

AD _____

Award Number: DAMD17-99-2-9009

TITLE: A floristic inventory of vascular plant species on
Elmendorf Air Force Base, Alaska

PRINCIPAL INVESTIGATOR: Robert Lipkin

PROJECT MANAGER: Gerald F. Tande

CONTRACTING ORGANIZATION: Alaska Natural Heritage Program
Anchorage, Alaska 99501

REPORT DATE: April 2001

TYPE OF REPORT: Final

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for public release;
Distribution unlimited

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

20010524 038

REPORT DOCUMENTATION PAGEForm Approved
OMB No. 074-0188

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 Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE Apri 2001	3. REPORT TYPE AND DATES COVERED Final (4 Jan 99 -27 April 01)	
4. TITLE AND SUBTITLE A floristic inventory of vascular plant species on Elmendorf Air Force Base, Alaska			5. FUNDING NUMBERS DAMD17-99-2-9009	
6. AUTHOR(S) Robert Lipkin			8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Alaska Natural Heritage Program, University of Alaska Anchorage 707 A Street Anchorage, Alaska 99501 E-MAIL: anrl@uaa.alaska.edu			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Materiel Command Fort Detrick, Maryland 21702-5012			11. SUPPLEMENTARY NOTES	
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; Distribution unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 Words) In conjunction with a project to establish long-term vegetation monitoring plots, we conducted a survey of the vascular flora of Elmendorf Air Force Base. The main objectives of the survey were to: identify any rare vascular plants on Elmendorf Air Force Base; document additions to the flora of Elmendorf Air Force Base; insure that the vascular flora of the monitoring plots is accurately documented. We documented 301 vascular plant taxa for Elmendorf Air Force Base of which 99 were new to the base and one species was new to Southcentral Alaska. Five rare vascular plant species (Alaska Natural Heritage Program rank S1-S3) were found.				
14. SUBJECT TERMS Vegetation, Monitoring, Plots, Elmendorf Air Force Base, Alaska, Botany, Floristics, Plant Diversity, Vascular Plants, Inventory, Alder, Plant Ecology, Anchorage, Method, Plant Community, Boreal Forest			15. NUMBER OF PAGES 24	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

**A FLORISTIC INVENTORY OF VASCULAR PLANT
SPECIES
on
ELMENDORF AIR FORCE BASE, ALASKA**

Prepared for:

Conservation and Environmental Planning Office
3 CES/CEVP
6326 Arctic Warrior Drive
Elmendorf Air Force Base, Alaska
99506-3204

By:

Rob Lipkin
Chief Botanist

Alaska Natural Heritage Program
Environment and Natural Resources Institute
University of Alaska Anchorage
707 A Street
Anchorage AK 99501

April 13, 2001



**Copies of this report and access to original data are available from the Elmendorf AFB
Wildlife Biologist or Chief of Conservation and Environmental Planning:**

Conservation and Environmental Planning Office
3 CES/CEVP
6326 Arctic Warrior Drive
Elmendorf Air Force Base, Alaska
99506-3204

(907)552-3853 or 552-1609

TABLE OF CONTENTS

<u>TABLE OF CONTENTS</u>	II
<u>INTRODUCTION</u>	1
<u>LOCATION</u>	1
<u>METHODS</u>	1
<u>FIELD DATA COLLECTION</u>	1
<u>RESULTS AND DISCUSSION</u>	2
<u>RARE VASCULAR PLANTS</u>	3
<u>NON-NATIVE VASCULAR PLANTS</u>	5
<u>LITERATURE CITED</u>	7
<u>APPENDICES</u>	8

INTRODUCTION

In January 1999, the Alaska Natural Heritage Program (AKNHP) undertook a project to establish and characterize long-term vegetation monitoring plots (LTVMPs) on Elmendorf Air Force Base (EAFB), Alaska, under Contract Agreement No. DAMD17-99-2-9004 (Tande et al. 2001). The purpose of the project was to develop a method for monitoring long-term vegetation change and provide a baseline description of LTVMPs that Base personnel would use to periodically update the EAFB Integrated Natural Resource Management Plan (INRMP) as directed in AFI 327064 and 32 CFR 190.7, 16 USC5CSCII670a (Sikes Act).

In conjunction with this project, we conducted a limited survey of the vascular plants of EAFB with the following three main objectives:

1. Identify any rare vascular plants on EAFB (rare plants are defined in this report as those ranked S3 or rarer by the AKNHP).
2. Document any vascular plant taxa not previously known from EAFB.
3. Insure that the vascular flora of the monitoring plots is accurately and adequately documented.

A secondary objective was to conduct a preliminary survey for non-native vascular plant taxa in selected disturbed areas of EAFB.

LOCATION

Elmendorf Air Force Base (EAFB) is situated on approximately 5,314 hectares (13,130 acres) in Southcentral Alaska at the head of Cook Inlet. The vascular plant inventory was limited to the 3,614 hectares (8,931 acres) of undeveloped land and 587 hectares (1,450 acres) of semi-developed land.

