified	2
	Monitoring: USFWS Protocol	2
	Nest Monitoring	12
	Research	4
	Survival: Unspecified	1
Bird Total		33
Clam	Active Search: USFWS Protocol	6
Clam Total		6
Crustacean	Monitoring: Unspecified	1
	Presence/Absence	1
	Research	1
Crustacean Total		3
Fish	Monitoring: Unspecified	1
	Presence/Absence	1
	Telemetry	1
Fish Total		3
Insect	Counts: Unspecified	1
	Monitoring: Unspecified	2
	Presence/Absence	1
Insect Total		4

Continued on next page.

Taxon	Monitoring Activity	Total
Mammal	Counts: Bat Counters	2
	Counts: Roost Counts	2
	Life-History	1
	Live Trapping	1
	Mist Netting	7
	Monitoring: Unspecified	2
	Presence/Absence	1
	Telemetry	1
Mammal Total		17
Plant	Active Search	5
	Counts: Unspecified	4
	Counts: USFWS Protocol	1
	Habitat Monitoring: Unspecified	1
	Introduction	1
	Monitoring: BLM Protocol	1
	Monitoring: Unspecified	1
	Presence/Absence	5
	Reproduction: Unspecified	1
Plant Total		20
Reptile	Active Search: USFWS Protocol	1
	Live Trapping	1
	Mark-Recapture	1
	Research	1
	Survival: Unspecified	1
Reptile Total		5
Snail	Presence/Absence	1
Snail Total		1
Grand Total		99

Table 12. Approximate amounts spent per installation in the previous fiscal year (1999-2000), as reported by interviewees on installations conducting active species monitoring.

Refer to Appendix E for the names of species monitored on each installation.

Installation	State	IMA Region	FWS Region	T & E Onsite	# Species Monitored	Amount Spent
Fort Hood	TX	Southwest	2	3	3	3000000
Fort Irwin	CA	Southwest	1	2	2	2000000
Fort Stewart	GA	Southeast	4	6	5	300000
Fort Hunter Liggett	CA	Southwest	1	5	7	250000
Fort Bliss	TX	Southwest	2	3	8	100000
Fort Gordon	GA	Southeast	4	3	3	100000
Fort Carson	CO	Northwest	6	3	5	90000
Fort Campbell	KY	Southeast	4	3	2	80000
Fort Sill	OK	Southwest	2	1	1	70000
Fort Pickett	VA	ARNG	5	3	2	65000
Fort Huachuca	AZ	Southwest	2	4	9	55000
MO ARNG HQ	MO	ARNG	3	0	3	50000
Aberdeen Proving Ground	MD	Northeast	5	3	2	50000
Camp Gruber	OK	ARNG	2	1	1	40000
STARC-HI	HI	ARNG	1	11	3	40000
Camp Blanding TS	FL	ARNG	4	7	1	35000
STARC-TX	TX	ARNG	2	2	2	30000
Pinon Canyon Maneuver Site	CO	Northwest	6	1	1	30000
White Sands Missile Range	NM	Southwest	2	5	2	30000
Camp Navajo	AZ	ARNG	2	1	1	20000
Fort Knox	KY	Southeast	4	3	2	20000
ARDEC (Picatinny)	NJ	Northeast	5	2	2	15000
Fort Eustis	VA	Northeast	5	1	1	10000
Sunny Point	NC	Southeast	4	7	2	6000
McAlester AAP	OK	Southwest	2	1	1	2000
Adelphi Army Research Lab	MD	Northeast	5	1	1	500
Camp Grafton	ND	ARNG	6	1	2	0
Fort Chaffee	AR	ARNG	4	2	1	0

References

- Army Magazine, *Green Book* at <http://www.USA.org/www/greenbook.nsf>.
- Bak, J., Sekscienski, S. and Woodson, W. 2002. *Installation Summaries from the FY 2000 Survey of Threatened and Endangered Species on Army Lands*. SFIM-AEC-EQ-TR-20018, U.S. Army Environmental Center Aberdeen Proving Ground, MD.
- Department of Defense. (2003). *Department of Defense Base Structure Report (A Summary of DoD's Real Property Inventory) Fiscal Year 2004 Baseline*.
http://www.defenselink.mil/pubs/20040910_2004BaseStructureReport.pdf.
- Evinger, W. R. 1998. *Directory of U.S. military bases worldwide* edited by William R. Evinger. 3rd ed. Oryx Press, Phoenix, Ariz.
- NatureServe (2004, August). Internet report. *Species of Concern (SOC) on Department of Defense Installations*. <http://www.natureserve.org/prodServices/speciesatRiskdod.jsp>.
- Rubenson, D., and Rand Corporation. 1999. *Does the Army have a national land use strategy?* Rand, Santa Monica, CA.
- Rubinoff, J., S. Sekscienski and B. Woodson (2004). *Installation Summaries from the 2003 Survey of Threatened and Endangered Species*. US Army Environmental Center. Report No. SFIM-AEC-TS-TR-2004005.
- Schreiber, E. R. and Reed, M. A. 1999. *Installation Summaries From the 1998 Survey of Threatened and Endangered Species on Army Lands*, CERL Technical Report 99/78, U.S. Army Construction Engineering Research Laboratory, Champaign, IL.
- Watland, A., J. Bak, S. Sekscienski and B. Woodson (2002). *Installation Summaries from the 2001 Survey of Threatened and Endangered Species*. US Army Environmental Center. Report No. SFIM-AEC-CD-TR-2002034.

Appendix A: Installations in the Study

Installations in the study, along with each installation's state, Installation Management Agency (IMA) region, former Major Command (MACOM), U. S. Fish and Wildlife Service (USFWS) region, and information on whether the installation was contacted for the monitoring survey, and whether a response was successfully obtained.

Installation	State	IMA Region (& National Guard)	Former MACOM	USFWS Region	Contact Attempted	Installation Responded
63rd RRC HQ	CA	USAR	USARC	1	No	
70th RRC HQ	WA	USAR	USARC	1	No	
81st RRC HQ	GA	USAR	USARC	4	No	
Aberdeen Proving Ground	MD	Northeast	AMC	5	Yes	Yes
Addicks Reservoir WTS	TX	ARNG	ARNG	2	No	
Adelphi Army Research Lab	MD	Northeast	AMC	5	Yes	Yes
Anniston Army Depot	AL	Southeast	AMC	4	Yes	No
ARDEC (Picatinny)	NJ	Northeast	AMC	5	Yes	Yes
Badger AAP	WI	Northwest	AMC	3	Yes	Yes
Barker Dam WTS	TX	ARNG	ARNG	2	No	
Blue Grass Army Depot	KY	Southeast	AMC	4	Yes	No
Camp Adair	OR	ARNG	ARNG	1	Yes	Yes
Camp Ashland	NE	ARNG	ARNG	6	No	
Camp Atterbury	IN	ARNG	ARNG	3	No	
Camp Barkeley	TX	ARNG	ARNG	2	No	
Camp Beauregard	LA	ARNG	ARNG	4	Yes	No
Camp Blanding TS	FL	ARNG	ARNG	4	Yes	Yes
Camp Bowie	TX	ARNG	ARNG	2	No	
Camp Bullis	TX	Southwest	MEDCOM	2	No	
Camp Crowder	MO	ARNG	ARNG	3	No	
Camp Grafton	ND	ARNG	ARNG	6	Yes	Yes
Camp Grayling	MI	ARNG	ARNG	3	Yes	No
Camp Gruber	OK	ARNG	ARNG	2	Yes	Yes
Camp Guernsey	WY	ARNG	ARNG	6	Yes	Yes
Camp Joseph T. Robinson	AR	ARNG	ARNG	4	Yes	Yes
Camp Murray	WA	ARNG	ARNG	1	Yes	No
Camp Navajo	AZ	ARNG	ARNG	2	Yes	Yes
Camp Perry	OH	ARNG	ARNG	3	No	
Camp Rilea	OR	ARNG	ARNG	1	Yes	Yes

Installation	State	IMA Region (& National Guard)	Former MACOM	USFWS Region	Contact Attempted	Installation Responded
Camp Ripley	MN	ARNG	ARNG	3	Yes	No
Camp Roberts TS	CA	ARNG	ARNG	1	No	
Camp San Luis Obispo	CA	ARNG	ARNG	1	No	
Camp Shelby	MS	ARNG	ARNG	4	Yes	No
Camp Smith	NY	ARNG	ARNG	5	Yes	Yes
Camp Williams	UT	ARNG	ARNG	6	No	
Catoosa Range TS	TN	ARNG	ARNG	4	No	
Cedar City Armory	UT	ARNG	ARNG	6	No	
Chas E. Kelly (Oakdale SPT FAC)	PA	Northeast	USARC	5	Yes	No
Chevak Armory	AK	ARNG	ARNG	7	No	
Clark County Training Area	NV	ARNG	ARNG	1	No	
Cornhusker AAP	NE	Northwest	AMC	6	No	
Deseret Chemical Depot	UT	Northwest	AMC	6	Yes	Yes
Devens RFTA	MA	Northeast	USARC	5	Yes	Yes
Dillingham Military Reservation	HI	Pacific	USARPAC	1	Yes	No
Dugway Proving Ground	UT	Northwest	ATEC	6	Yes	No
Elim Armory	AK	ARNG	ARNG	7	No	
Florence Military Reservation	AZ	ARNG	ARNG	2	No	
Fort A. P. Hill	VA	Northeast	MDW	5	Yes	No
Fort Belvoir	VA	Northeast	MDW	5	Yes	No
Fort Benning	GA	Southeast	TRADOC	4	Yes	No
Fort Bliss	TX	Southwest	TRADOC	2	Yes	Yes
Fort Bragg	NC	Southeast	FORSCOM	4	Yes	No
Fort Buchanan	PR	Southeast	USARSO	4	Yes	No
Fort Campbell	KY	Southeast	FORSCOM	4	Yes	Yes
Fort Carson	CO	Northwest	FORSCOM	6	Yes	Yes
Fort Chaffee	AR	ARNG	ARNG	4	Yes	Yes
Fort Dix	NJ	Northeast	FORSCOM	5	No	
Fort Drum	NY	Northeast	FORSCOM	5	No	
Fort Eustis	VA	Northeast	TRADOC	5	Yes	Yes
Fort Gordon	GA	Southeast	TRADOC	4	Yes	Yes
Fort Greely	AK	Pacific	USARPAC	7	Yes	Yes
Fort Harrison	MT	ARNG	ARNG	6	No	
Fort Hood	TX	Southwest	FORSCOM	2	Yes	Yes
Fort Huachuca	AZ	Southwest	TRADOC	2	Yes	Yes
Fort Hunter Liggett	CA	Southwest	USARC	1	Yes	Yes
Fort Irwin	CA	Southwest	FORSCOM	1	Yes	Yes
Fort Jackson	SC	Southeast	TRADOC	4	Yes	No
Fort Knox	KY	Southeast	TRADOC	4	Yes	Yes
Fort Leavenworth	KS	Northwest	TRADOC	6	No	
Fort Lee	VA	Northeast	TRADOC	5	Yes	No
Fort Leonard Wood	MO	Northwest	TRADOC	3	Yes	No
Fort Lewis	WA	Northwest	FORSCOM	1	Yes	No
Fort McClellan	AL	ARNG	ARNG	4	Yes	No

