ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
State Wildlife Grant

Grant Number: **T-14-1** **Segment Number: 1**

Project Number: 1.0

Project Title: Development of a Cooperative Nongame Program between UAA and ADF&G

Project Duration: 1 July 2009 – 30 June 2012 (extended through 2013)

Report Due Date: June 30 2013

Principle Investigator: Keith Boggs, Tracey Gotthardt

Project Location: Alaska

I. PROBLEM OR NEED THAT PROMPTED THIS RESEARCH

The primary need of the ADF&G Nongame Program is to help implement Alaska's Comprehensive Wildlife Conservation Strategy (CWCS) to better address the conservation needs of nongame wildlife in Alaska. The four sub-objectives of this proposal address specific recommendations from the CWCS.

Sub-objective 1 (Complete the Alaska Species Ranking System) specifically addresses and completes the objective in "Identifying and Filling Information Gaps" on page 148 "to complete a systematic statewide species ranking process in the next 18 months."

Sub-objective 2 (Establish the framework for developing the Alaska, Yukon and BC node for the Avian Knowledge Network) addresses the following recommendations in the "List of CWCS Recommendations" on page 149:
Information and Data Gathering

- Ensure that scientific data and pertinent traditional knowledge are available to decision-makers.
- Synthesize and distribute scientific information about species distribution, abundance and habitat use.

Data and Classification Systems

- Develop and maintain coordinated data storage, retrieval, and management systems.
- Develop procedures for contributing Alaska information to regional or national databases and conservation initiatives.

Sub-objective 3 (Update and maintain Biotics database, and develop web-ready products) addresses the following recommendations in the "List of CWCS Recommendations" on page 149:
Information and Data Gathering

- Ensure that scientific data and pertinent traditional knowledge are available to decision-makers.

Data and Classification Systems

- Develop and maintain coordinated data storage, retrieval, and management systems.
- Develop procedures for contributing Alaska information to regional or national databases and conservation initiatives.

Education and Outreach

- Use website development, citizen science programs, school programs, outreach through the media, and other techniques to reach and engage the public in actions that support wildlife goals outlined in the CWCS.

Sub-objective 4 (Develop habitat maps and descriptions of the habitats and ecological processes that support the G1-G3 and Category 1 and 2 nongame species) addresses the following recommendations in the "List of CWCS Recommendations" on page 149:

Information and Data Gathering

- Implement studies to collect baseline inventory and life history information on select species and their habitats.
- Conduct regional GAP analyses across Alaska as part of the National GAP; to help states maintain biodiversity, this program develops overlay maps showing land cover, and species distribution.
- Synthesize and distribute scientific information about species distribution, abundance and habitat use.

Data and Classification Systems

- Develop and implement uniform/complementary habitat classification systems.

Species and Habitat-related Planning

- Develop wildlife habitat maps, including connectivity corridors, for use in designing and planning growth.
- Identify and protect important habitats to help achieve long-term habitat or species population goals.

II. REVIEW OF PRIOR RESEARCH AND STUDIES IN PROGRESS ON THE PROBLEM OR NEED

During the project, we thoroughly reviewed all databases, research and ongoing studies applicable to the project.

III. APPROACHES USED AND FINDINGS RELATED TO THE OBJECTIVES AND TO PROBLEM OR NEED

OBJECTIVE 1: Complete the Alaska Species Ranking System (ASRS).

We updated taxonomic nomenclature and Heritage Conservation Status ranks for previously ranked species. For birds, we used the Fiftieth Supplement to the American Ornithologists' Union Checklist of North American Birds (Chesser et al. 2009); for amphibians we followed taxonomy according to Frost et al. (2006); for mammals we used taxonomy synonomous with MacDonald and Cook (2009). All taxonomic changes were applied directly to the ASRS and also entered into the Heritage Programs' Biotics database.

WE scored/ranked 40 species in 2009 and 68 species in 2010.We also ranked an additional 52 new species (most of these had low S ranks of S4 to S5). The total number of species now ranked with information entered into the ASRS is 492, and includes all S1-S5 bird, mammal and amphibian species and subspecies in Alaska.

We entered biological and action data from ASRS into the Biotics database and updated web products serving this information. Before we could enter biological and action data from the ASRS into AKNHPs Biotics database, we first had to crosswalk fields between the two systems and then transfer the information manually, to insure that we were not overwriting important information already housed in the Boitics database. To do so, we developed an Access database and user interface to speed the manual data entry. We then cross-walked all biological, action, status and threat variables from the ASRS into Biotics for all species that have been ranked to date (n = 492). This updated information will be used to update Heritage Conservation Status Ranks for individual species and subspecies.

In order to serve this information directly on the web, we designed a species conservation status summary that presents information regarding species taxonomy, biology, ecology, distribution, and status for each species. The summary report is automatically formatted and populated from Biotics so that information is current and dynamic. The conservation status summary reports are served from the "Rare Species" portal at the AKNHP website (http://aknhp.uaa.alaska.edu/maps/biotics), and are explained in greater detail under

We developed a website and posted products. We worked closely with Axiom Consulting and Design to develop the new website (see OBJECTIVE 3 for more details). Under the Zoology Program webpages, we placed an interim webpage that provides basic information about the Cooperative Program between AKNHP and the Alaska Department of Fish and Game Wildlife Diversity Program (http://aknhp.uaa.alaska.edu/zoology/programs/adfg-wildlife-diversity-cooperative/).

OBJECTIVE 2: Establish the framework for developing the Alaska, Yukon and BC node for the Avian Knowledge Network.

We met with Brian Sullivan, the data manager for the Avian Knowledge Network (AKN) to discuss hardware, software and data entry needs. We developed a portal for data exchange. We also pursued external funding for developing the AVN for Alaska. Funding was provided by the National Park Service, Southwest Area Network (SWAN), to: 1) establish a conduit for data exchange with AKN (Cornell Bird Laboratory); 2) to compile, synthesize, an historical bird data from SWAN network parks into AKN; 3) develop a standard operating procedure for NPS staff to enter bird observations into AKN.

This project occurred in two phases. During the first phase, we entered 6,006 incidental bird observations for 183 species from the Southwest Network of National Parks into the AKN

database. Once SWAN personnel reviewed the data entered, they provided us with additional funds to add more recent breeding bird and coastal survey data into AKN. During Phase II, we entered an additional 29,575 records for 173 species from NPS bird surveys in southwest Alaska into AKN.

OBJECTIVE 3: Update and maintain Biotics database, and develop web-ready products.

