Statement of Corporate Qualifications

965 South 100 West, Suite 200
Logan, Utah 84321

Telephone: (435) 787-1490
Fax: (435) 787-1495

www.cirruses.com

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INTRODUCTION

Cirrus Ecological Solutions, L.C. (Cirrus) is a Logan, Utah, based consulting firm providing a wide range of natural resource and environmental planning and permitting services. These include comprehensive environmental compliance assistance, environmental impact assessment, biological inventory and analysis, physical resource inventory and analysis, natural resource management and planning, GIS services, and litigation support.

Our staff has training and experience in the pertinent natural and human resource disciplines and an in-depth knowledge of federal, state, and local environmental regulations. This knowledge and experience allow us to provide solutions to most natural resource management and environmental planning and compliance problems in a timely and cost-effective manner. The high standard of our work has earned the respect of a clientele that includes private industry, land management agencies, and regulatory agencies.

We are based in northern Utah, but our specialists have worked in most regions of the U.S., with the most cumulative experience in the Intermountain Region, the Desert Southwest, and the Pacific Northwest, including Alaska. Our staff is familiar with the consultation requirements, survey and analysis protocols, and reporting standards of all pertinent federal land management and regulatory agencies and their state government counterparts. We also have international experience, having completed work in Africa and Latin America.

SUMMARY OF SERVICES

Our principal service is assisting clients in natural resource management and environmental planning and in permitting actions involving federal and state regulatory and resource management agencies. What sets us apart in providing this service is our ability to plan in advance for environmental compliance, to coordinate multi-agency permitting processes, to facilitate effective public involvement activities, to build and manage multi-disciplinary analysis teams, to focus analysis on real issues, to maintain schedules and budgets, and to produce quality documentation.

We have provided these services on diverse projects involving winter and summer recreational development, grazing and livestock management, water development and water-quality assessment, energy development, real estate acquisition and development, land use planning and development, transportation, aviation, disturbed-site reclamation, wetland mitigation, waste management, research, and teaching. Representative projects are described under Project Profiles below. Our specific capabilities include the following:

ENVIRONMENTAL COMPLIANCE

- National Environmental Policy Act (NEPA): categorical exclusions (CEs), environmental assessments (EAs), and environmental impact statements (EISs).
- Federal Energy Regulatory Commission (FERC): hydroelectric relicensing, pipeline filings, development plans, environmental reports, site clearances, and environmental inspection.
- Endangered Species Act: biological evaluations and assessments, and threatened and endangered species clearances.
- Clean Water Act: Section 404 aquatic resource delineations (i.e., wetlands and other waters of the U.S.), permit applications, mitigation plans, and Section 401 permits.
- State environmental compliance (CEQA, Act 250).
- Environmental inspection during construction and post-construction monitoring.
- Environmental Site Assessments (ASTM standard).
- Stormwater pollution prevention plans (SWPPP) and National Pollution Discharge Elimination System (NPDES) permitting and inspection.
- Training in environmental compliance and permitting.

ENVIRONMENTAL IMPACT ASSESSMENT

- Wetland impact avoidance, assessment, and mitigation planning.
- Watershed, hydrologic, and flood-plain investigations.
- Wildlife impact assessment and mitigation.
- Grazing utilization and range condition studies.
- Aquatic impact assessment and stream, wetland, and marsh restoration.
- Disturbed site rehabilitation planning and implementation.
- Socioeconomic analysis and impact assessment.
- Visual resource analysis and impact assessment.

BIOLOGICAL INVENTORY AND ANALYSIS

- Wildlife, fish, and plant inventory and census.
- Terrestrial and aquatic habitat inventory and analysis.
- Surveys for threatened, endangered, and sensitive plant and animal species.
- Adamus Wetland Evaluation Techniques (WET).
- U.S. Environmental Protection Agency's Rapid Bioassessment Protocols for use in Streams and Rivers.
- Natural Resources Conservation Service's Stream Visual Assessment Protocol (SVAP).