The Base is bounded by the Municipality of Anchorage to the south, the Knik Arm of Cook Inlet to the north and west, and Fort Richardson Army Base to the east. Elmendorf is located at 149 degrees, 48 minutes west longitude and 61 degrees, 15 minutes north latitude.

METHODS

We compiled a preliminary list of plant taxa that were either known from EAFB (Tande 1983) or that could be expected to occur based on herbarium collections from adjacent areas (holdings of the University of Alaska Fairbanks Museum) and existing literature (Hultén 1940-50, 1967, 1968, Tande 1983, Tande et al. 1995). This list was used to highlight particular habitats to search for taxa not yet known from the Base. The list of expected taxa was also cross-referenced against the AKNHP databases to identify rare taxa ranked S1-S3. Bluffs and fresh water and estuarine wetlands received special attention as likely sources for range extensions and rare taxa.

Field Data Collection

Field surveys of vascular plants were conducted between July and September 1999 and plants were opportunistically collected based on phenology and habitat. Specific collecting areas were selected based on previous vegetation studies (Tande 1983, Tande et al. 1995), aerial photography, and the

known or suspected habitat requirements of those taxa not yet known from the study area. Additional transects were added to provide adequate baseline coverage of other vegetation types and several LTVM plots were also surveyed. Voucher specimens were made of critical taxa and range extensions but were not made for new records of common taxa known from adjacent areas on Fort Richardson (Tande et al. 1995). Element Occurrence Records (EOR's) were constructed for all rare plants and were entered into the AKNHP databases and associated GIS.

A brief survey was made of non-native taxa on selected roads and trails and all non-native taxa were listed.

Collections were identified using standard herbarium techniques and all collections will be archived at ALA and AKNHP. Nomenclature generally follows that of the Biota of North America Program (1999), with exceptions cross-referenced to that list.

RESULTS and DISCUSSION

Elmendorf Air Force Base lies near the geographic and climatic boundaries between Pacific maritime Southcoastal Alaska and continental Interior Alaska. Although the flora of EAFB is most closely allied with the boreal spruce-birch forests of the Interior, the coastal influence is seen in the presence of *Populus balsamifera* ssp. *trichocarpa* as well as many of the understory and wetland species such as *Carex aquatilis* var. *dives*, *C. mertensii*, *C. pauciflora*, *C. pluriflora*, *Oplopanax horridus*, and *Menziesia ferruginea*. The Base contains a number of distinct plant communities ranging from fens, marshes and riparian areas to boreal forests as well as azonal grasslands, bluffs and small areas of estuarine mudflats and saltmarsh. It lacks the dramatic elevation gradient found on adjacent Ft. Richardson and consequently does not have the varied alpine and subalpine communities found on that Army Base.

Although the Anchorage vicinity is the center of activity for most of Alaska's population, there have been few attempts to produce floras for southcentral Alaska. Tande (1983) documented some of the flora of EAFB and several additional, limited species lists have been provided for the Cook Inlet area in the course of vegetation studies (Batten et al. 1978, McCormick and Pinchon 1978, Ritchie et al. 1981, Hogan and Tande 1982). Tande et al. (1995) conducted an extensive inventory of the flora of Ft. Richardson, including areas immediately adjacent to EAFB.

Appendix A lists the known flora of EAFB, totaling 301 taxa. Although the floristic survey should not be considered complete, the species list presented is a good basis for describing the vascular flora of Elmendorf Air Force Base. The 301 taxa are distributed among 163 genera and represent more than 15% of Alaska's vascular flora. The survey added 99 taxa to the previously known flora of EAFB (Appendix B), nearly all of which were already known from the adjacent flora of Ft. Richardson.

The flora of Ft. Richardson (Tande et al. 1995) includes approximately 588 taxa, nearly twice the number of taxa found on EAFB. The great range in elevation found on Ft. Richardson, including alpine and subalpine habitats, explains much of this difference. Nearly 180 of the Ft. Richardson taxa were restricted to these high elevation habitats. Ft. Richardson is also nearly four times the size of EAFB and was surveyed intensively over two seasons by more than six botanists. Adjusting for these differences, the flora of the boreal forest and wetlands on EAFB is

comparable to that of Ft. Richardson. Approximately 120 lowland taxa of Ft. Richardson were not found on EAFB and 22 taxa of EAFB are not yet known from Ft. Richardson. These include:

- Arabis divaricarpa*
- Arnica ovata*
- Calla palustris*
- Carex aquatilis* var. *dives*
- Carex atherodes*
- Carex capitata*
- Carex disperma*
- Carex echinata* ssp. *phyllomanica*
- Carex microglochin*
- Cypripedium guttatum*
- Dracocephalum parviflorum*
- Epilobium ciliatum* ssp. *ciliatum*
- Epilobium lactiflorum*
- Eriophorum angustifolium* ssp. *scabriusculum*
- Eriophorum scheuchzeri*
- Honckenya peploides*
- Juncus supiniformis*
- Lycopus uniflorus*
- Nymphaea tetragona*
- Pyrola grandiflora*
- Ribes glandulosum*
- Salix myrtillifolia*

Rare Vascular Plants

None of the vascular plant taxa found on EAFB are listed by the U. S. Fish and Wildlife Service as Endangered, Threatened or Candidate species. Rare taxa were defined for this study as those plants ranked S1-S3 by the AKNHP. The ranking system (developed by The Nature Conservancy and the Natural Heritage Network) assigns each taxon a global and a state rank from 1 - 5 based on several factors such as abundance, range, degree of threat, existing protection, and the number of occurrences. These ranking categories are listed below.