We added 9,561 new source features (Spatial Observations) into the Biotics system and generated 307 Element Occurrence (Ranges). We also updated historical source features of some species and regenerated Element Occurrences. Since data has visualized online into the web, we put additional effort on data availability, data integrity, and data consistency via frequent backup, routine maintenance, patch update and integrity check. We successfully completed data exchange with Natureserve, gave most current version of Biotics state data and received latest Biotics global data.

We developed, implemented and maintained a searchable on-line system for species of concern data. We worked with Axiom Consulting and Design to develop the new AKNHP webpage and a web-based searchable spatial database for rare species (Biotics rare species portal accessible at: http://aknhp.uaa.alaska.edu/maps/biotics). Users of the website are able to access spatial and tabular information on rare plants and animals. In additional to information on just rare species, the portal also serves tabular information (species conservation status summary reports) for more commonly occurring birds, mammals and amphibians (species with status ranks S4 and S5), and download range maps (pdf and JPEG formats). Additionally users can view spatial data for multiple species at a time on an interactive map and utilize advanced query functions to generate lists of species based on conservation status (listed threatened and endangered, etc...) and geography (BCR, ecoregion, etc...).

We filled formal and many informal data request from different organizations. Most of the data requests were about TES species, invasive and rare plants within the range of specific project affecting areas, categorized by different agencies. We also prepared separate range maps of species for different agencies and used that range map information to respond data request together with our Biotics data. The entire data requests were responded with in the mentioned dateline.

We updated and created new EOs for S1-S3 and G1-G3 species. The first step in this process was to prioritize species whose Element Occurrences (EOs: spatial data denoting occurrence) were outdated and needed updating and secondly, to identify species that did not already have EOs created. We generated a list of all bird, animal and amphibian species with ranks S1 to S3. Any species with high ranks (S1 and S2) whose EOs had not been updated in over 5 years became priorities for updates. Then, priority was given to producing new EOs also based on species with the highest ranks.

We selected 13 species to update EO data for. Spatial information was acquired from researchers that specialized in particular species and also from the literature. Of these 13 species selected,

new spatial information was only available for 5 of the species after numerous inquiries and literature review. Thus, we are able to consider information current for all 13 species (See Table 1 below).

We also selected 30 species with ranks of S1-S3 to create new EOs. Although we were able to obtain spatial data for all 30 species, data for 5 of the species were not sufficient to use for EO development (they did not show persistence of habitat use in any area over time); these included: Swainson's Hawk, Tennessee Warbler, Gray-headed Chickadee, Blue Whale and California Ses Lion). Data for these 5 species was retained in the Biotics archives and can be revisited to potentially track range expansion of these species into Alaska.

All spatial and associated attribute information for both updated and new EOs was uploaded into the Biotics database and should be fully accessible via the Biotics rare species web-portal.

We also continue to be affiliated with the Alaska Citizen Science Program (http://www.adfg.alaska.gov/index.cfm?adfg=citizenscience.main) and host the web-portal for the Alaska wood frog, loon and grebe, and bat monitoring projects, and continue to update web content as needed. We also consolidate all the data generated by the projects and use it to update EOs in the Biotics database, particularly for bats and frogs.

OBJECTIVE 4: Develop habitat maps and descriptions of the habitats and ecological processes that support the G1-G3 and Category 1 and 2 nongame species

WE updated the plant association and ecological system data within Biotics. Information sources included The Alaska Vegetation Classification (Viereck et al. 1992), and a literature search of post-Viereck et al. (1992) plant association classifications in Alaska. We also updated the literature citations (source abstracts) within Biotics. We then listed and crosswalk all plant associations in Alaska and ranked them (G1-G5).

We heads-up digitized using ARCGIS the boundaries of the various plant association classifications developed for Alaska. We completed this task, digitizing the boundaries of 160 classifications.

We developed a new landcover map for Alaska. We accomplished this by mosaicking together all available maps into two maps that, together, cover all of Alaska: 1) Vegetation map and classification northern, western and interior Alaska, and 2) Vegetation Map and Classification: Southern Alaska and Aleutian Islands.

We also developed the following products for each map:

- Coarse-scale vegetation map (accessed through the AKNHP website: http://aknhp.uaa.alaska.edu/)
- Key to coarse-scale vegetation classes
- Coarse-scale class descriptions

- Fine-scale vegetation map (accessed through the AKNHP website: http://aknhp.uaa.alaska.edu/)
- Fine-scale legend

All the products can be downloaded at http://aknhp.uaa.alaska.edu/ecology/landcover-maps/

IV. MANAGEMENT IMPLICATIONS

Every aspect of this proposal contributed to the conservation of nongame wildlife in Alaska. Sub-objective 1 completed the systematic statewide species ranking process (ASRS) for nongame wildlife in Alaska. This will enable the Wildlife Diversity Program and other conservation efforts to prioritize efforts to fill data gaps and direct actions toward species of greatest conservation need.

Sub-objective 2 established the Avian Knowledge Network node for Alaska, Yukon and BC. This significantly increased our understanding of the patterns and dynamics of bird populations across Alaska and the Western Hemisphere. Partners include Audubon Society, Cornell University, the Bird Conservation Network, Ducks Unlimited, and many other organizations.

Sub-objective 3 developed web-ready products for the Heritage Program data and ASRS. This easily accessed web portal provides needed information to wildlife managers to make informed decisions based on scientific data. It also contributes to the funding of the essential operation, maintenance, and management functions of the conservation database repository. Partners include NatureServe and The Nature Conservancy.

Sub-objective 4 helped develop habitat maps and descriptions of the habitats and ecological processes that support G1-G3 and Category 1 and 2 species. From this, we can evaluate what plant communities are not adequately represented in existing conservation lands. This will also enable managers to take a more ecosystem based approach when dealing with habitat changes, including connectivity corridors, for use in designing and planning growth. The BLM also helped fund this objective.

Please provide suggestions for further work (i.e. what did this study show us, and where do we go from here)?

We need a better vegetation (landcover) map for Southeast Alaska and also the Aleutian Islands. The remainder of Alaska has been mapped.

V. SUMMARY OF WORK COMPLETED ON JOBS

OBJECTIVE 1: Complete the Alaska Species Ranking System (ASRS).

JOB/ACTIVITY 1A: Update taxonomic nomenclature and Heritage Conservation Status ranks for previously ranked species.

Accomplishments: We completed this task. We updated all taxonomic nomenclature according to national standards. For birds, we used the Fiftieth Supplement to the American Ornithologists' Union Checklist of North American Birds (Chesser et al. 2009); for amphibians we followed taxonomy according to Frost et al. (2006); for mammals we used taxonomy synonomous with MacDonald and Cook (2009). All taxonomic changes were applied directly to the ASRS and also entered into the Heritage Programs' Biotics database.