Installation	State	IMA Region (& National Guard)	Former MACOM	USFWS Region	Contact Attempted	Installation Responded
Fort McCoy	WI	Northwest	USARC	3	Yes	No
Fort Pickett	VA	ARNG	ARNG	5	Yes	Yes
Fort Polk	LA	Southwest	FORSCOM	4	Yes	No
Fort Richardson	AK	Pacific	USARPAC	7	Yes	Yes
Fort Riley	KS	Northwest	FORSCOM	6	Yes	No
Fort Rucker	AL	Southeast	TRADOC	4	Yes	Yes
Fort Ruger	HI	ARNG	ARNG	1	No	
Fort Sam Houston	TX	Southwest	MEDCOM	2	Yes	No
Fort Sill	OK	Southwest	TRADOC	2	Yes	Yes
Fort Stewart	GA	Southeast	FORSCOM	4	Yes	Yes
Fort Wainwright	AK	Pacific	USARPAC	7	Yes	Yes
Georgia ARNG TC	GA	ARNG	ARNG	4	No	
Hastings Training Site	NE	ARNG	ARNG	6	No	
Hawthorne AAP	NV	Southwest	AMC	1	No	
Hilo (Keaukaha Military Reserve)	HI	ARNG	ARNG	1	No	
Holston AAP	TN	Southeast	AMC	4	Yes	Yes
Ike Skelton Training Site	MO	ARNG	ARNG	3	No	
Indiana AAP	IN	BRAC	AMC	3	Yes	No
Iowa AAP	IA	Northwest	AMC	3	No	
Jefferson Proving Ground	IN	BRAC	AMC	3	Yes	No
Kahuku TA	HI	Pacific	USARPAC	1	Yes	No
Kanaio Weekend Training Site	HI	ARNG	ARNG	1	No	
Kansas AAP	KS	Northwest	AMC	6	No	
Kawailoa TA	HI	Pacific	USARPAC	1	Yes	No
Keaukaha Military Reservation	HI	ARNG	ARNG	1	No	
Kekaha WETS	HI	ARNG	ARNG	1	No	
Kwigillingok Armory	AK	ARNG	ARNG	7	No	
Leesburg TS	SC	ARNG	ARNG	4	Yes	No
Letterkenny Army Depot	PA	Northeast	AMC	5	Yes	Yes
Lil Aaron Straus Wilderness Area	MD	ARNG	ARNG	5	Yes	No
Lonestar AAP	TX	Southwest	AMC	2	No	
Longhorn AAP	TX	BRAC	AMC	2	No	
Louisiana AAP	LA	Southwest	AMC	4	No	
Macon Training Site	MO	ARNG	ARNG	3	No	
Makua Military Reservation	HI	Pacific	USARPAC	1	Yes	No
Marana SBAH Facilities	AZ	ARNG	ARNG	2	No	
McAlester AAP	OK	Southwest	AMC	2	Yes	Yes
Military Ocean Terminal - Bayonne	NJ	Northeast	MTMC	5	No	
MO ARNG HQ	MO	ARNG	ARNG	3	Yes	Yes
New Hampshire National Guard Training Site	NH	ARNG	ARNG	5	No	
Newport Chemical Activity	IN	Northwest	AMC	3	Yes	Yes
NH State Military Reservation	NH	ARNG	ARNG	5	Yes	Yes
Orchard Range TS	ID	ARNG	ARNG	1	No	

Installation	State	IMA Region (& National Guard)	Former MACOM	USFWS Region	Contact Attempted	Installation Responded
Parks RFTA	CA	Southwest	USARC	1	Yes	No
Perrine Reserve Center	FL	Southeast	USARC	4	No	
Pine Bluff Arsenal	AR	Southwest	AMC	4	Yes	Yes
Pinon Canyon Maneuver Site	CO	Northwest	FORSCOM	6	Yes	Yes
Pohakuloa TA	HI	Pacific	USARPAC	1	Yes	No
POM	CA	Southwest	TRADOC	1	No	
POM Annex	CA	Southwest	TRADOC	1	Yes	No
Pueblo Depot Activity	CO	Northwest	AMC	6	No	
Radford AAP	VA	Northeast	AMC	5	Yes	Yes
Ravenna AAP	OH	Northwest	AMC	3	Yes	Yes
Redstone Arsenal	AL	Southeast	AMC	4	Yes	No
Regional Training Institute	NH	ARNG	ARNG	5	Yes	Yes
Riverbank AAP	CA	Southwest	AMC	1	No	
Rock Island Arsenal	IL	Northwest	AMC	3	Yes	No
Rocky Mountain Arsenal	CO	BRAC	AMC	6	Yes	No
Salina Smokey Hill TA	KS	ARNG	ARNG	6	No	
Santa Cruz Armory	CA	ARNG	ARNG	1	No	
Savanna Army Depot	IL	BRAC	AMC	3	Yes	Yes
Schofield Barracks Military Reservation	HI	Pacific	USARPAC	1	Yes	No
Sea Girt TS	NJ	ARNG	ARNG	5	No	
Shaktoolik Armory	AK	ARNG	ARNG	7	No	
Sheridan LTA	WY	ARNG	ARNG	6	No	
Sierra Army Depot	CA	Southwest	AMC	1	Yes	No
St. George Armory	UT	ARNG	ARNG	6	No	
St. Michael Armory	AK	ARNG	ARNG	7	No	
STARC-AK	AK	ARNG	ARNG	7	No	
STARC-CA	CA	ARNG	ARNG	1	Yes	Yes
STARC-HI	HI	ARNG	ARNG	1	Yes	Yes
STARC-KS	KS	ARNG	ARNG	6	Yes	Yes
STARC-NE	NE	ARNG	ARNG	6	Yes	Yes
STARC-TX	TX	ARNG	ARNG	2	Yes	Yes
STARC-UT	UT	ARNG	ARNG	6	Yes	No
State Wide Regulatory	NV	ARNG	ARNG	1	Yes	Yes
Stead Training Site	NV	ARNG	ARNG	1	No	
Stebbins Armory	AK	ARNG	ARNG	7	No	
Sunflower AAP	KS	BRAC	AMC	6	Yes	Yes
Sunny Point	NC	Southeast	MTMC	4	Yes	Yes
Tooele Army Depot	UT	Northwest	AMC	6	Yes	No
Tripler Army Medical Center	HI	Pacific	USARPAC	1	No	
Truman Reservoir Training Site	MO	ARNG	ARNG	3	No	
TS Garrison	ND	ARNG	ARNG	6	No	
Tullahoma TS	TN	ARNG	ARNG	4	Yes	No
Twin Cities AAP	MN	Northwest	AMC	3	Yes	Yes

Installation	State	IMA Region (& National Guard)	Former MACOM	USFWS Region	Contact Attempted	Installation Responded
Ukumehame Firing Range	HI	ARNG	ARNG	1	No	
Unalakleet Armory	AK	ARNG	ARNG	7	No	
Volunteer AAP	TN	Southeast	AMC	4	Yes	No
Wendell H. Ford RTC	KY	ARNG	ARNG	4	Yes	Yes
West Point Military Reservation	NY	Northeast	USMA	5	Yes	Yes
White Sands Missile Range	NM	Southwest	ATEC	2	Yes	Yes
Wisconsin Military Academy	WI	ARNG	ARNG	3	No	
Yakima TC	WA	Northwest	FORSCOM	1	Yes	No
Yuma Proving Ground	AZ	Southwest	ATEC	2	Yes	No

Appendix B: Species Included in this Study

Species included in this study, the taxa they belong to, Federal listing status, and the number of species occurrences among the Army installations.

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Abutilon sandwicense</i>	None	Plant	E	1
<i>Achatinella apexfulva</i>	Pupu_Kuahiwi	Snail	E	1
<i>Achatinella byronii</i>	Pupu_Kuahiwi	Snail	E	2
<i>Achatinella curta</i>	Pupu_Kuahiwi	Snail	E	2
<i>Achatinella decipiens</i>	Pupu_Kuahiwi	Snail	E	2
<i>Achatinella leucorraphe</i>	Pupu_Kuahiwi	Snail	E	2
<i>Achatinella lila</i>	Pupu_Kuahiwi	Snail	E	1
<i>Achatinella livida</i>	Pupu_Kuahiwi	Snail	E	1
<i>Achatinella mustelina</i>	Pupu_Kuahiwi	Snail	E	2
<i>Achatinella pulcherrima</i>	Pupu_Kuahiwi	Snail	E	1
<i>Achatinella sowerbyana</i>	Pupu_Kuahiwi	Snail	E	3
<i>Acipenser brevirostrum</i>	Shortnose_Sturgeon	Fish	E	6
<i>Aconitum noveboracense</i>	Northern_Wild_Monkshood	Plant	T	1
<i>Alectryon macrococcus</i>	Mahoe	Plant	E	2
<i>Alligator mississippiensis</i>	American_Alligator	Reptile	T(S/A)	11
<i>Alsinidendron obovatum</i>	None	Plant	E	1
<i>Alsinidendron trinerve</i>	None	Plant	E	1
<i>Amaranthus pumilus</i>	Seabeach_Amaranth	Plant	T	2
<i>Amblyopsis rosae</i>	Ozark_Cavefish	Fish	T	2
<i>Ambystoma californiense</i>	California_Tiger_Salamander	Amphibian	T	4
<i>Ambystoma cingulatum</i>	Flatwoods_Salamander	Amphibian	T	1
<i>Ambystoma tigrinum stebbinsi</i>	Sonoran_Tiger_Salamander	Amphibian	E	1
<i>Anas wyvilliana</i>	Hawaiian_Duck	Bird	E	2
<i>Aphelocoma coerulescens</i>	Florida_Scrub-jay	Bird	T	1
<i>Apios priceana</i>	Price's_Potato_Bean	Plant	T	2
<i>Arctomecon humilis</i>	Dwarf_Bear_Poppy	Plant	E	3
<i>Asclepias meadii</i>	Mead's_Milkweed	Plant	T	1
<i>Asplenium fragile var. insulare</i>	Rhombic_Spleenwort	Plant	E	1
<i>Astragalus jaegerianus</i>	Lane_Mountain_Milk-vetch	Plant	E	1
<i>Bonamia menziesii</i>	None	Plant	E	1