Alaska Natural Heritage Program Global Rankings

- G1:** Critically imperiled globally (typically 5 or fewer occurrences, or very few remaining individuals or acres).
- G2:** Imperiled globally (typically 6 - 20 occurrences, or few remaining individuals or acres).
- G3:** Either very rare and local throughout its range or found locally in a restricted range (typically 21 - 100 occurrences).
- G4:** Apparently secure globally.
- G5:** Demonstrably secure globally.
- G#Q:** Taxonomically questionable.
- G#T#:** Global rank of species and global rank of the described variety or subspecies.
- G#G#:** Global rank of species uncertain, best described as a range between the two ranks.

Alaska Natural Heritage Program State Rankings

- S1:** Critically imperiled in state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state (typically 5 or fewer occurrences, or very few remaining individuals or acres).
- S2:** Imperiled in state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (typically 6 - 20 occurrences, or few remaining individuals or acres).
- S3:** Rare or uncommon in the state (typically 21 - 100 occurrences).
- S4:** Apparently secure in state, with many occurrences.
- S5:** Demonstrably secure in state, with many occurrences.
- SE:** Exotic
- SR#:** Reported from the state, but not yet verified.
- SP:** Occurring in nearby state or province; not yet reported in state, but probably will be encountered with further inventory.
- S#S#:** State rank of species uncertain, best described as a range between the two ranks.

Five rare vascular plant species were found on EAFB. Although these species are considered rare within Alaska, they are all more common elsewhere and none of them are globally rare.

Lycopus uniflorus (northern bugleweed) is new to the flora of both EAFB and Ft. Richardson, as well as to Southcentral AK. This species is known from a number of locations in Southeast Alaska where it can be locally abundant. In Alaska it is otherwise known from only a few locations in the interior including Ft. Wainwright, Ruby, and Minto Lakes and has a rank of G5 S3. This mint is typically found on wet locations and on EAFB it was found on wet lakeshores of Tuomi and Six-mile Lakes.

Malaxis paludosa (bog adder's-mouth), G4 S3. This small, easily overlooked orchid is known from nearly twenty bog or fen locations scattered across Southeast, Southcentral, Southwest, and Interior Alaska, and is known from many more sites outside of Alaska. It is known from fens on Ft. Richardson and was previously reported from EAFB (Tande 1983). During the present survey it was seen at the Triangle Lake fen, in sphagnum mats.

Salicornia maritima (sea saltwort), G5 S2, is known in Alaska from only a few scattered locations in the Southcentral region. It is locally common in the salt marshes where it occurs and is a distinctive halophyte. On EAFB it is only found on the small salt marsh below the bluffs adjacent to the Port of Anchorage. It is also known from Eagle River Flats on Ft. Richardson.

Scheuchzeria palustris (pod grass), G5 S3, is known from Southeast Alaska (where it is somewhat peripheral to its main range outside of Alaska) and disjunctly to scattered bogs in Interior and Southcentral Alaska. On EAFB it is known from several bogs or fens including the fens adjacent to Triangle Lake where it was found on floating sphagnum mats.

Scirpus maritimus (saltmarsh bulrush), G5 S2SE, is widespread globally, but is known in Alaska from only a few scattered locations in Southeast and Southcentral. It is locally common in a few of the salt marshes (or brackish waters) where it occurs. On EAFB it is only found on the small salt marsh below the bluffs adjacent to the Port of Anchorage. It is also known from Eagle River Flats on Ft. Richardson. Hultén (1968) felt this species was “probably not native” in Alaska, but gave no supporting evidence, and it is not clear that it is introduced.

No other rare taxa were found on EAFB. The small salt marsh areas of EAFB contain a distinctive array of halophytic species that are not found elsewhere on the Base. These include:

Carex lyngbyaei
Carex ramenskii
Glaux maritima
Hippuris tetraphylla
Plantago maritima
Poa eminens
Potentilla egedii
Puccinellia nutkaensis
Puccinellia phryganodes
Ranunculus cymbalaria
Salicornia maritima
Triglochin maritimum

Non-native Vascular Plants

Due to limitations of time, only a very limited survey of non-native plants was made. Roadsides and parking pullouts were surveyed in the course of the main survey, and the powerline behind the Beluga power plant was surveyed as well. Housing and developed areas were not surveyed. The following non-native vascular plants were observed:

Achillea millefolium
Brassica rapa
Cerastium fontanum
Crepis tectorum
Erysimum cheiranthoides
Lolium multiflorum
Medicago falcata
Melandrium noctiflorum
Matricaria matricarioides
Phleum pratense
Plantago major var. major
Poa annua
Poa pratensis
Stellaria media
Taraxacum officinale
Trifolium hybridum
Trifolium repens
Tripleurospermum perforata

Non-native plants were not seen to be invading undisturbed habitats, and were generally concentrated within a few meters of the disturbed sites.