Chesser, T.R., R.C. Banks, F.K. Barker, C. Cicero, J.l. Dunn, A.W. Kratter, I.J. Lovette, P.C. Rasmussen, J.V. Remsen, J.D. Rising, D.F. Stotz and K. Winker. 2009. Fiftieth Supplement to the American Ornithologists' Union Checklist of North American Birds. The Auk 126:705-714.

Frost, Grant, Faivovich, Bain, Haas, Haddad, De Sá, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green & Wheeler. 2006. The Amphibian Tree of Life. Bulletin of the American Museum of Natural History 297: 1-37.

MacDonald, S.O and J.A. Cook. 2009. Recent mammals of Alaska. University of Alaska Press. Fairbanks, Alaska.

JOB/ACTIVITY 1B: Score/rank 100 additional vertebrate taxon.

Accomplishments: We completed this task. We ranked 40 species in 2009 and 68 species in 2010. We also ranked an additional 52 new species in 2011 (most of these had low S ranks of S4 to S5). The total number of species now ranked with information entered into the ASRS is 492, and includes all S1-S5 bird, mammal and amphibian species and subspecies in Alaska.

JOB/ACTIVITY 1C: Enter biological and action data from ASRS into the Biotics database and update web products serving this information.

Accomplishments: We completed this task. Before we could enter biological and action data from the ASRS into AKNHPs Biotics database, we first had to crosswalk fields between the two systems and then transfer the information manually, to insure that we were not overwriting important information already housed in Botics. To do so, we developed an Access database and user interface to speed the manual data entry. We then cross-walked all biological, action, status and threat variables from the ASRS into Biotics for all species that have been ranked to date (n = 492). This updated information was then used to update Heritage Conservation Status Ranks for individual species and subspecies. In order to serve this information directly on the web, we designed a species conservation status summary report that presents information regarding species taxonomy, biology, ecology, distribution, and status for each species. The summary report is automatically formatted and populated from Biotics so that information is current and

dynamic. The conservation status summary reports are served from the "Rare Species" portal at the AKNHP website (http://aknhp.uaa.alaska.edu/maps/biotics).

JOB/ACTIVITY 1D: Develop website and post products.

Accomplishments: We completed this task. We worked closely with Axiom Consulting and Design to develop a project specific web-site for the ASRS (http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content) as well as linkages to the Wildlife Diversity Program (http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/#content), which can be accessed via the AKNHP Zoology Program webpage. The link to the Wildlife Diversity Program provides basic information about the Cooperative Program between AKNHP and the Alaska Department of Fish and Game Wildlife Diversity Program (http://aknhp.uaa.alaska.edu/zoology/programs/adfg-wildlife-diversity-cooperative/) and the current projects we are sharing. The ASRS web-site provides project specific information about the Alaska Species Ranking System, and was “rolled-out” over the course of 3 years. During year 1 we developed a basic web-page with links to the project final report. During year 2 we developed a species search tool and provided the capabilities to produce species list and sort using specified criteria. The species status reports, lists and range maps were all provided in downloadable formats.

JOB/ACTIVITY 1E: Update web products

Accomplishments: Described under JOB/ACTIVITY 1D: Develop website and post products. We prepared species status reports as pdf files and range maps as jpg files. These products were made available via the ASRS web-site during the second year of the roolout.

JOB/ACTIVITY 1F: Conduct expert review for all species ranked including species ranked during previous work and additional 100 species ranked during this contract.

Accomplishments: After discussions with ADF&G Wildlife Diversity staff, we collectively agreed not to complete this task. Instead, we elected to provide a mechanism on the ASRS web-page for users to provide comments about individual species. However, throughout the duration of the project we did receive expert review on approximately 127 taxa.

JOB/ACTIVITY 1G: Develop on-line review system; includes submittal forms - one for system errors and one for scoring changes (replacing pers. comm. with data). (DB Manager)

Accomplishments: We completed this task. At the bottom of the ASRS web-site (http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content), we included a mechanism to submit comments about specific species or scores for specific species.

JOB/ACTIVITY 1H: Assist ADF&G with presentations to cooperators including conferences, meetings, and publications.

Accomplishments: We completed this task.

JOB/ACTIVITY 1I: Complete annual review of on-line comments

Accomplishments: We completed this task.

JOB/ACTIVITY 1J: Update Bioscores and Actions Scores of high ranking species

Accomplishments: We completed this task. We were provided a list of taxa that needed review by Wildlife Diversity staff, and this included all S1-S3 taxa. We updated all information in the ASRS for taxa on this list. This process included literature review and calling upon experts when literature was lacking.

JOB/ACTIVITY 1K: Develop final project report/Manuscript

Accomplishments: We completed this task. The final project report was completed in December 2012. This included an internal review by Wildlife Diversity Staff. The full project report is accessible at the ASRS web-site: http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content.

OBJECTIVE 2: Establish the framework for developing the Alaska, Yukon and BC node for the Avian Knowledge Network.

JOB/ACTIVITY 1A: Convene meeting with Cornell personnel to identify hardware and software needs.

Accomplishments: We completed this task. We met with Brian Sullivan, the data manager for the Avian Knowledge Network (AKN) to discuss hardware, software and data entry needs. We developed a portal for data exchange.

JOB/ACTIVITY 1B: Install AKN digger on UAA server, etc.

Accomplishments: We installed the proper software on the UAA server.

JOB/ACTIVITY 1C: Pursue external funding for developing the AVN for Alaska

Accomplishments: We completed this task. During this fiscal year, we made great strides in procuring external funds to explore the potential for developing an AKN node for Alaska. Funding was provided by the National Park Service, Southwest Area Network (SWAN), to: 1) establish a conduit for data exchange with AKN (Cornell Bird Laboratory); 2) to compile, synthesize, an historical bird data from SWAN network parks into AKN; 3) develop a standard operating procedure for NPS staff to enter bird observations into AKN.

This project occurred in two phases. During the first phase, we entered 6006 incidental bird observations for 183 species from the Southwest Network of National Parks into the AKN database. Once SWAN personnel reviewed the data entered, they provided us with additional funds to add more recent breeding bird and coastal survey data into AKN. During Phase II, we entered an additional 29,575 records for 173 species from NPS bird surveys in southwest Alaska into AKN.

JOB/ACTIVITY 1D: Begin to acquire and prioritize avian datasets for data entry from Biotics and ADF&G.; begin data entry into AKN

Accomplishments: We accomplished this task. (see above)

OBJECTIVE 3: Update and maintain Biotics database, and develop web-ready products.