PHYSICAL RESOURCE INVENTORY AND ANALYSIS

- Water quality and quantity surveys and assessments.
- Total Maximum Daily Load (TMDL) studies and plans.
- Air quality inventory and impact assessment.

NATURAL RESOURCE MANAGEMENT AND PLANNING

- Wildlife, fish, livestock, and vegetation management consulting and planning.
- Riparian habitat restoration planning and implementation.
- Residential development planning and landscape integration.
- Ranch resource inventory and management planning.

GEOGRAPHIC INFORMATION SYSTEM (GIS) SERVICES

- ESRI suite and open-source GIS software used for cartographic production and for natural resource planning, analysis, and research projects.
- GPS data collection and post processing.
- Aerial photography, satellite imagery, and their associated formats, projections, and coordinate systems.
- Large raster dataset creation and management.
- Geospatial databases using Access and PostgreSQL/PostGIS software use and maintenance.
- Spatial data quality control and associated attribute data management.
- Internet-based mapping services for up-to-date project progress, map printing, and database querying.

LITIGATION SUPPORT

- Analysis and expert witness services.

CORE STAFF

PROJECT DIRECTORS

Scott G. Evans, PhD
NEPA Specialist/Natural Resource Manager/Economist
Dr. Evans is experienced in natural resource, project, and business management, range science, economics, and livestock production. He has first-hand knowledge and experience in private as well as public aspects of resource use and management. In 2000, he founded Cirrus Ecological Solutions, LC, and has been active in its day-to-day operations since its inception. Since 1992, he has served as a NEPA project manager, a resource specialist, an expert witness, and a pipeline inspector. As a project manager, he has led numerous small and large NEPA analyses (focusing on recreation, livestock grazing, and energy related projects), several water quality projects, resource management plans, and environmental site assessments. He demonstrates expertise in the management of complex projects and on-the-ground decision making as well as an in-depth understanding of the environmental compliance process. He has provided expert witness testimony for range and livestock production issues. He worked as a head environmental inspector for pipeline construction and has provided oversight of various in reclamation efforts. He also taught at the university level in range economics and ranch inventory and management planning.

SENIOR RESOURCE SPECIALISTS/PROJECT MANAGERS

Neal E. Artz, PhD
NEPA Specialist/Natural Resource Manager/Social Scientist
Dr. Artz is a broad-based natural resource professional who has emphasized human aspects – from rural sociology to conflict resolution to policy analysis – in his 30+-year career. In 2000, he founded Cirrus Ecological Solutions, LC, and has been involved in its operations since its inception. Since 1992, he has worked in the environmental field as a consulting business owner/manager, an environmental project manager, a natural resource management specialist, a socioeconomic analyst, expert witness, and a pipeline inspector. He has demonstrated expertise in social and natural sciences, environmental compliance and permitting, rangeland management, reclamation, rehabilitation, and technical writing. In the past, he has worked in rangeland management, vegetation/habitat analysis and fire control for federal agencies and spent several years as a social scientist and natural resource management specialist on government-funded projects in Africa.

Eric K. Duffin, MS
Watershed Scientist/Hydrologist
Mr. Duffin has advanced training and professional experience in the field of watershed science since 1993. His expertise includes hydrology, soil physics, fluvial geomorphology, and computer science. He has experience as a project manager, managing several TMDL (water quality) and watershed planning projects for the State of Utah, working with Salt Lake County to develop an ecological health index for the Jordan River, and supporting hydroelectric relicensing processes with PacifiCorp Energy. He has managed field crews, served as watershed scientist on numerous NEPA project teams, and provided technical writing and editing for other physical and human-resource disciplines. He has examined snowmelt runoff, soil erosion, infiltration, evapotranspiration, and unsaturated soil moisture flow in sagebrush-steppe ecosystems. His experience includes evaluation and analysis of proposed watershed improvements, conducting hydrologic inventories, quantifying point and non-point source pollution, computer modeling, stream surveying, water quality sampling and monitoring, water quantity assessment, datalogger programming, and remote data retrieval.