Along the powerline transect the following non-native plants were seen:

Achillea millefolium
Cerastium fontanum
Crepis tectorum
Matricaria matricarioides
Phleum pratense
Plantago major var. major
Poa annua
Poa pratensis
Stellaria media
Taraxacum officinale
Trifolium hybridum
Trifolium repens

The two clovers (*Trifolium hybridum* and *T. repens*), the dandelion (*Taraxacum officinale*), and the yarrow (*Achillea millefolium*) were locally abundant and had between 5-25% cover in patches. The remaining species generally had less than 5% cover or were found only as isolated plants.

LITERATURE CITED

- Batten, A., S. Murphy and D.F. Murray 1978. Definition of Alaska coastal wetlands by floristic criteria. EPA Rep. No. 804965-01. Corvallis Environmental Research Laboratory, Corvallis, OR. 490 p.
- Hogan, M. and G.F. Tande. 1983. Vegetation types and bird use of Anchorage wetlands. U.S. Fish and Wildlife Service, Special Studies, Anchorage, AK. 134 p.
- Hultén, E. 1941-1950. Flora of Alaska and Yukon. 1-10. Lunds Univ. Arsskr. N.F. Avd. 2, Vol. 37-46. 1,902 p.
- Hultén, E. 1967. Comments on the flora of Alaska. Arkiv Bot. 2(7): 1-47. Almqvist and Wiksell, Stockholm, Sweden.
- Hultén, E. 1968. Flora of Alaska and neighboring territories. Stanford University Press. Stanford, CA. 1008 p.
- McCormick, J. and W. Pinchon. 1978. Wetlands of Potter Marsh, Point Campbell to Potter. WAPORA Proj. 681. WAPORA, Inc., Washington, D.C. 79 p.
- Ritchie, R., J. Curatolo and A.R. Batten. 1981. Knik Arm wetland study: final report. Alaska Biological Research, Inc., Fairbanks, AK. 195 p.
- Tande, G.F. 1983. Vegetation. Pp. 14-85. *In*: Rothe, T.C., S.H. Lanigan, P.A. Martin and G.F. Tande. 1983. Natural resource inventory of Elmendorf Air Force Base, Alaska: Part I. U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK. 368 p.
- Tande, G.F., R. Lipkin and M. Duffy. 1995. Results of a floristic inventory of Fort Richardson Military Reservation, Alaska. Report to U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS, and Cold Regions Research and Engineering Laboratory, Hanover, NH. Alaska Natural Heritage Program, University of Alaska, Anchorage. 74p.
- Tande, G.F., J. Michaelson, S.C. Klein and J. Lenz. 2000. Establishment and characterization of long-term vegetation monitoring plots on Elmendorf Air Force Base, Alaska. Rep. Prep. for: Natural Resources Branch, 3 CES/CEVPW, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A St., Anchorage AK.
- Viereck, L.A. and E.L. Little, Jr. 1972. Alaska trees and shrubs. Agriculture Handbook No. 410. U.S. Forest Service, Washington, DC. 265 p.
- Wikgren, K.R. and J.P. Moore. 1997. Soil survey of Elmendorf Air Force Base, Alaska (an interim report). USDA Natural Resources Conservation Service, Anchorage, AK. 97 p.

APPENDICES

APPENDIX A

CHECKLIST OF VASCULAR PLANT SPECIES FOR ELMENDORF AIR FORCE BASE APRIL 2001

Achillea millefolium L.
Aconitum delphinifolium DC.
Actaea rubra (Ait.) Willd.
Adoxa moschatellina L.
Agrostis scabra Willd.
Alnus incana ssp. *tenuifolia* (Nutt.) Breitung [=*A. tenuifolia* Nutt.]
Alnus viridis ssp. *fruticosa* (Rupr.) Nyman [=*A. crispa* (Ait.) Pursh ssp. *crispa*]
Alnus viridis ssp. *sinuata* (Regel) A. & D. Löve [=*A. crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hult.]
Andromeda polifolia L.
Anemone parviflora Michx.
Anemone richardsonii Hock.
Angelica lucida E. Nels.
Antennaria rosea (D.C. Eaton) E. Greene
Aquilegia formosa Fisch.
Arabis divaricarpa A. Nels.
Arabis holboellii Hornem.
Arabis kamchatica (Fisch. ex DC.) Ledeb. [=*A. lyrata* L. ssp. *kamchatica* (Fisch.) Hult.]
Arctagrostis latifolia (R. Br.) Griseb.
Arctagrostis poaeoides Nash
Arctostaphylos uva-ursi (L.) Sprengel
Arctous rubra (Rehd. & Wilson) Nakai [=*Arctostaphylos rubra* (Rehd. & Wilson) Fern.]
Arnica ovata E. Greene
Artemisia tilesii Ledeb.
Aster junciformis Rydb.
Athyrium filix-femina (L.) Roth
Barbarea orthoceras Ledeb.
Beckmannia erucaeformis (L.) Host ssp. *baicalensis* (Kusn.) Hult.
Betula glandulosa Michx.
Betula hybrids
Betula kenaica Evans
Betula papyrifera Marshall [=*B. neoalaskana*]
Bistorta vivipara (L.) Gray [=*Polygonum viviparum* L.]
Boschniakia rossica (Cham & Schldl.) B. Fedtsch.
Brassica rapa L.
Bromopsis inermis (Leys.) Holub [=*Bromus inermis* Leys.]
Bromus tectorum L.
Calamagrostis canadensis (Michx.) Beauv.
Calamagrostis inexpansa Gray
Calamagrostis lapponica (Wahlenb.) Hartman. F.
Calla palustris L.
Capsella bursa-pastoris (L.) Medic.