JOB/ACTIVITY 1A: Maintain Biotics database.

Accomplishments: We completed this task. We added 9,561 new source features (Spatial Observations) into the Biotics system from 63 different species and generated 307 Element Occurrence (Ranges). We also updated historical source features of some species and regenerated Element Occurrences. Since data has visualized online into the web, we put additional effort on data availability, data integrity, and data consistency via frequent backup, runtine maintenance, patch update and integrity check. We successfully completed data exchange with Natureserve, gave most current version of Biotics state data and received latest Biotics global data.

JOB/ACTIVITY 1B: Develop, implement and maintain searchable on-line system for species of concern data.

Accomplishments: We worked with Axiom Consulting and Design to develop the new AKNHP webpage and a web-based searchable spatial database for rare species (Biotics rare species portal accessible at: http://aknhp.uaa.alaska.edu/maps/biotics). Users of the website are able to access spatial and tabular information on rare plants and animals. In additional to information on just rare species, the portal also serves tablular infomation (species conservation status summary reports) for more commonly occurring birds, mammals and amphibians (species with status ranks S4 and S5), and download range maps (pdf and JPEG formats). Additionally users can view spatial data for multiple species at a time on an interactive map and utilize advanced query functions to generate lists of species based on conservation status (listed threatened and endangered, etc...) and geography (BCR, ecoregion, etc...).

JOB/ACTIVITY 1C: Fill data requests.

Accomplishments: We filled all formal and informal data request from different organizations. Most of the data requests were about TES species, invasive and rare plants within the range of

specific project affecting areas, categorized by different agencies. We also prepared separate range maps of species for different agencies and used that range map information to respond data request together with our Biotics data. The entire data requests were responded with in the mentioned dateline.

JOB/ACTIVITY 1D: Update/ create new EOs for S1-S3 and G1-G3 species.

Accomplishments: The first step in this process was to prioritize species whose Element Occurrences (EOs: spatial data denoting occurrence) were outdated and needed updating and secondly, to identify species that did not already have EOs created. We generated a list of all bird, animal and amphibian species with ranks S1 to S3. Any species with high ranks (S1 and S2) whose EOs had not been updated in over 5 years became priorities for updates. Then, priority was given to producing new EOs also based on species with the highest ranks.

We selected 13 species to update EO data for. Spatial information was acquired from researchers that specialized in particular species and also from the literature. Of these 13 species selected, new spatial information was only available for 5 of the species after numerous inquiries and literature review. Thus, we are able to consider information current for all 13 species (See Table 1 below).

We also selected 30 species with ranks of S1-S3 to create new EOs. Although we were able to obtain spatial data for all 30 species, data for 5 of the species were not sufficient to use for EO development (they did not show persistence of habitat use in any area over time); these included: Swainson's Hawk, Tennessee Warbler, Gray-headed Chickadee, Blue Whale and California Sea Lion). Data for these 5 species was retained in the Biotics archives and can be revisited to potentially track range expansion of these species into Alaska.

All spatial and associated attribute information for both updated and new EOs was uploaded into the Biotics database and should be fully accessible via the Biotics rare species web-portal.

JOB/ACTIVITY 1E: Zoology data (i.e. citizen science)

Accomplishments: We continue to be affiliated with the Alaska Citizen Science Program (http://www.adfg.alaska.gov/index.cfm?adfg=citizenscience.main). We host the web-portal for the Alaska wood frog, loon and grebe, and bat monitoring projects, and continue to update web content as needed. We also consolidate all the data generated by the projects and use it to update EOs in the Biotics database, particularly for bats

OBJECTIVE 4: Develop habitat maps and descriptions of the habitats and ecological processes that support the G1-G3 and Category 1 and 2 nongame species

JOB/ACTIVITY 1A: Update the plant association and ecological system data within Biotics.

Accomplishments: We completed this task. Information sources included The Alaska Vegetation Classification (Viereck et al. 1992), and a literature search of post-Viereck et al. (1992) plant association classifications in Alaska. We also updated the literature citations (source abstracts) within Biotics. We then listed and crosswalk all plant associations in Alaska and ranked them (G1-G5).

JOB/ACTIVITY 4B: We will heads-up digitize using ARCGIS the boundaries of the various plant association classifications developed for Alaska.

Accomplishments: We completed this task, digitizing the boundaries of 160 classifications (Figure 2).

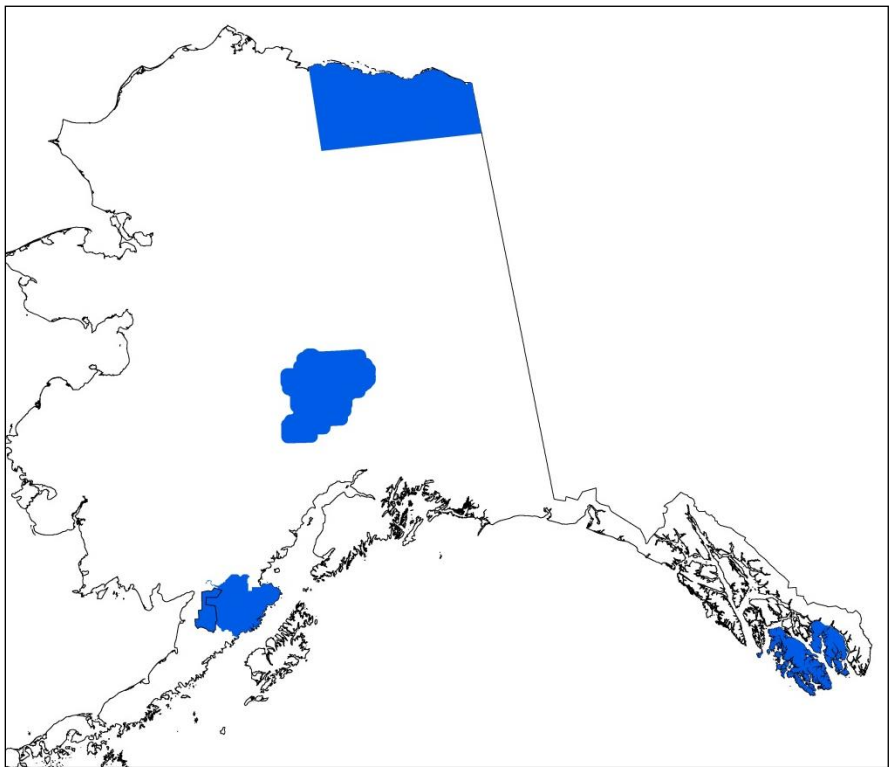


Figure 2. Boundaries of five of the 160 plant association classifications developed for Alaska

JOB/ACTIVITY 4C: The next step is to develop descriptions of the habitats and ecological processes that support the Category 1 and 2 and G1-G3 species.
JOB/ACTIVITY 4D: The final step is to use these habitat descriptions to improve the GAP habitat maps and to tease out critical habitats for the species of concern.