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Brachyramphus marmoratus marmoratus</i>	Marbled_Murrelet	Bird	T	1
<i>Branchinecta lynchi</i>	Vernal_Pool_Fairy_Shrimp	Crustacean	T	3
<i>Branta (=Nesochen) sandvicensis</i>	Hawaiian_Goose	Bird	E	2
<i>Bufo californicus (=microscaphus)</i>	Arroyo_Southwestern_Toad	Amphibian	E	2
<i>Buteo solitarius</i>	Hawaiian_Hawk	Bird	E	3
<i>Caesalpinia kavaeense</i>	Uhiuhi	Plant	E	1
<i>Canis lupus</i>	Gray_Wolf	Mammal	T	2
<i>Canis lupus baileyi</i>	Mexican_Wolf	Mammal	EXPN	1
<i>Caretta caretta</i>	Loggerhead_Sea_Turtle	Reptile	T	2
<i>Cenchrus agrimonioides</i>	Kamanomano	Plant	E	1
<i>Centrocercus urophasianus phaios</i>	Western_Sage_Grouse	Bird	C	1
<i>Chamaesyce celastroides var. kaenana</i>	Akoko	Plant	E	1
<i>Chamaesyce deltoidea ssp. deltoidea</i>	Deltoid_Spurge	Plant	E	2
<i>Chamaesyce rockii</i>	Akoko	Plant	E	3
<i>Charadrius alexandrinus nivosus</i>	Western_Snowy_Plover	Bird	T	2
<i>Charadrius melodus</i>	Piping_Plover	Bird	T	7
<i>Chasiempis sandwichensis ibidis</i>	Oahu_Elepaio	Bird	E	4
<i>Chelonia mydas</i>	Green_Sea_Turtle	Reptile	T	2
<i>Chlorogalum purpureum var. purpureum</i>	Purple_Amole	Plant	T	3
<i>Chorizanthe pungens var. pungens</i>	Monterey_Spineflower	Plant	T	2
<i>Christella boydiae</i>	None	Plant	C	1
<i>Cicindela puritana</i>	Puritan_Tiger_Beetle	Insect	T	1
<i>Cicurina madla</i>	Madla's_Cave_Spider	Arachnid	E	2
<i>Cirsium fontinale var. obispoense</i>	Chorro_Creek_Bog_Thistle	Plant	E	2
<i>Clematis morefieldii</i>	Morefield's_Leather-flower	Plant	E	1
<i>Clemmys muhlenbergii</i>	Bog_Turtle	Reptile	T	3
<i>Colubrina oppositifolia</i>	Kaulia	Plant	E	1
<i>Corvus hawaiiensis</i>	Hawaiian_Crow	Bird	E	1
<i>Coryphantha sneedii var. sneedii</i>	Sneed_Pincushion_Cactus	Plant	E	1
<i>Ctenitis squamigera</i>	Pauoa	Plant	E	1
<i>Cyanea acuminata</i>	Haha	Plant	E	2
<i>Cyanea crispa</i>	Crimped_Rollandia	Plant	E	1
<i>Cyanea grimesiana ssp. grimesiana</i>	Haha	Plant	E	1
<i>Cyanea humboldtiana</i>	Haha	Plant	E	1
<i>Cyanea koolauensis</i>	Haha	Plant	E	3
<i>Cyanea st-johnii</i>	Haha	Plant	E	1
<i>Cyanea superba</i>	Haha	Plant	E	1
<i>Cynomys ludovicianus</i>	Black-tailed_Prairiedog	Mammal	C	10
<i>Cynomys parvidens</i>	Utah_Prairie_Dog	Mammal	T	1
<i>Cyperus trachysanthos</i>	Pu`uka`a	Plant	E	3
<i>Cyprinella caerulea</i>	Blue_Shiner	Fish	T	1
<i>Cyprogenia stegaria</i>	Fanshell	Clam	E	1
<i>Cyrtandra dentata</i>	Ha`iwale	Plant	E	2
<i>Cyrtandra subumbellata</i>	Ha`iwale	Plant	E	1

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Cyrtandra viridiflora</i>	Ha`iwale	Plant	E	1
<i>Delissea subcordata</i>	Oha	Plant	E	1
<i>Dendroica chrysoparia</i>	Golden-cheeked_Warbler	Bird	E	3
<i>Dendroica kirtlandii</i>	Kirtland's_Warbler	Bird	E	1
<i>Dermochelys coriacea</i>	Leatherback_Sea_Turtle	Reptile	E	2
<i>Desmocerus californicus dimorphus</i>	Valley_Elderberry_Longhorn_Beetle	Insect	T	1
<i>Diellia falcata</i>	None	Plant	E	2
<i>Dipodomys stephensi</i>	Stephen's_Kangaroo_Rat	Mammal	E	1
<i>Dromus dromas</i>	Dromedary_Pearlymussel	Clam	E	1
<i>Drymarchon corais couperi</i>	Eastern_Indigo_Snake	Reptile	T	3
<i>Dubautia herbstobatae</i>	Na`ena`e	Plant	E	1
<i>Echinacea laevigata</i>	Smooth_Coneflower	Plant	E	3
<i>Echinocactus horzonthalonius var. nicholii</i>	Nichol's_Turk's_Head_Cactus	Plant	E	1
<i>Echinocereus fendleri var. kuenzleri</i>	Kuenzler_Hedgehog_Cactus	Plant	E	1
<i>Empidonax traillii extimus</i>	Southwestern_Willow_Flycatcher	Bird	E	4
<i>Epicrates inornatus</i>	Puerto_Rican_Boa	Reptile	E	1
<i>Epioblasma florentina walkeri</i>	Tan_Riffleshell	Clam	E	1
<i>Erigeron basalticus</i>	Basalt_Daisy	Plant	C	1
<i>Erigeron lemmonii</i>	Lemmon_Fleabane	Plant	C	1
<i>Etheostoma cragini</i>	Arkansas_Darter	Fish	C	3
<i>Etheostoma sellare</i>	Maryland_Darter	Fish	E	1
<i>Eugenia koolauensis</i>	Nioi	Plant	E	1
<i>Euphilotes enoptes smithi</i>	Smith's_Blue_Butterfly	Insect	E	1
<i>Euphorbia haeleleana</i>	`Akoko	Plant	E	1
<i>Falco femoralis septentrionalis</i>	Northern_Aplomado_Falcon	Bird	E	2
<i>Fallicambarus gordonii</i>	Camp_Shelby_Burrowing_Crayfish	Crustacean	C	1
<i>Flueggea neowawraea</i>	Mehamehame	Plant	E	2
<i>Fulica americana alai</i>	Hawaiian_Coot	Bird	E	4
<i>Gallinula chloropus sandvicensis</i>	Hawaiian_Common_Moorhen	Bird	E	3
<i>Gardenia manni</i>	Nanu	Plant	E	3
<i>Gilia tenuiflora ssp. arenaria</i>	Monterey_Gilia	Plant	E	1
<i>Glaucidium brasilianum cactorum</i>	Cactus_Ferruginous_Pygmy_Owl	Bird	E	2
<i>Gopherus agassizii</i>	Desert_Tortoise	Reptile	T	3
			T(S/A)	2
<i>Gopherus polyphemus</i>	Gopher_Tortoise	Reptile	T	1
<i>Grus americana</i>	Whooping_Crane	Bird	E	6
<i>Gymnogyps californianus</i>	California_Condor	Bird	E	4
<i>Haliaeetus leucocephalus</i>	Bald_Eagle	Bird	T	70
<i>Haplostachys haplostachya</i>	Honohono	Plant	E	2
<i>Hedeoma todsenii</i>	Todsen's_Pennyroyal	Plant	E	2
<i>Hedyotis coriacea</i>	Kio`ele	Plant	E	1
<i>Hedyotis degeneri</i>	None	Plant	E	1
<i>Hedyotis fluvialis</i>	Kampua'a	Plant	C	1
<i>Hedyotis parvula</i>	None	Plant	E	1

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Helianthus eggertii</i>	Eggert's_Sunflower	Plant	T	1
<i>Helminthoglypta walkeriana</i>	Morro_Shoulderband_Snail	Snail	E	1
<i>Helonias bullata</i>	Swamp_Pink	Plant	T	1
<i>Hemignathus munroi</i>	`Akiapola`au	Bird	E	1
<i>Hesperia dacotae</i>	Dakota_Skipper_Butterfly	Insect	C	1
<i>Hesperomannia arborescens</i>	None	Plant	E	3
<i>Hibiscus brackenridgei</i>	Ma`o`Hau_Hele	Plant	E	2
<i>Himantopus mexicanus knudseni</i>	Hawaiian_Stilt	Bird	E	3
<i>Holocarpha macradenia</i>	Santa_Cruz_Tarplant	Plant	T	1
<i>Howellia aquatilis</i>	Water_Howellia	Plant	T	1
<i>Hymenoxys texana</i>	Texas_Prairie_Dawn-flower	Plant	E	3
<i>Isodendron laurifolium</i>	Aupaka	Plant	E	1
<i>Isodendron spp.</i>	Aupaka	Plant	E	1
<i>Isoetes louisianensis</i>	Louisiana_Quillwort	Plant	E	1
<i>Isotria medeoloides</i>	Small_Whorled_Pogonia	Plant	T	4
<i>Korthalsella degeneri</i>	Hulumoa	Plant	C	1
<i>Labordia cyrtandrae</i>	Kamakahala	Plant	E	1
<i>Lampsilis abrupta</i>	Pink_Mucket_Pearlymussel	Clam	E	2
<i>Lampsilis higginsii</i>	Higgins_Eye_Pearlymussel	Clam	E	2
<i>Lanius ludovicianus mearnsi</i>	San_Clemente_Loggerhead_Shrike	Bird	E	1
<i>Lasiurus cinereus semotus</i>	Hawaiian_Hoary_Bat	Mammal	E	7
<i>Lasthenia conjugens</i>	Contra_Costa_Goldfields	Plant	E	1
<i>Lepidium arbuscula</i>	`Anaunau	Plant	E	3
<i>Lepidium papilliferum</i>	Slick_Spot_Peppergrass	Plant	PE	1
<i>Lepidochelys kempii</i>	Kemp's_Ridley_Sea_Turtle	Reptile	E	2
<i>Leptonycteris curasoae yerbabuena</i>	Lesser_Long-nosed_Bat	Mammal	E	2
<i>Lespedeza leptostachya</i>	Prairie_Bush-clover	Plant	T	1
<i>Lilaeopsis schaffneriana var. recurva</i>	Huachuca_Water-umbel	Plant	E	1
<i>Lindera melissifolia</i>	Pondberry	Plant	E	1
<i>Lipochaeta tenuifolia</i>	Slender-leaved_Nehe	Plant	E	1
<i>Lobelia gaudichaudii ssp. koolauensis</i>	None	Plant	E	2
<i>Lobelia niihauensis</i>	None	Plant	E	2
<i>Lobelia oahuensis</i>	None	Plant	E	2
<i>Loxioides bailleui</i>	Palila	Bird	E	1
<i>Loxops coccineus coccineus</i>	Hawaii_`Akepa	Bird	E	1
<i>Lupinus oreganus var. kincaidii</i>	Kincaid's_Lupine	Plant	T	1
<i>Lycaeides melissa samuelis</i>	Karner_Blue_Butterfly	Insect	E	3
<i>Lycopodium nutans</i>	Wawae'iole	Plant	E	2
<i>Lysimachia asperulaefolia</i>	Rough-leaved_Loosestrife	Plant	E	4
<i>Manduca blackburni</i>	Blackburns_Hawk_Moth	Insect	E	2
<i>Marshallia mohrii</i>	Mohr's_Barbara's_Buttons	Plant	T	1
<i>Meda fulgida</i>	Spikedace	Fish	T	1
<i>Megalagrion xanthomelas</i>	Orangeblack_Hawaiian_Damselfly	Insect	C	1
<i>Melicope hiakae</i>	Alani	Plant	C	1