Capsella rubella Reut.
Carex aquatilis var. *dives* (Holm) Kükenth. [= *C. sitchensis* Prescott ex Bong.]
Carex aquatilis Wahlenb. ssp. *aquatilis*
Carex atherodes Spreng.
Carex bigelowii Torr.
Carex buxbaumii Wahlenb.
Carex canescens L.
Carex capitata L.
Carex chordorrhiza Ehrh.
Carex diandra Schrank
Carex disperma Dewey
Carex echinata ssp. *phyllomanica* (W. Boott) Reznicek [= *C. phyllomanica* W. Boott]
Carex lasiocarpa Ehrh. ssp. *americana* (Fern.) Hult.
Carex lenticularis var. *lipocarpa* (Holm) L.A. Standley [= *C. kelloggii* W. Boott]
Carex limosa L.
Carex livida (Wahlenb.) Willd.
Carex loliacea L.
Carex lyngbyaei Hornem.
Carex magellanica Lam. ssp. *irrigua* (Wahlenb.) Hult.
Carex membranacea Hook.
Carex mertensii Prescott
Carex microglochin Wahlenb.
Carex oederi Retz.
Carex pauciflora Lightf.
Carex pluriflora Hult.
Carex ramenskii Kom.
Carex rariflora (Wahlenb.) Smith
Carex rostrata Stokes
Carex rotundata Wahlenb.
Carex tenuiflora Wahlenb.
Carex utriculata F. Boott
Cerastium fontanum Baumg.
Chamaedaphne calyculata (L.) Moench
Chenopodium album L.
Chrysanthemum leucanthemum L.
Cicuta douglasii (DC.) J. Coulter & Rose
Cicuta virosa L. [= *C. mackenzieana* Raup]
Circaea alpina L.
Comarum palustre L. [= *Potentilla palustris* (L.) Scop.]
Conioselinum pacificum (S. Wats.) Coult. & Rose [= *C. chinense* (L.) BSP.]
Corallorrhiza trifida Chatel.
Cornus canadensis L.
Cornus suecica L.
Corydalis sempervirens (L.) Pers.
Crepis tectorum L.
Cypripedium guttatum Sw.
Delphinium glaucum S. Wats.
Deschampsia caespitosa (L.) P. Beauv. ssp. *caespitosa*
Descurainia sophioides (Fisch.) O.E. Shultz

Dracocephalum parviflorum Nutt.
Drosera anglica Huds.
Drosera rotundifolia L.
Dryopteris dilatata (Hoffm.) A.Gray
Eleocharis palustris (L.) Roem. & Schult.
Eleocharis quinquefolia (F. Hartmann) O. Schwarz
Elymus alaskanus (Scribn. & Merr.) A. Loeve ssp. *alaskanus* [=*Agropyron violaceum*]
Elymus trachycaulis (Link) Gould ex Shinnery ssp. *trachycaulis* [=*A. pauciflorum* (Schwein.) A.S. Hitchc.]
Elytrigia repens (L.) Nevski [=*Agropyron repens* (L.) Beauv.]
Empetrum nigrum L.
Epilobium angustifolium L.
Epilobium ciliatum ssp. *ciliatum* [=*E. adenocaulon* Hausskn.]
Epilobium hornemannii Reichb. ssp. *hornemannii*
Epilobium lactiflorum Hausskn.
Epilobium latifolium L.
Epilobium palustre L.
Equisetum arvense L.
Equisetum fluviatile L. ampl. Ehrh.
Equisetum pratense L.
Equisetum sylvaticum L.
Equisetum variegatum Schleich.
Eriophorum angustifolium Honck. ssp. *subarcticum* (V. Vassiljev) Hult.
Eriophorum angustifolium ssp. *scabriusculum* Hultén
Eriophorum gracile Koch
Eriophorum russeolum Fries
Eriophorum russeolum Fries var. *albidum* W. Nyl.
Eriophorum scheuchzeri Hoppe
Eriophorum scheuchzeri Hoppe
Eriophorum viridi-carinatum (Englem.) Fern.
Erysimum cheiranthoides L.
Festuca rubra L.
Galium boreale L.
Galium trifidum L. ssp. *trifidum*
Galium triflorum Michx.
Geocaulon lividum (Richards.) Fern.
Geranium erianthum DC.
Geum macrophyllum Willd. ssp. *macrophyllum*
Geum perincisum Rydb. [=*G. macrophyllum* Willd. ssp. *perincisum* (Rydb.) Raup.]
Glaux maritima L.
Goodyera repens (L.) R. Br. var. *ophioides* Fern.
Gymnocarpium dryopteris (L.) Newm.
Hedysarum alpinum L.
Heracleum lanatum Michx.
Hierchloe odorata (L.) P. Beauv.
Hippuris montana Ledeb.
Hippuris tetraphylla L.F.
Honckenya peploides (L.) Ehrh.
Hordeum jubatum L.
Iris setosa Pall. ssp. *setosa*