John W. Stewart, MS
Terrestrial Ecologist/Wetland Specialist

Mr. Stewart is an experienced terrestrial ecologist dealing in a wide variety of natural resource issues, emphasizing botany, wetland delineation and permitting, wildlife, range management, and technical writing. Since 1993, his professional experience includes surveys for federally listed threatened, endangered, and candidate species as well as state and Forest Service sensitive species, ESA compliance (including biological impact assessments), general vegetation surveys and inventories, and community descriptions of habitats ranging from desert to alpine ecosystems. His wetland expertise includes jurisdictional delineation, functional value analysis, impact avoidance planning, 404 permitting, and mitigation planning and implementation. He has managed terrestrial surveys for plants and wildlife as part of the permitting process for geophysical surveys for oil and gas resources. He has worked on numerous NEPA project teams for a variety of projects and been an expert witness. He has provided project management and technical writing and editing for other biological, physical, and human-resource disciplines.

Justin Barker, BS
Aquatic Ecologist/Hydrologist

Justin is a broad-based natural resource professional who has emphasized environmental aspects from field research to data analysis to written and oral presentations in his 19-year career. As both a scientist and writer, he has gained experience in a wide range of environmental areas over his tenure with an emphasis on data collection and analysis, project planning and permitting, FERC licensing and relicensing, wetland determinations and permitting, fisheries surveys, water-quality data collection and analysis, threatened and endangered species surveys, modeling and technical writing. He managed the fish data collection on the Madison River in Montana, Henrys Fork River in Idaho, Row and Deschutes rivers in Oregon, and the San Juan River in New Mexico and Utah from 2000–2012. As a result, he has over 3,000 hours of boat electrofishing experience.

RESOURCE SPECIALISTS

Adam Clifford, MS
Wildlife Ecologist

Adam is a wildlife ecologist familiar with a range of general, game, and special-status wildlife species in aquatic, riparian, and upland habitats ranging from desert to alpine environments. He has been involved in multi-year and short-term research projects focusing on behavioral characteristics or habitat relationships of species including the greater sage-grouse, prairie chicken, ptarmigan, golden eagles, songbirds, several species of bats, mule deer, and several others. He has experience with numerous habitat, fish, and wildlife sampling and surveying techniques including: vegetation surveys, rangeland assessments, electrofishing, gill netting, nest surveys, songbird point counts, bird-call broadcasting, aerial wildlife counts, radio-telemetry, scat surveys, animal track surveys, bird and mammal trapping, and remote camera sampling. In addition to his field expertise, Adam is experienced with lab-based data analyses including: mammal scat-based diet analysis, bird crop content-based diet analysis, big game necropsies. Adam also has extensive experience with Geographic Information Systems (GIS) and remote sensing software. He earned a GIS Certification and has performed a wide range of spatial analyses on data from many different sources. He is experienced with vegetation and landcover classification, as well as habitat modeling.

ADMINISTRATIVE SUPPORT STAFF

Judith A. Seamons, BS
Office Manager/Document Production Specialist
Ms. Seamons is an experienced office manager, document production specialist, and desktop publisher. Since 1989, she has demonstrated expertise in completing high-quality ad campaigns, project proposals, and environmental documents, including EISs, EAs, technical reports, biological assessments and evaluations, and TMDL reports. She also has experience in desktop publishing. She is skilled in maintaining and indexing administrative records for NEPA projects. As a bookkeeper and office manager, she assists in all aspects of business management and administration on a daily basis.

NETWORKING

In addition to our in-house staff, we maintain sound, long-term working relationships with other firms and individuals offering technical expertise in specialized biological fields, civil engineering, stormwater management, surveying, air quality analysis, transportation engineering, noise assessment and management, landscape planning, mine planning, geologic assessment, environmental law, and archaeology and cultural resources. We are experienced at coordinating these staffing resources to manage the large multidisciplinary teams necessary to complete projects such as major environmental impact analyses and land-use plans.