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Melicope lydgatei</i>	Lydgate's_Pelea	Plant	E	1
<i>Melicope makahae</i>	Alani	Plant	C	1
<i>Mustela nigripes</i>	Black-footed_Ferret	Mammal	E	1
<i>Mycteria americana</i>	Wood_Stork	Bird	E	4
<i>Myotis grisescens</i>	Gray_Bat	Mammal	E	14
<i>Myotis sodalis</i>	Indiana_Bat	Mammal	E	23
<i>Myrsine fosbergii</i>	Kolea	Plant	C	1
<i>Myrsine juddii</i>	Kolea	Plant	E	1
<i>Neonympha mitchellii francisci</i>	Saint_Francis'_Satyr	Insect	E	1
<i>Neraudia angulata</i>	None	Plant	E	2
<i>Neraudia ovata</i>	None	Plant	E	1
<i>Nerodia erythrogaster neglecta</i>	Copperbelly_Water_Snake	Reptile	T	1
<i>Nicrophorus americanus</i>	American_Burying_Beetle	Insect	E	5
<i>Nothocestrum latifolium</i>	'Alea	Plant	C	1
<i>Nototrichium humile</i>	Kulu`i	Plant	E	3
<i>Notropis topeka</i>	Topeka_Shiner	Fish	E	2
<i>Obovaria retusa</i>	Ring_Pink_Mussel	Clam	E	1
<i>Onchorhynchus clarki henshawi</i>	Lahontian_cutthroat_trout	Fish	T	1
<i>Oncorhynchus clarki stomias</i>	Greenback_Cutthroat_Trout	Fish	T	1
<i>Oncorhynchus mykiss</i>	Steelhead	Fish	T	4
<i>Oncorhynchus tshawytscha</i>	Chinook_Salmon	Fish	T	2
<i>Oreomystis mana</i>	Hawaii_Creeper	Bird	E	1
<i>Ottoschulzia rhodoxylon</i>	Palo_de_Rosa	Plant	E	1
<i>Palaemonias alabamae</i>	Alabama_Cave_Shrimp	Crustacean	E	1
<i>Panicum niihauense</i>	Lau'ehu	Plant	E	1
<i>Paroreomyza maculata</i>	Oahu_Creeper	Bird	E	3
<i>Pelecanus occidentalis</i>	Brown_Pelican	Bird	E	1
<i>Percina rex</i>	Roanoke_Log_Perch	Fish	E	1
<i>Phlegmariurus nutans</i>	Wawae'iole	Plant	E	1
<i>Phyllostegia hirsuta</i>	None	Plant	E	3
<i>Phyllostegia kaalaensis</i>	None	Plant	E	1
<i>Phyllostegia mollis</i>	Velvety_Phyllostegia	Plant	E	1
<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	12
<i>Piperia yadonii</i>	Yadon's_Piperia	Plant	E	2
<i>Pituophis melanoleucus lodingi</i>	Black_Pine_Snake	Reptile	C	1
<i>Pituophis ruthveni</i>	Louisiana_Pine_Snake	Reptile	C	1
<i>Plantago princeps</i>	Laukahi_kuahiwi	Plant	E	2
<i>Platydesma cornuta cornuta</i>	None	Plant	C	1
<i>Platydesma cornuta decurrens</i>	None	Plant	C	2
<i>Pleomele forbesii</i>	Hala_Pepe	Plant	C	2
<i>Plethobasus cooperianus</i>	Orangefoot_Pimpleback_Pearlymussel	Clam	E	1
<i>Pleurobema plenum</i>	Rough_Pigtoe	Clam	E	1
<i>Polygyriscus virginianus</i>	Virginia_Fringed_Mountain_Snail	Snail	E	1
<i>Polysticta stelleri</i>	Steller's_Eider	Bird	T	2

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Portulaca sclerocarpa</i>	Po`e	Plant	E	1
<i>Pritchardia kaalae</i>	Loulu	Plant	E	2
<i>Pseudocopaedes eunus obscurus</i>	Carson_Wandering_Skipper	Insect	E	1
<i>Psittirostra psittacea</i>	O`u	Bird	E	1
<i>Psychotria hexandra oahuensis</i>	Kopiko	Plant	C	1
<i>Pteralyxia macrocarpa</i>	Kaulu	Plant	C	3
<i>Pteris lidgatei</i>	Lydgate's_Brake	Plant	E	2
<i>Pterodroma phaeopygia sandwichensis</i>	Hawaiian_Dark-rumped_Petrel	Bird	E	1
<i>Ptilimnium nodosum</i>	Harperella	Plant	E	1
<i>Puma concolor coryi</i>	Florida_Panther	Mammal	E	1
<i>Puma concolor cougar</i>	Eastern_Puma	Mammal	E	1
<i>Pyrgulopsis thompsoni</i>	Huachuca_Springsnail	Snail	C	1
<i>Quadrula fragosa</i>	Winged_Mapleleaf_Mussel	Clam	E	1
<i>Rana aurora draytonii</i>	California_Red-legged_Frog	Amphibian	T	5
<i>Rana capito sevosia</i>	Dusky_Gopher_Frog	Reptile	E	1
<i>Rana chiricahuensis</i>	Chiricahua_Leopard_Frog	Amphibian	T	1
<i>Rana luteiventris</i>	Columbia_Spotted_Frog	Amphibian	C	1
<i>Rana pretiosa</i>	Oregon_Spotted_Frog	Amphibian	C	1
<i>Rhadine exilis</i>	None	Insect	E	1
<i>Rhadine infernalis</i>	None	Insect	E	1
<i>Rhododendron chapmanii</i>	Chapman_Rhododendron	Plant	E	1
<i>Rhus michauxii</i>	Michaux's_Sumac	Plant	E	2
<i>Salvelinus confluentus</i>	Bull_Trout	Fish	T	2
<i>Sanicula mariversa</i>	None	Plant	E	1
<i>Sanicula purpurea</i>	Purple-flowered_Sanicle	Plant	E	2
<i>Scaphirhynchus albus</i>	Pallid_Sturgeon	Fish	E	3
<i>Schiedea adamantis</i>	Diamond_Head_schiedea	Plant	E	2
<i>Schiedea hookeri</i>	None	Plant	E	2
<i>Schiedea kealiae</i>	Ma`oli`oli	Plant	E	1
<i>Schiedea nuttallii</i>	Nuttall_Schiedea	Plant	E	1
<i>Schwalbea americana</i>	American_Chaffseed	Plant	E	1
<i>Scutellaria montana</i>	Large-flowered_Skullcap	Plant	T	2
<i>Sesbania tomentosa</i>	O`hai	Plant	E	2
<i>Sidalcea nelsoniana</i>	Nelson's_Checker-mallow	Plant	T	1
<i>Silene hawaiiensis</i>	Sherff's_Catchfly	Plant	T	1
<i>Silene lanceolata</i>	Lanceolate_Catchfly	Plant	E	2
<i>Sistrurus catenatus catenatus</i>	Eastern_Massasauga	Reptile	C	1
<i>Solanum incompletum</i>	Popolo_Ku_Mai	Plant	E	1
<i>Solidago houghtonii</i>	Houghton's_Goldenrod	Plant	T	1
<i>Somateria fischeri</i>	Spectacled_Eider	Bird	T	6
<i>Spermolepis hawaiiensis</i>	Hawaiian_Spermolepis	Plant	E	2
<i>Speyeria zerene hippolyta</i>	Oregon_Silverspot_Butterfly	Insect	T	1
<i>Spiranthes delitescens</i>	Canelo_Hills_Ladies'-tresses	Plant	E	1
<i>Spiranthes diluvialis</i>	Ute_Ladies'-tresses	Plant	T	2

Scientific Name	Common Name	Taxon	Federal Status	Species Occurrences
<i>Stenogyne angustifolia</i>	None	Plant	E	1
<i>Sterna antillarum</i>	Least_Tern	Bird	E	11
<i>Sterna dougallii dougallii</i>	Roseate_Tern	Bird	E	1
<i>Strix occidentalis caurina</i>	Northern_Spotted_Owl	Bird	T	3
<i>Strix occidentalis lucida</i>	Mexican_Spotted_Owl	Bird	T	5
<i>Tetramolopium arenarium</i>	None	Plant	E	1
<i>Tetramolopium filiforme</i>	None	Plant	E	1
<i>Tetraplasandra gymnocarpa</i>	‘Ohe`ohe	Plant	E	3
<i>Thalictrum cooleyi</i>	Cooley's_Meadowrue	Plant	E	1
<i>Tiaroga cobitis</i>	Loach_Minnow	Fish	T	1
<i>Trichechus manatus</i>	West_Indian_Manatee	Mammal	E	1
<i>Trifolium stoloniferum</i>	Running_Buffalo_Clover	Plant	E	1
<i>Trillium reliquum</i>	Relict_Trillium	Plant	E	1
<i>Urera kaalae</i>	Opuhe	Plant	E	1
<i>Ursus americanus floridanus</i>	Florida_Black_Bear	Mammal	T(S/A)	1
<i>Viola chamissoniana ssp. chamissoniana</i>	Pamakani	Plant	E	2
<i>Viola oahuensis</i>	Forbes_Violet	Plant	E	2
<i>Vireo atricapillus</i>	Black-capped_Vireo	Bird	E	7
<i>Vireo bellii pusillus</i>	Least_Bell's_Vireo	Bird	E	4
<i>Vulpes macrotis mutica</i>	San_Joaquin_Kit_Fox	Mammal	E	4
<i>Xyris tennesseensis</i>	Tennessee_Yellow-eyed_Grass	Plant	E	2
<i>Zanthoxylum hawaiiense</i>	A`e	Plant	E	1
<i>Zanthoxylum oahuense</i>	A`e	Plant	C	2
<i>Zapus hudsonius preblei</i>	Preble's_Meadow_Jumping_Mouse	Mammal	T	2
Grand Total				617

Appendix C: Federal Listing Status and Rank

Federal listing status vs. Heritage Global Rank, and IUCN extinction risk class. See text for rank and class definitions.