Juncus alpinus Villers
Juncus bufonius L.
Juncus castaneus Sm. ssp. *castaneus*
Juncus stygius L. ssp. *americanus* (Buchenau) Hult.
Juncus supiniformis Engelm. [=*J. oregonus* S. Wats.]
Juncus triglumis L.
Juniperus communis L.
Lathyrus palustris L. ssp. *pilosus* (Cham.) Hult.
Ledum groenlandicum Oeder [=*L. palustre* L. ssp. *groenlandicum* (Oeder) Hult.]
Ledum palustre L. ssp. *decumbens* (Ait.) Hult.
Lemna minor L.
Lepidium densiflorum Schrad.
Leymus mollis (Trin.) Hara ssp. *mollis* [=*Elymus arenarius* L. ssp. *mollis* (Trin.) Hult.]
Ligusticum scoticum L. ssp. *hultenii* (Fern.) Cald. & Tayl.
Linaria vulgaris Mill.
Linnaea borealis L.
Listera cordata (L.) R. Br.
Lolium multiflorum Lam.
Lupinus nootkatensis Donn
Lupinus polyphyllus Lindl.
Luzula multiflora (Retz.) Lej. var. *frigida* (Buchenau) Hult.
Lycopodium alpinum L. [=*Diphasiastrum alpinum* (L.) Holub In: FNA*]
Lycopodium annotinum L.
Lycopodium clavatum L. ssp. *monostachyon* (Grev. & Hook.) Sel. [=*L. lagopus* (Laest. Ex C. Hartman)]
Lycopodium complanatum L. [=*Diphasiastrum complanatum* (L.) Holub In: FNA*]
Lycopus uniflorus Michx.
Malaxis paludosa (L.) Sw. [= *Hammarbya paludosa* (L.) Ktze.]
Matricaria matricarioides (Less.) Porter
Medicago falcata L.
Melandrium noctiflorum (L.) Fries
Menyanthes trifoliata L.
Menziesia ferruginea Sm.
Mertensia paniculata (Ait.) G. Don
Mimulus guttatus DC.
Moehringia lateriflora (L.) Fenzl
Moneses uniflora (L.) Gray
Myrica gale L.
Myriophyllum exalbescens Fern. [=*M. spicatum* L.]
Nuphar polysepalum Engelm.
Nymphaea tetragona Georgi
Oplopanax horridum (Smith) Miquel [=*Echinopanax horridum* (Sm.) Decne. & Planch.]
Orthilia secunda (L.) House [=*Pyrola secunda* L. ssp. *secunda*]
Osmorhiza depauperata Phill.
Oxycoccus microcarpus Turcz. ex Rupr.
Papaver nudicaule L.
Parnassia palustris L.
Parnassia palustris L. ssp. *neogaea* (Fern.) Hult.
Pedicularis capitata Adams.
Pedicularis labradorica Wirsing

Pentaphylloides floribunda (Pursh.) Loeve [=*Potentilla fruticosa* L.]
Phalaris arundinacea L.
Phleum pratense L.
Picea glauca (Moench) Voss
Picea mariana (Mill.) Britt., Sterns & Pogg
Plantago major L. var. *major*
Plantago maritima L. ssp. *juncoides* (Lam.) Hult.
Platanthera dilatata Pursh
Platanthera hyperborea (L.) Lindl. var. *hyperborea*
Poa alpigena (E. Fries) Lindm.
Poa annua L.
Poa eminens Presl
Poa glauca M. Vahl.
Poa palustris L.
Poa pratensis L.
Polemonium acutiflorum Willd.
Polygonum aviculare L.
Polygonum fowleri Robins.
Populus balsamifera L.
Populus balsamifera L. ssp. *trichocarpa* (Torr. & Gray) Brayshaw
Populus tremuloides Michx.
Potamogeton alpinus Balb.
Potamogeton epihydrus Raf.
Potamogeton filiformis Pers. [=*Stuckenia filiformis* (Pers) Boerner]
Potamogeton gramineus L.
Potamogeton natans L.
Potamogeton pectinatus L. [=*Stuckenia pectinata* (L.) Boerner]
Potamogeton richardsonii (A. Bennett) Rydb. [=*P. perfoliatus* L. ssp. *richardsonii* (A. Bennett) Hult.]
Potamogeton vaginatus Turcz. [=*Stuckenia pectinata* (L.) Boerner]
Potentilla egedii Wormsk. ssp. *grandis* (Torr. & Gray) Hult.
Potentilla norvegica L.
Puccinellia nutkaensis (Presl) Fern. & Weath.
Puccinellia phryganodes (Trin.) Scribner & Marr.
Pyrola asarifolia Michx.
Pyrola chlorantha Sw.
Pyrola grandiflora Radius
Pyrola minor L.
Ranunculus cymbalaria Pursh
Ranunculus gmelini DC. ssp. *gmelini*
Ranunculus lapponicus L.
Ranunculus trichophyllus Chaix var. *trichophyllus*
Rhinanthus minor L.
Ribes glandulosum Grauer
Ribes hudsonianum Richards.
Ribes laxiflorum Pursh
Ribes triste Pall.
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell
Rosa acicularis Lindl.
Rosa nutkana Presl