Accomplishments: We had planned to use the LANDFIRE ecological systems map (landcover map) for our base map. But it had a poor accuracy and we were not able to use it to complete 4C or 4D. To remedy the lack of a statewide landcover map, in agreement with Mary Rabe, we used

the funding for 4C and 4D to develop a landcover map for Alaska. We accomplished this by mosaicking together all available maps into two maps that, together, cover all of Alaska: 1) Vegetation map and classification northern, western and interior Alaska (Figure 1), and 2) Vegetation Map and Classification: Southern Alaska and Aleutian Islands (Figure 2).

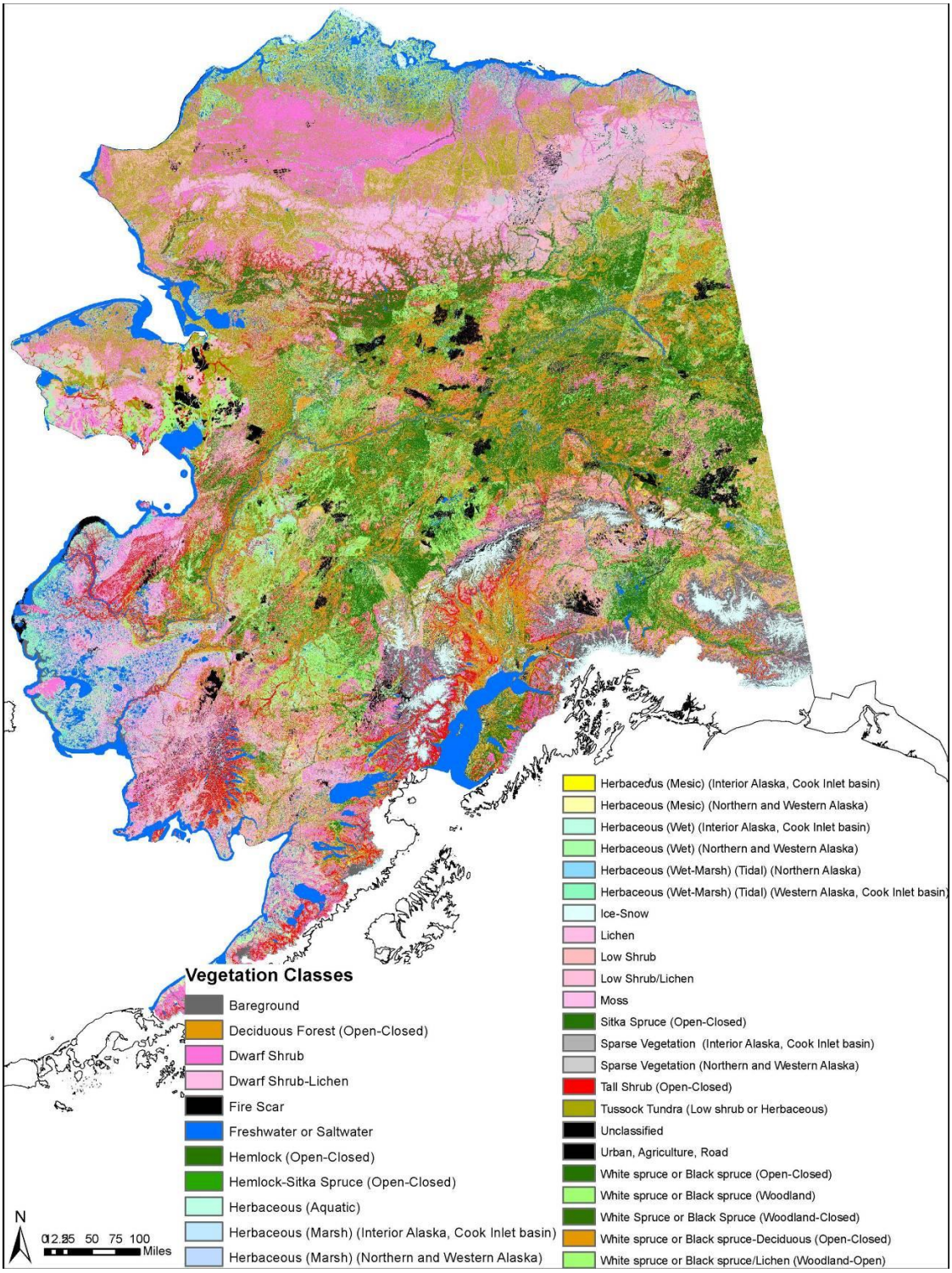


Figure 1. Vegetation map and classes for Northern, Western and Interior Alaska.