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Achatinella apexfulva</i>	E	G1	1	CR	1
<i>Achatinella byronii</i>	E	G1	1	CR	2
<i>Achatinella curta</i>	E	G1	1	CR	1
<i>Achatinella decipiens</i>	E	G1	1	CR	2
<i>Achatinella leucorraphe</i>	E	G1	1	CR	2
<i>Achatinella lila</i>	E	G1	1	CR	1
<i>Achatinella livida</i>	E	G1	1	EX	1
<i>Achatinella mustelina</i>	E	G1	1	CR	1
<i>Achatinella pulcherrima</i>	E	G1	1	CR	1
<i>Achatinella sowerbyana</i>	E	G1	1	CR	2
<i>Acipenser brevirostrum</i>	E	G3	3	VU	3
<i>Alectryon macrococcus</i>	E	G1	1	NONE	2
<i>Alligator mississippiensis</i>	T(S/A)	G5	5	NONE	9
<i>Alsinidendron obovatum</i>	E	G1	1	NONE	1
<i>Alsinidendron trinerve</i>	E	G1	1	NONE	1
<i>Amaranthus pumilus</i>	T	G2	2	NONE	1
<i>Ambystoma californiense</i>	T	G2G3	2	VU	4
<i>Ambystoma cingulatum</i>	T	G2G3	2	VU	1
<i>Ambystoma tigrinum stebbinsi</i>	E	G5T1T2	1	NONE	1
<i>Aphelocoma coerulescens</i>	T	G3	3	VU	1
<i>Apios priceana</i>	T	G2	2	NONE	1
<i>Arctomecon humilis</i>	E	G1	1	NONE	1
<i>Asplenium fragile var. insulare</i>	E	G1	1	NONE	1
<i>Astragalus jaegerianus</i>	E	G1	1	NONE	1
<i>Bonamia menziesii</i>	E	G1	1	NONE	1
<i>Branchinecta lynchi</i>	T	G2G3	2	VU	2
<i>Branta (=Nesochen) sandvicensis</i>	E	G1	1	VU	2
<i>Bufo californicus (=microscaphus)</i>	E	G2G3	2	NONE	1

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Buteo solitarius</i>	E	G2	2	LR/nt	2
<i>Canis lupus</i>	T	G4	4	NONE	2
<i>Cenchrus agrimonoides</i>	E	G1	1	NONE	1
<i>Centrocercus urophasianus phaios</i>	C	G4T3Q	3	NONE	1
<i>Chamaesyce celastroides var. kaenana</i>	E	G3T1	1	NONE	1
<i>Chamaesyce deltoidea ssp. deltoidea</i>	E	G2T1	1	NONE	1
<i>Chamaesyce rockii</i>	E	G1	1	EN	1
<i>Charadrius alexandrinus nivosus</i>	T	G4T3	3	NONE	1
<i>Charadrius melodus</i>	T	G3	3	VU	3
<i>Chasiempis sandwichensis ibidis</i>	E	G3T1	1	VU	2
<i>Chelonia mydas</i>	T	G3	3	EN	1
<i>Chlorogalum purpureum var. purpureum</i>	T	G1T1	1	NONE	2
<i>Chorizanthe pungens var. pungens</i>	T	G2T2	2	NONE	2
<i>Christella boydiae</i>	C	G1	1	NONE	1
<i>Cicurina madla</i>	E	G1	1	NONE	1
<i>Cirsium fontinale var. obispoense</i>	E	G2T1	1	NONE	1
<i>Clemmys muhlenbergii</i>	T	G3	3	EN	1
<i>Coryphantha sneedii var. sneedii</i>	E	G2T2	2	NONE	1
<i>Ctenitis squamigera</i>	E	G1	1	NONE	1
<i>Cyanea acuminata</i>	E	G2	2	NONE	2
<i>Cyanea crispa</i>	E	G1	1	NONE	1
<i>Cyanea grimesiana ssp. grimesiana</i>	E	G1	1	NONE	1
<i>Cyanea humboldtiana</i>	E	G1	1	NONE	1
<i>Cyanea koolauensis</i>	E	G1	1	NONE	3
<i>Cyanea st-johnii</i>	E	G1	1	NONE	1
<i>Cyanea superba</i>	E	G1	1	NONE	1
<i>Cynomys ludovicianus</i>	C	G3G4	3	LR/nt	6
<i>Cyperus trachysanthos</i>	E	G1	1	NONE	1
<i>Cyrtandra dentata</i>	E	G1	1	NONE	1
<i>Cyrtandra subumbellata</i>	E	G1	1	NONE	1
<i>Cyrtandra viridiflora</i>	E	G1	1	NONE	1
<i>Delissea subcordata</i>	E	G1	1	NONE	1
<i>Dendroica chrysoparia</i>	E	G2	2	EN	2
<i>Dendroica kirtlandii</i>	E	G1	1	VU	1
<i>Diellia falcata</i>	E	G2	2	NONE	2
<i>Drymarchon corais couperi</i>	T	G4T3	3	NONE	2
<i>Dubautia herbstobatae</i>	E	G1	1	NONE	1
<i>Echinacea laevigata</i>	E	G2	2	NONE	2
<i>Echinocactus horizontalonius var. nicholii</i>	E	G4T2	2	NONE	1
<i>Epicrates inornatus</i>	E	.	3	LR/nt	1
<i>Erigeron basalticus</i>	C	G1	1	NONE	1
<i>Erigeron lemmonii</i>	C	G1	1	NONE	1

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Etheostoma cragini</i>	C	G3	3	LR/nt	1
<i>Eugenia koolauensis</i>	E	G1	1	EN	1
<i>Euphilotes enoptes smithi</i>	E	G5T1T2	1	NONE	1
<i>Euphorbia haeleeleana</i>	E	G1	1	EN	1
<i>Falco femoralis septentrionalis</i>	E	G4T2	2	NONE	2
<i>Fallicambarus gordonii</i>	C	G1	1	VU	1
<i>Flueggea neowawraea</i>	E	G1	1	CR	2
<i>Fulica americana alai</i>	E	G5	5	NONE	4
<i>Gallinula chloropus sandvicensis</i>	E	G5T2	2	NONE	1
<i>Gardenia mannii</i>	E	G1	1	CR	2
<i>Gilia tenuiflora ssp. arenaria</i>	E	G3?T2	2	NONE	1
<i>Gopherus agassizii</i>	T	G4	4	VU	2
	T(S/A)	G4	4	VU	2
<i>Gopherus polyphemus</i>	T	G3	3	VU	1
<i>Grus americana</i>	E	G1	1	EN	1
<i>Gymnogyps californianus</i>	E	G1	1	CR	1
<i>Haliaeetus leucocephalus</i>	T	G4	4	NONE	41
<i>Haplostachys haplostachya</i>	E	G1	1	NONE	1
<i>Hedeoma todsenii</i>	E	G2	2	NONE	1
<i>Hedyotis coriacea</i>	E	G1	1	NONE	1
<i>Hedyotis degeneri</i>	E	G1	1	NONE	1
<i>Hedyotis fluviatilis</i>	C	G1	1	NONE	1
<i>Hedyotis parvula</i>	E	G1	1	NONE	1
<i>Helianthus eggertii</i>	T	G3	3	NONE	1
<i>Helminthoglypta walkeriana</i>	E	G1	1	CR	1
<i>Helonias bullata</i>	T	G3	3	NONE	1
<i>Hemignathus munroi</i>	E	G1	1	EN	1
<i>Hesperia dacotae</i>	C	G2G3	2	VU	1
<i>Hesperomannia arborescens</i>	E	G1	1	CR	2
<i>Hibiscus brackenridgei</i>	E	G1	1	NONE	1
<i>Himantopus mexicanus knudseni</i>	E	G5T2	2	NONE	1
<i>Holocarpha macradenia</i>	T	G1	1	NONE	1
<i>Howellia aquatilis</i>	T	G2	2	NONE	1
<i>Isodendron laurifolium</i>	E	G1	1	NONE	1
<i>Isoetes louisianensis</i>	E	G2	2	NONE	1
<i>Isotria medeoloides</i>	T	G2	2	NONE	1
<i>Korthalsella degeneri</i>	C	G1Q	1	NONE	1
<i>Labordia cyrtandrae</i>	E	G1	1	NONE	1
<i>Lampsilis higginsii</i>	E	G1	1	EN	1
<i>Lasiurus cinereus semotus</i>	E	G5T2	2	NONE	4
<i>Lasthenia conjugens</i>	E	G1	1	NONE	1
<i>Lepidium arbuscula</i>	E	G1	1	NONE	3

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Lepidium papilliferum</i>	PE	G2	2	NONE	1
<i>Leptonycteris curasoae yerbabuena</i>	E	G4T3T4	3	VU	1
<i>Lilaeopsis schaffneriana</i> var. <i>recurva</i>	E	G4T2	2	NONE	1
<i>Lipochaeta tenuifolia</i>	E	G1	1	NONE	1
<i>Lobelia gaudichaudii</i> ssp. <i>koolauensis</i>	E	G1T1	1	NONE	1
<i>Lobelia niihauensis</i>	E	G2	2	NONE	2
<i>Lobelia oahuensis</i>	E	G1	1	NONE	1
<i>Loxioides bailleui</i>	E	G1	1	EN	1
<i>Lupinus oregonus</i> var. <i>kincaidii</i>	T	G5T2	2	NONE	1
<i>Lycaeides melissa samuelis</i>	E	G5T2	2	NONE	1
<i>Lycopodium nutans</i>	E	G1	1	NONE	2
<i>Lysimachia asperulaefolia</i>	E	G3	3	NONE	3
<i>Marshallia mohrii</i>	T	G3	3	NONE	1
<i>Megalagrion xanthomelas</i>	C	G1G3	1	VU	1
<i>Melicope hiiakae</i>	C	G1	1	NONE	1
<i>Melicope lydgatei</i>	E	G1	1	NONE	1
<i>Melicope makahae</i>	C	G1	1	EN	1
<i>Mycteria americana</i>	E	G4	4	NONE	4
<i>Myotis grisescens</i>	E	G3	3	EN	7
<i>Myotis sodalis</i>	E	G2	2	EN	8
<i>Myrsine fosbergii</i>	C	G1	1	VU	1
<i>Myrsine juddii</i>	E	G1	1	NONE	1
<i>Neonympha mitchellii francisci</i>	E	G1G2T1	1	NONE	1
<i>Neraudia angulata</i>	E	G1T1	1	NONE	1
<i>Neraudia ovata</i>	E	G1	1	CR	1
<i>Nicrophorus americanus</i>	E	G2G3	2	CR	3
<i>Nothoestrum latifolium</i>	C	G1	1	EN	1
<i>Nototrichium humile</i>	E	G2	2	NONE	2
<i>Notropis topeka</i>	E	G2	2	NONE	1
<i>Oncorhynchus clarki stomias</i>	T	G4T2T3	2	NONE	1
<i>Oncorhynchus mykiss</i>	T	G5	5	NONE	3
<i>Oncorhynchus tshawytscha</i>	T	G5T2Q	2	NONE	1
<i>Ottoschulzia rhodoxylon</i>	E	.	.	NONE	1
<i>Palaemonias alabamiae</i>	E	G1	1	EN	1
<i>Panicum niihauense</i>	E	G1	1	NONE	1
<i>Percina rex</i>	E	G1G2	1	VU	1
<i>Phlegmariurus nutans</i>	E	G1	1	NONE	1
<i>Phyllostegia hirsuta</i>	E	G1	1	NONE	2
<i>Phyllostegia mollis</i>	E	G1	1	NONE	1
<i>Picoides borealis</i>	E	G3	3	VU	9
<i>Piperia yadonii</i>	E	G1	1	NONE	1
<i>Pituophis ruthveni</i>	C	G3Q	3	NONE	1