Rubus arcticus L.
Rubus chamaemorus L.
Rubus idaeus L.
Rubus pedatus Sm.
Rumex acetosella L.
Rumex arcticus Trautv.
Sagina saginoides (L.) Karst.
Salicornia maritima Wolff & Jefferies [=*S. europaea* auct. non L.]
Salix alaxensis (Anderss.) Cov.
Salix barclayi Anderss.
Salix bebbiana Sarg. [=*S. depressa* L. ssp. *rostrata* (Anderss.) Hiitonen]
Salix fuscescens Anderss.
Salix glauca L.
Salix lucida Muhl. ssp. *lasiandra* (Benth.) Argus [=*S. lasiandra* Benth.]
Salix myrtillofolia Anderss.
Salix niphoclada Rydb. [=*S. brachycarpa* Nutt. ssp. *niphoclada* (Rydb.) Argus]
Salix ovalifolia Trautv.
Salix pulchra Cham. [=*S. planifolia* Pursh ssp. *pulchra* (Cham.) Argus]
Salix scouleriana Barratt
Salix sitchensis Sanson
Sambucus racemosa L.
Sanguisorba stipulata Raf.
Scheuchzeria palustris L.
Scirpus maritimus L. [=*S. paludosus* Nels].
Scirpus validus M. Vahl
Senecio pauciflorus Pursh
Shepherdia canadensis (L.) Nutt.
Sorbus scopulina Greene
Sparganium angustifolium Michx.
Sparganium hyperboreum Laest.
Sparganium minimum (Hartm.) E. Fries
Spiraea beauverdiana Schneid.
Spiranthes romanzoffiana Cham.
Stellaria media (L.) Villars
Streptopus amplexifolius (L.) DC.
Swertia perennis L.
Taraxacum officinale Weber
Thalictrum alpinum L.
Thalictrum sparsiflorum Trucz.
Thelypteris phegopteris (L.) Solsson
Tofieldia coccinea Richards.
Tofieldia glutinosa (Michx.) Pers.
Tofieldia pusilla (Michx.) Pers.
Trichophorum alpinum (L.) Pers.
Trichophorum caespitosum (L.) Hartm.
Trientalis europaea L.
Trifolium hybridum L.
Trifolium repens L.
Triglochin maritimum L.

Triglochin palustris L.
Tripleurospermum perforata (Merat) M. Lainz [=T. inodoratum (L.) Schultz-Bip.]
Trisetum spicatum (L.) Richter
Typha latifolia L.
Urtica dioica L. ssp. gracilis (Aiton) Selander
Utricularia intermedia Hayne
Utricularia minor L.
Utricularia vulgaris L. ssp. macrorhiza (LeConte) Clauson
Vaccinium ovalifolium Sm.
Vaccinium uliginosum L.
Vaccinium vitis-idaea L.
Valeriana capitata Pall.
Viburnum edule (Michx.) Raf.
Viola epipsila Ledeb.
Viola renifolia Gray