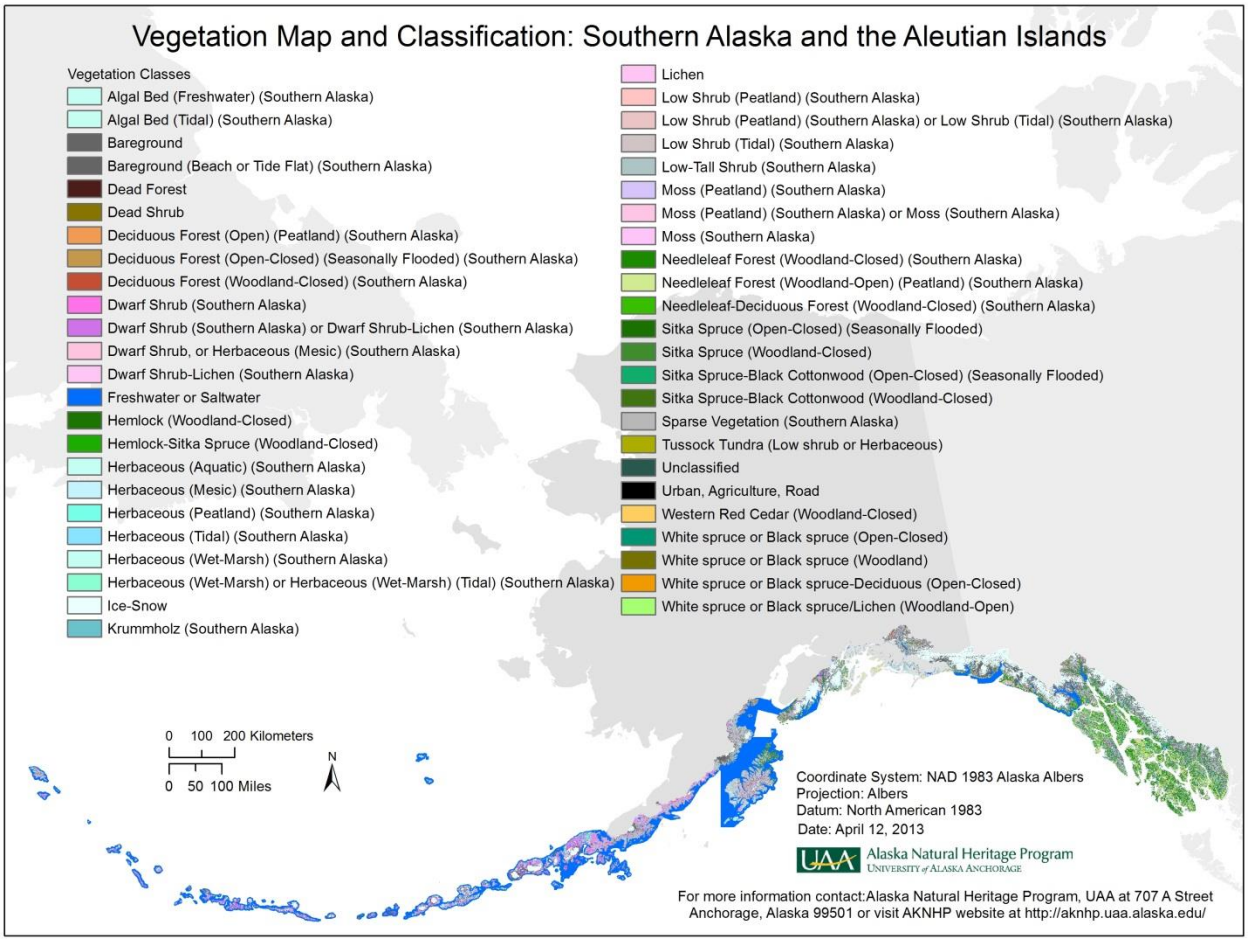


Figure 2. Vegetation map and classes for Southern Alaska and the Aleutian Islands.

We developed the following products for each map:

- Coarse-scale vegetation map (accessed through the AKNHP website: http://aknhp.uaa.alaska.edu/)
- Key to coarse-scale vegetation classes
- Coarse-scale class descriptions
- Fine-scale vegetation map (accessed through the AKNHP website: http://aknhp.uaa.alaska.edu/)
- Fine-scale legend

All the products can be downloaded at http://aknhp.uaa.alaska.edu/ecology/landcover-maps/

Once the landcover maps were completed we were able to complete OBJECTIVE 4: JOB/ACTIVITY 4B to develop descriptions of the habitats and ecological processes that support the Category 1 and 2 and G1-G3 species. The results are in the report: Alaska Biophysical Settings and Plant Associations of Conservation Concern by Keith Boggs, Brian Heitz, and

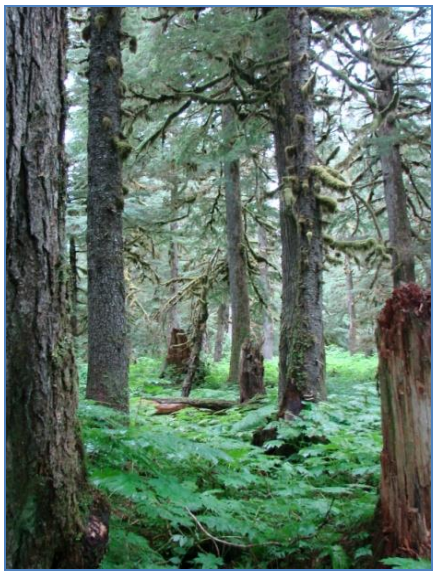
Lindsey Flagstad. They will be downloadable on the web page Ecosystems and Plant Associations of Conservation Concern http://aknhp.uaa.alaska.edu/ecology/landscapes-and-plant-associations-of-conservation-concern/ in the near future. The results are in final review by various ecologists in ADF&G, USDA Forest Service, USDI BLM, USDI NPS, and USDI FWS.

The following is an example of one description.

Floodplain Old Growth Sitka Spruce Forest Plant Association

Conservation Status Rank: G3 S3

Introduction
Old growth Sitka spruce forests on floodplains and outwash plains are characterized by high canopy cover of mature Sitka spruce, an abundance of snags and downed wood, and a diverse shrub and forb layer (Old-Growth Definition Task Group 1991). The floodplains of southeast Alaska may contain the highest densities of the largest old growth Sitka spruce trees in North America. These forests are recognized as reservoirs of biodiversity, (Franklin 1989) contain relatively high levels of endemism and species richness, provide important winter refugia for birds and mammals, and support unequalled anadramous fish runs (Samson et al 1989, DellaSalla et al. 1994, 1996).



Figures 1 and 2: Old-growth Sitka spruce floodplain forests along the Stikine River, Alaska.

Distribution
Sitka spruce frequently occurs in many forest types ranging from northern California through southeast and south central Alaska to Kodiak Island. In Washington and Oregon, the Sitka spruce zone is generally only a few kilometers wide and at elevations below 150 meters within the coastal fog drip zone (Franklin and Dyrness 1973, Hemstrom and Logan 1986). In Alaska, the Sitka spruce zone is wider and extends to higher elevations (up to 700 m), and includes well-drained alluvial fans, floodplains, outwash plains, coastal beach fringes, and steep erosional slopes. It achieves dominance in climax old-growth stands on only a small portion of the landscape (Martin 1989). Albert and Schoen (2006) estimate that there are 2,350 km² of productive old growth on valley floors in the Alexander Archipelago, much of which may include Sitka spruce forest on floodplains (Figure 3).

Figure 3. Distribution of floodplain old-growth Sitka spruce forests across Alaska. Note that the polygons in this map are exaggerated so the reader can see them.

Vegetation

Sitka spruce dominates the overstory and western hemlock may be common, usually providing less than 25% cover. When co-dominant, western hemlock canopies occupy the layer beneath the spruce (Martin 1989, Vierick 1992). Red alder and black cottonwood are occasional in the overstory.

Old growth Sitka spruce forests support several different plant communities associated with different disturbance regimes and moisture conditions (Martin 1989). An abundance of *Alnus* and predominance of undeveloped soils (*e.g.* entisols or inceptisol) are indicative of younger sites or sites with recent sediment deposition from flooding. *Oplopanax horridus* shrubs are common in the understory.