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Plantago princeps</i>	E	G2T1	1	NONE	2
<i>Platydesma cornuta cornuta</i>	C	G1T1	1	NONE	1
<i>Platydesma cornuta decurrens</i>	C	G1T1	1	NONE	2
<i>Pleomele forbesii</i>	C	G1	1	EN	2
<i>Portulaca sclerocarpa</i>	E	G2	2	NONE	1
<i>Pritchardia kaalae</i>	E	G1	1	CR	1
<i>Psychotria hexandra oahuensis</i>	C	G2T1	1	NONE	1
<i>Pteralyxia macrocarpa</i>	C	G1	1	VU	3
<i>Pteris lidgatei</i>	E	G1	1	NONE	2
<i>Pterodroma phaeopygia sandwichensis</i>	E	G2T2	2	CR	1
<i>Ptilimnium nodosum</i>	E	G2	2	NONE	1
<i>Pyrgulopsis thompsoni</i>	C	G2	2	VU	1
<i>Rana aurora draytonii</i>	T	G4T2T3	2	NONE	3
<i>Rana chiricahuensis</i>	T	G3	3	NONE	1
<i>Rhadine exilis</i>	E	G1	1	NONE	1
<i>Rhadine infernalis</i>	E	G1G2	1	NONE	1
<i>Rhododendron chapmanii</i>	E	G1	1	NONE	1
<i>Rhus michauxii</i>	E	G2	2	NONE	2
<i>Sanicula marivera</i>	E	G1	1	NONE	1
<i>Sanicula purpurea</i>	E	G1	1	NONE	2
<i>Schiedea adamantis</i>	E	G1	1	NONE	1
<i>Schiedea hookeri</i>	E	G1	1	NONE	1
<i>Schiedea kealiae</i>	E	G1	1	NONE	1
<i>Schiedea nuttallii</i>	E	G1	1	NONE	1
<i>Schwalbea americana</i>	E	G2	2	NONE	1
<i>Scutellaria montana</i>	T	G2	2	NONE	1
<i>Sidalcea nelsoniana</i>	T	G2	2	NONE	1
<i>Silene hawaiiensis</i>	T	G2	2	NONE	1
<i>Silene lanceolata</i>	E	G1	1	NONE	2
<i>Sistrurus catenatus catenatus</i>	C	G3G4 T3T4	3	NONE	1
<i>Solanum incompletum</i>	E	G1	1	NONE	1
<i>Solidago houghtonii</i>	T	G3	3	NONE	1
<i>Spermolepis hawaiiensis</i>	E	G2	2	NONE	2
<i>Speyeria zerene hippolyta</i>	T	G5T1	1	NONE	1
<i>Stenogyne angustifolia</i>	E	G2	2	NONE	1
<i>Sterna antillarum</i>	E	G4	4	NONE	4
<i>Strix occidentalis lucida</i>	T	G3T3	3	LR/nt	2
<i>Tetramolopium arenarium</i>	E	G1	1	NONE	1
<i>Tetramolopium filiforme</i>	E	G1	1	NONE	1
<i>Tetraplasandra gymnocarpa</i>	E	G1	1	CR	3
<i>Trifolium stoloniferum</i>	E	G3	3	NONE	1

Scientific Name	Federal Status	Heritage Global Status	Rounded Heritage Global Status	IUCN Status	Species Occurrences
<i>Trillium reliquum</i>	E	G2	2	NONE	1
<i>Urera kaalae</i>	E	G1	1	CR	1
<i>Viola chamissoniana ssp. chamissoniana</i>	E	G4T1	1	NONE	2
<i>Viola oahuensis</i>	E	G1	1	NONE	1
<i>Vireo atricapillus</i>	E	G2G3	2	VU	5
<i>Vulpes macrotis mutica</i>	E	G4T2T3	2	NONE	1
<i>Xyris tennesseensis</i>	E	G2	2	NONE	2
<i>Zanthoxylum hawaiiense</i>	E	G1	1	EN	1
<i>Zanthoxylum oahuense</i>	C	G1	1	VU	2
<i>Grand Total</i>					356

Appendix D: Federal Listing Status, Heritage Subnational Rank, and State Status

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
<i>Achatinella apexfulva</i>	E	HI	S1.1	1	E	1
<i>Achatinella byronii</i>	E	HI	S1.1	1	E	2
<i>Achatinella curta</i>	E	HI	S1.1	1	E	1
<i>Achatinella decipiens</i>	E	HI	S1.1	1	E	2
<i>Achatinella leucorraphe</i>	E	HI	S1.1	1	E	2
<i>Achatinella lila</i>	E	HI	S1.1	1	E	1
<i>Achatinella livida</i>	E	HI	S1.1	1	E	1
<i>Achatinella mustelina</i>	E	HI	S1.3	1	E	1
<i>Achatinella pulcherrima</i>	E	HI	S1.3	1	E	1
<i>Achatinella sowerbyana</i>	E	HI	S1.3	1	E	2
<i>Acipenser brevirostrum</i>	E	GA	S2	2	E	1
		MD	S1	1	E	1
		NY	S1	1	E	1
<i>Alectryon macrococcus</i>	E	HI	S?	.	E	2
<i>Alligator mississippiensis</i>	T(S/A)	AL	S4	4	.	2
		AR	S4	4	Inventory Element	1
		FL	S4	4	SoSC	1
		GA	S4	4	SoSC	1
		MS	S4	4	Not Listed	1
		NC	S3	3	T	1
		TX	S4	4	Not Listed	2
<i>Alsinidendron obovatum</i>	E	HI	S1.2	1	E	1
<i>Alsinidendron trinerve</i>	E	HI	S1.2	1	E	1
<i>Amaranthus pumilus</i>	T	NJ	S1	1	E	1
<i>Ambystoma californiense</i>	T	CA	S2S3	2	Not Listed	4
<i>Ambystoma cingulatum</i>	T	GA	S2	2	T	1
<i>Ambystoma tigrinum stebbinsi</i>	E	AZ	S1S2	1	.	1
<i>Aphelocoma coerulescens</i>	T	FL	S3	3	T	1
<i>Apios priceana</i>	T	AL	S2	2	.	1
<i>Arctomecon humilis</i>	E	UT	S1	1	Not Listed	1

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
<i>Asplenium fragile var. insulare</i>	E	HI	S1.2	1	E	1
<i>Astragalus jaegerianus</i>	E	CA	S1.1	1	Not Listed	1
<i>Bonamia menziesii</i>	E	HI	S1.1	1	E	1
<i>Branchinecta lynchi</i>	T	CA	S2S3	2	Not Listed	2
<i>Branta (=Nesochen) sandvicensis</i>	E	HI	S1.3	1	E	2
<i>Bufo californicus (=microscaphus)</i>	E	CA	S2S3	2	Not Listed	1
<i>Buteo solitarius</i>	E	HI	S2.3	2	E	2
<i>Canis lupus</i>	T	MN	S3	3	SoSC	1
		WI	S2	2	T	1
<i>Cenchrus agrimonioides</i>	E	HI	S?	.	E	1
<i>Centrocercus urophasianus phaios</i>	C	WA	S3	3	T	1
<i>Chamaesyce celastroides var. kaenana</i>	E	HI	S1.2	1	E	1
<i>Chamaesyce deltoidea ssp. deltoidea</i>	E	GA	.	.	Not Listed	1
<i>Chamaesyce rockii</i>	E	HI	S1.2	1	E	1
<i>Charadrius alexandrinus nivosus</i>	T	CA	S2	2	Not Listed	1
<i>Charadrius melodus</i>	T	KS	S1B,S1N	1	T	1
		ND	S1S2	1	.	1
		NJ	S1B	1	E	1
<i>Chasiempis sandwichensis ibidis</i>	E	HI	S1	1	E	2
<i>Chelonia mydas</i>	T	NC	S1B,SZN	1	T	1
<i>Chlorogalum purpureum var. purpureum</i>	T	CA	S1.1	1	Not Listed	2
<i>Chorizanthe pungens var. pungens</i>	T	CA	S2.2	2	Not Listed	2
<i>Christella boydiae</i>	C	HI	S1.1	1	C	1
<i>Cicurina madla</i>	E	TX	S1	1	Not Listed	1
<i>Cirsium fontinale var. obispoense</i>	E	CA	S1.2	1	E	1
<i>Clemmys muhlenbergii</i>	T	NJ	S2	2	E	1
<i>Coryphantha sneedii var. sneedii</i>	E	TX	S2	2	E	1
<i>Ctenitis squamigera</i>	E	HI	S1.2	1	E	1
<i>Cyanea acuminata</i>	E	HI	S2.2	2	E	2
<i>Cyanea crispa</i>	E	HI	S1.1	1	E	1
<i>Cyanea grimesiana ssp. grimesiana</i>	E	HI	S1.3	1	E	1
<i>Cyanea humboldtiana</i>	E	HI	S1	1	E	1
<i>Cyanea koolauensis</i>	E	HI	S1.3	1	E	3
<i>Cyanea st-johnii</i>	E	HI	S1.2	1	E	1
<i>Cyanea superba</i>	E	HI	S?	.	E	1
<i>Cynomys ludovicianus</i>	C	CO	S4	4	SoSC	2
		MT	S3S4	3	SoSC	1
		OK	S3	3	SoSC	1
		TX	S3	3	Not Listed	1
		WY	S2S3	2	.	1
<i>Cyperus trachysanthos</i>	E	HI	S1.2	1	E	1

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
<i>Cyrtandra dentata</i>	E	HI	S1.1	1	E	1
<i>Cyrtandra subumbellata</i>	E	HI	S1.2	1	E	1
<i>Cyrtandra viridiflora</i>	E	HI	S1.1	1	E	1
<i>Delissea subcordata</i>	E	HI	S1.3	1	E	1
<i>Dendroica chrysoparia</i>	E	TX	S2B	2	E	2
<i>Dendroica kirtlandii</i>	E	MI	S1	1	E	1
<i>Diellia falcata</i>	E	HI	S2.2	2	E	2
<i>Drymarchon corais couperi</i>	T	FL	S3	3	T	1
		GA	S3	3	T	1
<i>Dubautia herbstobatae</i>	E	HI	S1.2	1	E	1
<i>Echinacea laevigata</i>	E	SC	S1	1	E	2
<i>Echinocactus horizonthalonius var. nicholii</i>	E	AZ	S2	2	Highly Safeguarded	1
<i>Epicrates inornatus</i>	E	PR	.	.	.	1
<i>Erigeron basalticus</i>	C	WA	S1	1	T	1
<i>Erigeron lemmonii</i>	C	AZ	S1	1	Highly Safeguarded	1
<i>Etheostoma cragini</i>	C	CO	S2	2	T	1
<i>Eugenia koolauensis</i>	E	HI	S1.1	1	E	1
<i>Euphilotes enoptes smithi</i>	E	CA	S2	2	Not Listed	1
<i>Euphorbia haeleeeleana</i>	E	HI	S1.3	1	E	1
<i>Falco femoralis septentrionalis</i>	E	NM	SHB,S1N	0	E	1
		TX	S1	1	E	1
<i>Fallicambarus gordonii</i>	C	MS	S1	1	Not Listed	1
<i>Flueggea neowawraea</i>	E	HI	S1.2	1	E	2
<i>Fulica americana alai</i>	E	HI	S?	.	E	4
<i>Gallinula chloropus sandvicensis</i>	E	HI	S2.1	2	E	1
<i>Gardenia mannii</i>	E	HI	S1.3	1	E	2
<i>Gilia tenuiflora ssp. arenaria</i>	E	CA	S2.2	2	T	1
<i>Gopherus agassizii</i>	T	CA	S2	2	T	1
		NV	S3	3	Protected	1
	T(S/A)	AZ	S4	4	Protected	2
<i>Gopherus polyphemus</i>	T	MS	S2	2	Protected	1
<i>Grus americana</i>	E	TX	S1	1	E	1
<i>Gymnogyps californianus</i>	E	CA	S1	1	E	1
<i>Haliaeetus leucocephalus</i>	T	AL	S3B	3	Protected	1
		AZ	S2S3B,S4N	2	.	1
		CA	S2	2	E	2
		CO	S1B,S3N	1	T	2
		FL	S3	3	T	1
		GA	S2	2	E	3