APPENDIX B

TAXA NEW TO ELMENDORF AIR FORCE BASE APRIL 2001

Aconitum delphinifolium DC.
Adoxa moschatellina L.
Alnus viridis ssp. *fruticosa* (Rupr.) Nyman [=*A. crispa* (Ait.) Pursh ssp. *crispa*]
Alnus viridis ssp. *sinuata* (Regel) A. & D. Löve [=*A. crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hult.]
Angelica lucida E. Nels.
Antennaria rosea (D.C. Eaton) E. Greene
Arabis holboellii Hornem.
Arabis kamchatica (Fisch. ex DC.) Ledeb. [=*A. lyrata* L. ssp. *kamchatica* (Fisch.) Hult.]
Arctagrostis latifolia (R. Br.) Griseb.
Arctagrostis poaeoides Nash
Arnica ovata E. Greene
Artemisia tilesii Ledeb.
Barbarea orthoceras Ledeb.
Beckmannia erucaeformis (L.) Host ssp. *baicalensis* (Kusn.) Hult.
Betula hybrids
Betula kenaica Evans
Boschniakia rossica (Cham & Schldl.) B. Fedtsch.
Brassica rapa L.
Bromopsis inermis (Leyss.) Holub [=*Bromus inermis* Leyss.]
Bromus tectorum L.
Calamagrostis inexpansa Gray
Calamagrostis lapponica (Wahlenb.) Hartman. F.
Capsella rubella Reut.
Carex diandra Schrank
Carex loliacea L.
Carex ramenskii Kom.
Carex utriculata F. Boott
Cerastium fontanum Baumg.
Chrysanthemum leucanthemum L.
Circaea alpina L.
Comarum palustre L. [=*Potentilla palustris* (L.) Scop.]
Conioselinum pacificum (S. Wats.) Coult. & Rose [=*C. chinense* (L.) BSP.]
Cornus suecica L.
Crepis tectorum L.
Delphinium glaucum S. Wats.
Deschampsia caespitosa (L.) P. Beauv. ssp. *caespitosa*
Descurainia sophioides (Fisch.) O.E. Shultz
Eleocharis palustris (L.) Roem. & Schult.
Eleocharis quinquefolia (F. Hartmann) O. Schwarz
Elymus alaskanus (Scribn. & Merr.) A. Loeve ssp. *alaskanus* [=*Agropyron violaceum*]
Elymus trachycaulis (Link) Gould ex Shinnars ssp. *trachycaulis* [=*A. pauciflorum* (Schwein.) A.S. Hitchc.]
Elytrigia repens (L.) Nevski [=*Agropyron repens* (L.) Beauv.]

Equisetum variegatum Schleich.
Erysimum cheiranthoides L.
Festuca rubra L.
Galium trifidum L. ssp. *trifidum*
Geum perincisum Rydb. [=*G. macrophyllum* Willd. ssp. *perincisum* (Rydb.) Raup.]
Glaux maritima L.
Hedysarum alpinum L.
Hierchloe odorata (L.) P. Beauv.
Hippuris tetraphylla L.F.
Juncus triglumis L.
Lepidium densiflorum Schrad.
Leymus mollis (Trin.) Hara ssp. *mollis* [=*Elymus arenarius* L. ssp. *mollis* (Trin.) Hult.]
Ligusticum scoticum L. ssp. *hultenii* (Fern.) Cald. & Tayl.
Lolium multiflorum Lam.
Luzula multiflora (Retz.) Lej. var. *frigida* (Buchenau) Hult.
Lycopodium alpinum L. [=*Diphasiastrum alpinum* (L.) Holub In: FNA*]
Lycopodium clavatum L. ssp. *monostachyon* (Grev. & Hook.) Sel. [=*L. lagopus* (Laest. Ex C. Hartman)]
Lycopodium complanatum L. [=*Diphasiastrum complanatum* (L.) Holub In: FNA*]
Lycopus uniflorus Michx.
Medicago falcata L.
Melandrium noctiflorum (L.) Fries
Myriophyllum exalbescens Fern. [=*M. spicatum* L.]
Parnassia palustris L.
Phalaris arundinacea L.
Phleum pratense L.
Plantago maritima L. ssp. *juncoides* (Lam.) Hult.
Poa alpigena (E. Fries) Lindm.
Poa annua L.
Poa eminens Presl
Poa pratensis L.
Polygonum aviculare L.
Polygonum fowleri Robins.
Potamogeton vaginatus Turcz. [=*Stuckenia pectinata* (L.) Boerner]
Potentilla egedii Wormsk. ssp. *grandis* (Torr. & Gray) Hult.
Potentilla norvegica L.
Puccinellia nutkaensis (Presl) Fern. & Weath.
Puccinellia phryganodes (Trin.) Scribner & Marr.
Pyrola asarifolia Michx.
Ranunculus cymbalaria Pursh
Ranunculus trichophyllus Chaix var. *trichophyllus*
Ribes hudsonianum Richards.
Rosa nutkana Presl
Rumex acetosella L.
Rumex arcticus Trautv.
Sagina saginoides (L.) Karst.
Salicornia maritima Wolff & Jefferies [=*S. europaea* auct. Non L.]
Salix alaxensis (Anderss.) Cov.
Salix ovalifolia Trautv.
Salix sitchensis Sanson

Sanguisorba stipulata Raf.
Scheuchzeria palustris L.
Scirpus maritimus L. [=S. paludosus Nels].
Tripleurospermum perforata (Merat) M. Lainz [=T. inodoratum (L.) Schultz-Bip.]
Trisetum spicatum (L.) Richter
Urtica dioica L. ssp. gracilis (Aiton) Selander
Utricularia minor L.

LIST OF PERSONNEL RECEIVING COMPENSATION FROM THE RESEARCH EFFORT

Rob Lipkin	(RL)	Botanist
Julie Michaelson	(JM)	Field Botanist/Ecologist/Data Manager/GIS Specialist
Gerald (Jerry) Tande	(JT, TA)	Principal Investigator/Vegetation Ecologist

Abbreviations are provided for future reference to notations in the field data.