The presence of soil development (spodic soils) is indicative of low magnitude flooding rather than high magnitude events, and *Vaccinium* shrubs (along with *Oplopanax*) provide high cover. Other herbaceous plants include *Tiarella trifoliata, Rubus pedatus, Calamagrostis nutkaënsis, Streptopus* spp. and ferns *Gymnocarpium dryopteris*, *Dryopteris dilitata*, and *Athyrium felix-femina*. Bryophytes are usually abundant on the forest floor and within the canopies. *Lysichiton americanum* is often present on the forest floor in areas with poorly drained and seasonally wet soils. Floodplains and deltas on the outer Pacific coastal side of islands that are subject to salt spray, high winds, and storms, the shrub layer may be sparse or absent and the herb layer dominated by *Calamagrostis nutkaënsis.*

Environmental Characteristics

Mainland river systems are mostly glacial fed from large, nearly continuous glaciers of the Coast Range. Streams on the islands are generally very short (less than 25 km). Some of these streams are fed by high mountain glaciers, but most originate form high surface rainfall runoff. Soil and air moisture is high and fires are rare. When they do occur, fires rarely reach the spruce canopy, and burn out in the humid understory conditions below.

Soils: The underlying soils are mostly comprised of alluvial sand and gravel deposited during flooding events and are well drained. Flooded soils usually show little soil profile development and are often classified as Entisols or Inceptisols (Martin et al. 1995). Older sites may support spodisols.

Climate: Southern Alaska has a cool wet maritime climate (Gallant et al. 1995, Nowacki et al. 2001). The Coastal Rainforests mean annual precipitation ranges from 135 to 390 cm with 80 to 600 cm falling as snow. Average summer temperatures range from 7 to 18 °C; average winter temperatures range from -3 to 3°C. Consequently, these forests have developed under relatively short, cool, and extremely wet growing seasons. Rainfall and temperature show highly variable pattern dependent upon proximity to mainland ice-fields, the Pacific Ocean, topography, and regional weather patterns.

Succession
Old growth Sitka spruce forests form on both outwash plains and floodplains. Outwash plains are formed by glacial streams that spread sediment across wide areas as a massive plain. Two primary factors create and sustain outwash plains: (1) during summer, there are rapid and drastic changes in water discharge rates, and (2) a large sediment supply in the river that is deposited on the plain.

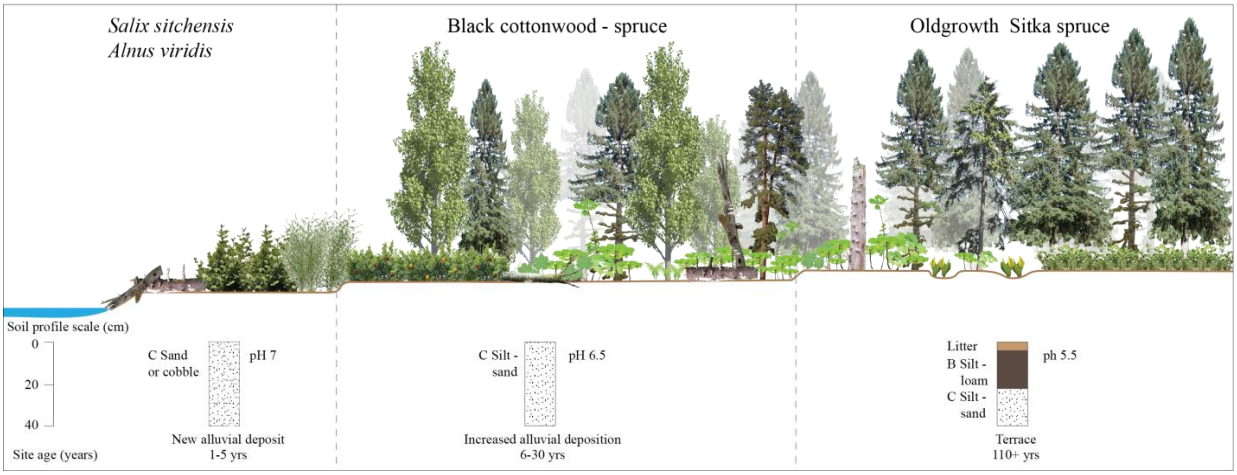


Figure 4. Idealized floodplain seral sequence.

In contrast, floodplains are mostly non-glacial consisting of meandering or straight active streams, abandoned channels, and alluvial terraces. The formation of new land in floodplain ecosystems is well documented (Leopold and others 1964). Along a meandering river, alluvium typically is deposited on convex curves in the river channel. The opposing concave bank is cut, providing sediment for deposition on convex curves downstream and creating a series of similar bands of alluvial deposits. The channel thus meanders laterally across the floodplain. Vegetation growing on new deposits near the river may be contrasted with that on older deposits inland to recognize and measure successional processes. Alluvium also is deposited on the soil surface

(flooding), groundwater, and precipitation and terraces become progressively drier as they are vertically and horizontally removed from the active channels.

On both outwash plains and floodplains, new alluvial bars or abandoned stream channels are colonized by tree, shrub, and herbaceous species including black cottonwood, Sitka spruce, alder and willow.The next successional stage includes black cottonwood and/or Sitka spruce forests with an alder or bryophyte understory. The tall shrub component of the early-successional stages diminishes rapidly, probably because of decreased light from the dense tree overstory. Black cottonwood does not regenerate and, consequently, dies out within 150 years, whereas Sitka spruce exhibits healthy regeneration and dominates the sites with a multilayered old-growth tree canopy. Western hemlock ultimately invades the sites, typically codominating with Sitka spruce.

Wind is an important factor causing change in the vegetation on floodplains. While individual treefall due to high wind speed is common throughout the forest, stand level disturbances are less common (Martin 1989) and are usually associated with fall and winter storms (Ott 1993). High rainfall and shallow root systems contribute to the susceptibility of Sitka spruce and western hemlock to windfall. Treefall results in canopy gaps and alteration of the microclimate of the understory plants below. Although seedlings of both spruce and hemlock are common, conditions generally favor spruce regeneration. Most regeneration of spruce and hemlock occurs on logs (Schrader 1998), which are nutrient rich habitats where seedlings are less susceptible to floods and avoid competition from forest floor mosses (Harmon 1986, Harmon and Franklin 1989).

Large spruce trees often develop heart-rot (*Neolentinus kauffmanii*), causing trunks to break (Boughton et al. 1992). As compared with other old growth conifer forests, old growth Sitka spruce forests have more large downed logs and fewer standing dead trees (snags).