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
		IL	S2B,S3N	2	T	2
		IN	S2	2	E	1
		KS	S1B,S4N	1	T	2
		KY	S1S2B, S2S3N	1	T	1
		MD	S2S3B,S3N	2	T	2
		MI	S4	4	T	1
		MN	S3	3	SoSC	1
		MO	S2	2	E	5
		NC	S3B,S3N	3	E	1
		NJ	S1B,S2N	1	E	1
		NV	S1B	1	Protected	1
		NY	S2S3B,S2N	2	T	1
		OH	S2	2	E	1
		OR	S3B,S4N	3	T	1
		TX	S3B,S3N	3	T	2
		VA	S2B,S3N	2	E	4
		WA	S3S4B,S4N	3	T	2
		WI	S2N,S3B	2	Not Listed	1
		WY	S2B,S3N	2	.	1
<i>Haplostachys haplostachya</i>	E	HI	S1.3	1	E	1
<i>Hedeoma todsenii</i>	E	NM	S2	2	E	1
<i>Hedyotis coriacea</i>	E	HI	S1.1	1	E	1
<i>Hedyotis degeneri</i>	E	HI	SNR	.	E	1
<i>Hedyotis fluviatilis</i>	C	HI	S1.2	1	C	1
<i>Hedyotis parvula</i>	E	HI	S1.1	1	E	1
<i>Helianthus eggertii</i>	T	TN	S3	3	T	1
<i>Helminthoglypta walkeriana</i>	E	CA	S1	1	Not Listed	1
<i>Helonias bullata</i>	T	VA	S2S3	2	E	1
<i>Hemignathus munroi</i>	E	HI	S1.3	1	E	1
<i>Hesperia dacotae</i>	C	ND	S2	2	.	1
<i>Hesperomannia arborescens</i>	E	HI	S1.3	1	E	2
<i>Hibiscus brackenridgei</i>	E	HI	S1	1	E	1
<i>Himantopus mexicanus knudseni</i>	E	HI	S2.2	2	E	1
<i>Holocarpha macradenia</i>	T	CA	S1.1	1	E	1
<i>Howellia aquatilis</i>	T	WA	S2	2	T	1
<i>Isodendron laurifolium</i>	E	HI	S1.2	1	E	1
<i>Isoetes louisianensis</i>	E	MS	S2	2	Not Listed	1
<i>Isotria medeoloides</i>	T	VA	S2	2	E	1
<i>Korthalsella degeneri</i>	C	HI	S1.1	1	C	1
<i>Labordia cyrtandrae</i>	E	HI	S1.1	1	E	1

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
<i>Lampsilis higginsii</i>	E	IL	S1	1	E	1
<i>Lasiurus cinereus semotus</i>	E	HI	S2.2	2	E	4
<i>Lasthenia conjugens</i>	E	CA	S1.1	1	NotListed	1
<i>Lepidium arbuscula</i>	E	HI	S1.2	1	E	3
<i>Lepidium papilliferum</i>	PE	ID	S2	2	.	1
<i>Leptonycteris curasoae yerbabuenae</i>	E	AZ	S2	2	Protected	1
<i>Lilaeopsis schaffneriana var. recurva</i>	E	AZ	S2	2	Highly Safeguarded	1
<i>Lipochaeta tenuifolia</i>	E	HI	S1.3	1	E	1
<i>Lobelia gaudichaudii ssp. koolauensis</i>	E	HI	S1.1	1	E	1
<i>Lobelia niihauensis</i>	E	HI	S2.1	2	E	2
<i>Lobelia oahuensis</i>	E	HI	S1.3	1	E	1
<i>Loxioides bailleui</i>	E	HI	S1.2	1	E	1
<i>Lupinus oregonus var. kincaidii</i>	T	OR	S2	2	T	1
<i>Lycaeides melissa samuelis</i>	E	WI	S2S3	2	Not Listed	1
<i>Lycopodium nutans</i>	E	HI	S1.1	1	E	2
<i>Lysimachia asperulaefolia</i>	E	NC	S3	3	E	2
		SC	S1	1	E	1
<i>Marshallia mohrii</i>	T	AL	S3	3	.	1
<i>Megalagrion xanthomelas</i>	C	HI	S1S3	1	C	1
<i>Melicope hiiakae</i>	C	HI	S1	1	C	1
<i>Melicope lydgatei</i>	E	HI	S1.1	1	E	1
<i>Melicope makahae</i>	C	HI	S1.1	1	C	1
<i>Mycteria americana</i>	E	FL	S2	2	E	1
		GA	S2	2	E	3
<i>Myotis grisescens</i>	E	AL	S2	2	Protected	2
		IN	S1	1	E	1
		KY	S2	2	E	2
		MO	S3	3	E	1
		TN	S2	2	E	1
<i>Myotis sodalis</i>	E	IA	S1	1	E	1
		IN	S1	1	E	3
		KY	S1S2	1	E	2
		MO	S1	1	E	1
		NJ	S1	1	E	1
<i>Myrsine fosbergii</i>	C	HI	S1.2	1	C	1
<i>Myrsine juddii</i>	E	HI	S1.2	1	E	1
<i>Neonympha mitchellii francisci</i>	E	NC	S1	1	Rare	1
<i>Neraudia angulata</i>	E	HI	S1.2	1	E	1
<i>Neraudia ovata</i>	E	HI	S1.1	1	E	1
<i>Nicrophorus americanus</i>	E	AR	S?	.	Inventory_	1

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
					Element	
		OK	S1	1	E	2
<i>Nothoctrum latifolium</i>	C	HI	S1.3	1	C	1
<i>Nototrichium humile</i>	E	HI	S2.1	2	E	2
<i>Notropis topeka</i>	E	KS	S2	2	T	1
<i>Oncorhynchus clarki stomias</i>	T	CO	S2	2	T	1
<i>Oncorhynchus mykiss</i>	T	CA	S5	5	Not Listed	2
		WA	S5	5	Not Listed	1
<i>Oncorhynchus tshawytscha</i>	T	WA	S3S4	3	C	1
<i>Ottoschulzia rhodoxylon</i>	E	PR	.	.	.	1
<i>Palaemonias alabamae</i>	E	AL	S1	1	.	1
<i>Panicum niihauense</i>	E	HI	S1.1	1	E	1
<i>Percina rex</i>	E	VA	S1S2	1	E	1
<i>Phlegmariurus nutans</i>	E	HI	S1.1	1	E	1
<i>Phyllostegia hirsuta</i>	E	HI	S1.2	1	E	2
<i>Phyllostegia mollis</i>	E	HI	S1.2	1	E	1
<i>Picoides borealis</i>	E	FL	S2	2	T	1
		GA	S2	2	E	3
		LA	S2	2	E	1
		NC	S2	2	E	2
		SC	S2	2	E	2
<i>Piperia yadonii</i>	E	CA	S1.1	1	Not Listed	1
<i>Pituophis ruthveni</i>	C	LA	S2S3	2	Not Listed	1
<i>Plantago princeps</i>	E	HI	S1.1	1	E	2
<i>Platydesma cornuta cornuta</i>	C	HI	S1.1	1	C	1
<i>Platydesma cornuta decurrens</i>	C	HI	S1	1	C	2
<i>Pleomele forbesii</i>	C	HI	S1.3	1	C	2
<i>Portulaca sclerocarpa</i>	E	HI	S2.3	2	E	1
<i>Pritchardia kaalae</i>	E	HI	S1.2	1	E	1
<i>Psychotria hexandra oahuensis</i>	C	HI	S1.1	1	C	1
<i>Pteralyxia macrocarpa</i>	C	HI	S1	1	C	3
<i>Pteris lidgatei</i>	E	HI	S1.1	1	E	2
<i>Pterodroma phaeopygia sandwichensis</i>	E	HI	S2.1	2	E	1
<i>Ptilimnium nodosum</i>	E	MD	S1	1	E	1
<i>Pyrgulopsis thompsoni</i>	C	AZ	S2	2	.	1
<i>Rana aurora draytonii</i>	T	CA	S2S3	2	Not Listed	3
<i>Rana chiricahuensis</i>	T	AZ	S3	3	.	1
<i>Rhadine exilis</i>	E	TX	S1	1	Not Listed	1
<i>Rhadine infernalis</i>	E	TX	S1	1	Not Listed	1
<i>Rhododendron chapmanii</i>	E	FL	S1	1	E	1
<i>Rhus michauxii</i>	E	NC	S2	2	E	1

Scientific Name	Federal Status	State	Heritage Subnational Rank	Rounded Heritage Subnational Rank	State Status	Species Occurrences
		VA	S1	1	Not Listed	1
<i>Sanicula marivera</i>	E	HI	S1.1	1	E	1
<i>Sanicula purpurea</i>	E	HI	S1.2	1	E	2
<i>Schiedea adamantis</i>	E	HI	S1.1	1	E	1
<i>Schiedea hookeri</i>	E	HI	S1.2	1	E	1
<i>Schiedea kealiae</i>	E	HI	S1.2	1	E	1
<i>Schiedea nuttallii</i>	E	HI	S1.2	1	E	1
<i>Schwalbea americana</i>	E	NC	S1	1	E	1
<i>Scutellaria montana</i>	T	TN	S2	2	E	1
<i>Sidalcea nelsoniana</i>	T	OR	S2	2	T	1
<i>Silene hawaiiensis</i>	T	HI	S2.2	2	T	1
<i>Silene lanceolata</i>	E	HI	S1.1	1	E	2
<i>Sistrurus catenatus catenatus</i>	C	MI	S3S4	3	Not Listed	1
<i>Solanum incompletum</i>	E	HI	S1	1	E	1
<i>Solidago houghtonii</i>	T	MI	S3	3	T	1
<i>Spermolepis hawaiiensis</i>	E	HI	S2.2	2	E	2
<i>Speyeria zerene hippolyta</i>	T	OR	S1	1	Not Listed	1
<i>Stenogyne angustifolia</i>	E	HI	S2.2	2	E	1
<i>Sterna antillarum</i>	E	AR	S2	2	Inventory_ Element	1
		KS	S1B	1	E	1
		MD	S2B	2	T	1
		NE	S2	2	E	1
<i>Strix occidentalis lucida</i>	T	AZ	S3S4	3	.	1
		CO	S1B,SUN	1	T	1
<i>Tetramolopium arenarium</i>	E	HI	S?	.	E	1
<i>Tetramolopium filiforme</i>	E	HI	S?	.	E	1
<i>Tetraplasandra gymnocarpa</i>	E	HI	S1.2	1	E	3
<i>Trifolium stoloniferum</i>	E	KY	S2S3	2	E	1
<i>Trillium reliquum</i>	E	GA	S2	2	E	1
<i>Urera kaalae</i>	E	HI	S1.2	1	E	1
<i>Viola chamissoniana ssp. chamissoniana</i>	E	HI	S1.1	1	E	2
<i>Viola oahuensis</i>	E	HI	S1.3	1	E	1
<i>Vireo atricapillus</i>	E	OK	S1B	1	E	1
		TX	S2B	2	E	4
<i>Vulpes macrotis mutica</i>	E	CA	S2S3	2	T	1
<i>Xyris tennesseensis</i>	E	AL	S1	1	.	2
<i>Zanthoxylum hawaiiense</i>	E	HI	S1.2	1	E	1
<i>Zanthoxylum oahuense</i>	C	HI	S1.1	1	C	2
Grand Total						356

Appendix E: Species Actively Monitored

Species actively monitored by installations, along with taxon, Federal status, and location relative to the installation.