Conservation Status
These forests are recognized as reservoirs of biodiversity, (Franklin 1989) contain relatively high levels of endemism and species richness, provide important winter refugia for birds and mammals, and support unequalled anadramous fish runs (Samson et al 1989, DellaSalla et al. 1994, 1996a). The capacity of these forests to sequester and store carbon and the role they play in regional and global climates are also of global significance (Waring and Franklin 1979, Alaback 1991).

Rarity: In southern coastal Alaska, old growth forests growing on well drained alluvial and riparian soils are relatively rare (62,000 ha), and it is highly probable that the largest big tree stands of this forest types have already been eliminated from the region (Albert and Schoen 2006).

Trend: Past logging practices, including the broad-scale clearing of riparian forests has occurred disproportionately on low elevation old-growth Sitka spruce forest on floodplains and alluvial fans and at rates of 1.6 times their availability. It has been estimated that the percentage of big-tree old-growth forest logged in the southeast region likely lies between 28-50% (Albert and Schoen 2006).

Threat: Old growth Sitka spruce forests on floodplains are susceptible to damage from logging and human development. Logging in old-growth forests has a negative impact on several species including northern goshawk (*Accipiter gentilis laingi*), Alexander archipelago wolf (*Canis lupus lingoni*), martern (*Martes americana*), northern flying squirrel (*Glaucomys sabrinus*), brown bear (Suring et al. 1993), and some neotropical and resident birds (DellaSala et al. 1996).

Species of Conservation Concern

The species listed below are designated critically imperiled or vulnerable either globally (G1-G3)[1] or within Alaska (S1-S3) (Faber-Langendoen et al. 2009), and occur or potentially occur in this Plant association. For literature citations associated with each species please see the Alaska Natural Heritage Program, UAA's web page and select the individual species (http://aknhp.uaa.alaska.edu/).

Mammals and Birds

Species		Rank G	Rank S	Description
Alexander Archipelago Wolf	*Canis lupus ligoni*	G4T2T3	S3	Primarily found in rugged coastal spruce-hemlock forests supporting prey such as deer, small mammals, and spawning salmon.
Keen's Myotis	*Myotis keenii*	G2G3	S1S2	In SE Alaska, occur primarily in coniferous forests with females preferring old-growth forests and cedar trees in riparian areas for day roosts.
Prince Of Wales River Otter	*Lontra canadensis mira*	G5T3T4	S3	In SE Alaska, occur primarily in uneven aged old-growth dominated by hemlock/spruce and hemlock.
Prince of Wales Flying Squirrel	*Glaucomys sabrinus griseifrons*	G5T2?	S2	Old growth western hemlock-Sitka spruce forests, and peatland scrub-mixed-conifer forests. Dens in tree cavities and woodpecker holes.
Marbled Murrelet	*Brachyramphus marmoratus*	G3G4	S2S3	Nest in old-growth hemlock and Sitka spruce on moss-covered trunks, or on ground near sea-facing talus slopes or cliffs.
Queen Charlotte Goshawk	*Accipiter gentilis laingi*	G5T2	S2	Nest in either Sitka spruce or western hemlock. Typically hunt in continuous forests.

Plants

Species	Rank G	Rank S	Description
Polystichum setigerum	G3	S3	This fern is endemic to coastal northwest British Columbia and southeastern Alaska. Disjunct populations occur on Attu Island at the western tip of the Aleutian Archipelago. It grows on forest floors in lowland coastal forests, forest edges, and along run-off channels at elevations ranging from sea level to 250 meters.

[1] Conservation status ranks estimate extinction or elimination risk posed to a species or ecological community, respectively. Ranks range from 1 = critically imperiled to 5 = secure, and consider the rarity, trend and threats to a given species or ecological community. Ranks are collaboratively designated by the conservation group, NatureServe and their partner organizations on global (G) and statewide (S) levels. See http://www.natureserve.org/explorer/ranking.htm for further explanation.

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ALASKA DEPARTMENT OF FISH AND GAME
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VI. PUBLICATIONS

The results of the ASRS ranking process are at ASRS web-site http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content

Species conservation status summary reports are served from the "Rare Species" portal at the AKNHP website (http://aknhp.uaa.alaska.edu/maps/biotics).

ASRS web-site (http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content) provides project specific information about the Alaska Species Ranking System. It also provides a species search tool and provided the capabilities to produce species list and sort using specified criteria.

We developed an ASRS on-line review system; includes submittal forms - one for system errors and one for scoring changes (http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content), we included a mechanism to submit comments about specific species or scores for specific species.

The final ASRS project report is accessible at the ASRS web-site: http://aknhp.uaa.alaska.edu/zoology/wildlife-diversity/asrs/#content.

We developed an Avian Knowledge Network (AKN) portal for data exchange with Yukon and BC and Cornell University.

We developed a new web-based searchable spatial database for rare species (Biotics rare species portal accessible at: http://aknhp.uaa.alaska.edu/maps/biotics).

We updated/ created new EOs for S1-S3 and G1-G3 species. All spatial and associated attribute information for both updated and new EOs was uploaded into the Biotics database and are fully accessible via the Biotics rare species web-portal. : http://aknhp.uaa.alaska.edu/maps/biotics).

We continue to be affiliated with the Alaska Citizen Science Program (http://www.adfg.alaska.gov/index.cfm?adfg=citizenscience.main). We host the web-portal for the Alaska wood frog, loon and grebe, and bat monitoring projects, and continue to update web content as needed. We also consolidate all the data generated by the projects and use it to update EOs in the Biotics database, particularly for bats and frogs.

We updated the plant association data for Alaska including literature citations and ranked all associations. The data can be accessed at http://aknhp.uaa.alaska.edu/ecology/landscapes-and-plant-associations-of-conservation-concern/

We will heads-up digitize using ARCGIS the boundaries of the 160 plant association classifications developed for Alaska. This can be obtained via an AKNHP data request.

Boggs, K., T.V. Boucher, T.T. Kuo, D. Fehringer, and S. Guyer. 2012. Vegetation map and classification: Northern, Western and Interior Alaska. Alaska Natural Heritage Program, University of Alaska Anchorage, Anchorage, Alaska. 88 pgs http://aknhp.uaa.alaska.edu/ecology/landcover-maps/

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Boggs, K., B. Heitz, and L. Flagstad. 2013. Alaska biophysical settings and plant associations of conservation concern. Alaska Natural Heritage Program, University of Alaska Anchorage, 707 A St., Anchorage, AK 99501 http://aknhp.uaa.alaska.edu/ecology/landscapes-and-plant-associations-of-conservation-concern/

VII. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

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