Installation	Scientific Name	Common Name	Taxon	Federal Status	Location
Aberdeen Proving Ground	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
Adelphi Army Research Lab	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
ARDEC (Picatinny)	<i>Myotis sodalis</i>	Indiana Bat	Mammal	E	Onsite
Camp Adair	<i>Lupinus oregonus</i> var. <i>kincaidii</i>	Kincaid's Lupine	Plant	T	Onsite
	<i>Sidalcea nelsoniana</i>	Nelson's Checker-mallow	Plant	T	Onsite
Camp Blanding TS	<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	Onsite
Camp Grafton	<i>Charadrius melodus</i>	Piping Plover	Bird	T	Onsite
	<i>Hesperia dacotae</i>	Dakota Skipper Butterfly	Insect	C	Onsite
Camp Gruber	<i>Nicrophorus americanus</i>	American Burying Beetle	Insect	E	Onsite
Camp Navajo	<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	Bird	T	Contiguous
Fort Bliss	<i>Charadrius montanus</i>	Mountain Plover	Bird	N	Potential
	<i>Coryphantha organensis</i>	Organ Mountain Foxtail-Cactus	Plant	N	Onsite
	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	Sneed Pincushion Cactus	Plant	E	Onsite
	<i>Falco femoralis septentrionalis</i>	Northern Aplomado Falcon	Bird	E	Onsite
	<i>Oenothera organensis</i>	Organ Mountain Evening Primrose	Plant	N	Onsite
	<i>Perityle cernua</i>	Nodding Cliff Daisy	Plant	N	Onsite
	<i>Perityle huecoensis</i>	Monarch (Hueco) Rockdaisy	Plant	N	Onsite
	<i>Scrophularia laevis</i>	Smooth Figwort	Plant	N	Onsite
Fort Campbell	<i>Dromus dromas</i>	Dromedary Pearlymussel	Clam	E	Contiguous
	<i>Epioblasma florentina walkeri</i>	Tan Riffleshell	Clam	E	Contiguous
	<i>Myotis grisescens</i>	Gray Bat	Mammal	E	Onsite
	<i>Myotis sodalis</i>	Indiana Bat	Mammal	E	Onsite
	<i>Nerodia erythrogaster neglecta</i>	Copperbelly Water Snake	Reptile	T	Potential
	<i>Obovaria retusa</i>	Ring Pink Mussel	Clam	E	Potential
	<i>Plethobasus cooperianus</i>	Orangefoot Pimpleback Pearlymussel	Clam	E	Potential
	<i>Pleurobema plenum</i>	Rough Pigtoe	Clam	E	Potential
	<i>Quadrula fragosa</i>	Winged Mapleleaf Mussel	Clam	E	Potential
Fort Carson	<i>Charadrius montanus</i>	Mountain Plover	Bird	N	Onsite
	<i>Etheostoma cragini</i>	Arkansas Darter	Fish	C	Onsite
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
	<i>Spiranthes diluvialis</i>	Ute Ladies'-tresses	Plant	T	Contiguous
	<i>Zapus hudsonius preblei</i>	Preble's Meadow Jumping Mouse	Mammal	T	Contiguous
Fort Chaffee	<i>Nicrophorus americanus</i>	American Burying Beetle	Insect	E	Onsite

Installation	Scientific Name	Common Name	Taxon	Federal Status	Location
Fort Eustis	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
Fort Gordon	<i>Gopherus polyphemus</i>	Gopher Tortoise	Reptile	N	Onsite
	<i>Myotis austroriparius</i>	Southeastern Myotis	Mammal	N	Onsite
	<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	Onsite
Fort Hood	<i>Dendroica chrysoparia</i>	Golden-cheeked Warbler	Bird	E	Onsite
	<i>Phrynosoma cornutum</i>	Horned Toad	Reptile	N	Onsite
	<i>Vireo atricapillus</i>	Black-capped Vireo	Bird	E	Onsite
Fort Huachuca	<i>Ambystoma tigrinum stebbinsi</i>	Sonoran Tiger Salamander	Amphibian	E	Onsite
	<i>Empidonax traillii extimus</i>	Southwestern Willow Flycatcher	Bird	E	Contiguous
	<i>Falco peregrinus anatum</i>	American Peregrine Falcon	Bird	DM	Onsite
	<i>Leptonycteris curasoae yerbabuena</i>	Lesser Long-nosed Bat	Mammal	E	Onsite
	<i>Lilaeopsis schaffneriana var. recurva</i>	Huachuca Water-umbel	Plant	E	Onsite
	<i>Pyrgulopsis thompsoni</i>	Huachuca Springsnail	Snail	C	Onsite
	<i>Rana subaquavocalis</i>	Ramsey Canyon Leopard Frog	Amphibian	N	Onsite
	<i>Rumex orthoneurus</i>	Blumer's Dock	Plant	N	Onsite
	<i>Strix occidentalis lucida</i>	Mexican Spotted Owl	Bird	T	Onsite
Fort Hunter Liggett	<i>Ambystoma californiense</i>	California Tiger Salamander	Amphibian	T	Onsite
	<i>Branchinecta lynchi</i>	Vernal Pool Fairy Shrimp	Crustacean	T	Onsite
	<i>Bufo californicus (=microscaphus)</i>	Arroyo Southwestern Toad	Amphibian	E	Onsite
	<i>Chlorogalum purpureum var. purpureum</i>	Purple Amole	Plant	T	Onsite
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
	<i>Vireo bellii pusillus</i>	Least Bell's Vireo	Bird	E	Contiguous
	<i>Vulpes macrotis mutica</i>	San Joaquin Kit Fox	Mammal	E	Contiguous
Fort Irwin	<i>Gopherus agassizii</i>	Desert Tortoise	Reptile	T	Onsite
Fort Knox	<i>Myotis grisescens</i>	Gray Bat	Mammal	E	Onsite
	<i>Myotis sodalis</i>	Indiana Bat	Mammal	E	Onsite
Fort Pickett	<i>Percina rex</i>	Roanoke Log Perch	Fish	E	Onsite
	<i>Rhus michauxii</i>	Michaux's Sumac	Plant	E	Onsite
Fort Sill	<i>Vireo atricapillus</i>	Black-capped Vireo	Bird	E	Onsite
Fort Stewart	<i>Acipenser brevirostrum</i>	Shortnose Sturgeon	Fish	E	Onsite
	<i>Ambystoma cingulatum</i>	Flatwoods Salamander	Amphibian	T	Onsite
	<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	Reptile	T	Onsite
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	Bird	T	Onsite
	<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	Onsite
McAlester AAP	<i>Nicrophorus americanus</i>	American Burying Beetle	Insect	E	Onsite
MO ARNG HQ	<i>Ammodramus henslowii</i>	Henslow's Sparrow	Bird	N	Onsite
	<i>Myotis grisescens</i>	Gray Bat	Mammal	E	Potential
	<i>Myotis sodalis</i>	Indiana Bat	Mammal	E	Potential
Pinon Canyon Maneuver Site	<i>Vulpes velox</i>	Swift Fox	Mammal	N	Onsite

Installation	Scientific Name	Common Name	Taxon	Federal Status	Location
STARC-CA	<i>Branchinecta lynchi</i>	Vernal Pool Fairy Shrimp	Crustacean	T	Potential
	<i>Cirsium fontinale var. obispoense</i>	Chorro Creek Bog Thistle	Plant	E	Potential
	<i>Rana aurora draytonii</i>	California Red-legged Frog	Amphibian	T	Potential
	<i>Vulpes macrotis mutica</i>	San Joaquin Kit Fox	Mammal	E	Potential
STARC-HI	<i>Cyperus trachysanthos</i>	Pu`uka`a	Plant	E	Potential
	<i>Lasiurus cinereus semotus</i>	Hawaiian Hoary Bat	Mammal	E	Potential
STARC-TX	<i>Hymenoxys texana</i>	Texas Prairie Dawn-flower	Plant	E	Potential
	<i>Vireo atricapillus</i>	Black-capped Vireo	Bird	E	Potential
Sunny Point	<i>Lysimachia asperulaefolia</i>	Rough-leaved Loosestrife	Plant	E	Onsite
	<i>Picoides borealis</i>	Red-cockaded Woodpecker	Bird	E	Onsite
White Sands Missile Range	<i>Cynomys ludovicianus</i>	Black-tailed Prairiedog	Mammal	C	Potential
	<i>Falco femoralis septentrionalis</i>	Northern Aplomado Falcon	Bird	E	Onsite

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 12-2004		2. REPORT TYPE Final		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Monitoring of Federally Threatened and Endangered Species on U.S. Army Installations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Robert H. Melton, Harold E. Balbach, and Michael Ward				5d. PROJECT NUMBER 622720A896	
				5e. TASK NUMBER 00AB42	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Research and Development Center (ERDC) Construction Engineering Research Laboratory (CERL) PO Box 9005 Champaign, IL 61826-9005				8. PERFORMING ORGANIZATION REPORT NUMBER ERDC/CERL TR-04-27	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) HQ, Department of the Army Assistant Chief of Staff, Installation Management 600 Army Pentagon Washington, DC 20310-0600				10. SPONSOR/MONITOR'S ACRONYM(S) ACSIM	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.					
14. ABSTRACT This report presents an examination of Federally listed Threatened and Endangered (T & E) species on United States Army installations, and the results of a survey conducted to ascertain the kinds and quality of efforts being made to monitor these species in compliance with the Endangered Species Act of 1973 and AR 200-3. The report summarizes some general aspects of T & E species on Army installations using information gleaned from previous reports and Internet sources, supplemented with the data collected during the monitoring survey. Data is presented on which installations have the largest numbers of T & E species, which T & E species affect the largest number of installations, and which T & E taxa are most prevalent on installations. The relationships of Federal listing as T & E to various alternative extinction risk classifications, and to State listing status, are explored. The progress of installations in completion of Planning Level Surveys and Endangered Species Management Plans is reported. The report presents information on monitoring of T & E species collected during a survey of a selected sample of Army installations. The completeness, variability, and consistency of the monitoring techniques reported are analyzed.					
15. SUBJECT TERMS threatened and endangered (T&E) species land management endangered species management plan (ESMP) military bases natural resource management					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Robert H. Melton
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) (217) 352-6511, ext 4450