PHYSICAL SUPPORT CAPABILITIES

We maintain the following equipment and other physical resources at our Logan, Utah, office:

- Vehicles and equipment to carry out field operations in all types of terrain and climates including pickup trucks, ATVs, snowmobiles, boats, etc.
- The capability to model biotic and abiotic processes, design and manage customized relational databases and Geographic Information Systems (GIS), and generate mapping and graphics using ESRI Suite, MapWindow, AutoCAD, PostgreSQL/PostGIS database software, and various other spatial analysis tools.
- Drone aircraft with various photographic and data-collection capabilities.
- Water quality and quantity sampling equipment.
- Global Positioning System (GPS) units for accurate spatial data gathering.
- Camping equipment for completing surveys in remote areas.

Our proximity to universities in Logan and Salt Lake City provides access to state-of-the-art research support resources. Minutes away from our office, Utah State University affords ready access to the Merrill Library, the Quinney Natural Resources Library, the Remote Sensing/GIS Laboratory, the Intermountain Herbarium, the Federal Documents Repository for the Intermountain Region, the Utah Water Research Laboratory and other university facilities. Proximity to the University of Utah provides access to additional resources, including the Eccles Health Sciences Library, Marriott Library, and the Quinney Law Library.

PROJECT PROFILES

Our staff has played central roles in the management and implementation of the following projects. Projects are grouped by the main industries Cirrus works with first, followed by projects that do not fall under these primary industries.

RECREATION PROJECTS

Alta Ski Lifts Master Development Plan Improvement Projects, Utah
Under third-party contract with the Wasatch-Cache National Forest and Alta Ski Lifts, Cirrus completed all phases of a NEPA analysis addressing a number of improvement projects from Alta's master development plan, including parking upgrades, improved avalanche control, lift replacements, lift additions, ski run work, and building additions and construction. An EA, a biological assessment, and a biological evaluation were prepared. This project began in 2016 and was completed in 2018.

Alta Ski Area Master Plan Amendment, Utah
Under third-party contract with the Wasatch-Cache National Forest and Alta Ski Lifts, Cirrus completed all phases of a NEPA analysis addressing a proposal to replace two older lifts with a single new detachable lift and to construct a major new base-area skier services structure adjacent to the lower terminal of the new lift. An EA, a biological assessment, and a biological evaluation were prepared. This project began in 2002 and was completed in 2004. Following up on this initial work, we continue to provide permitting support to Alta, including numerous resource surveys, drafting proposals to the Forest Service, and assistance in drafting Forest Service documents such as scoping notices, scoping reports, and decision memos for categorical exclusions.

Botany Report Concurrence, Utah
Under contract with SE Group, Cirrus completed technical review of botany field surveys completed by other consulting firms to document existing conditions of project development sites at Utah ski resorts including Snowbasin Ski and Summer Resort and Solitude Mountain Resort. Letters of concurrence were provided following the review. The project began and ended in 2022.

Brian Head Resort Master Plan Amendment, Utah
Under third-party contract with the Forest Service and Brian Head Resort, Cirrus completed NEPA analysis on a proposed master plan amendment which included a permit boundary expansion and construction of several new lifts and base facilities. The full range of physical, biological, and socioeconomic impacts was assessed and documented in an EA, biological assessment, and biological evaluation. This project began in 2001 and was completed in 2002.

Brooks Lake Lodge Additions, Wyoming
Under a third-party arrangement with the Shoshone National Forest and Brooks Lake Lodge, Cirrus completed NEPA analysis on proposed improvements associated with the lodge's master plan that included the addition of two cabins, a spa, and a pond for emergency water storage. The full range of potential impacts was assessed. This project began in 2001 and was completed in 2002.

Bridger Bowl Ski Area Cartography, Montana
Under contract with Bridger Bowl Ski Area, Cirrus designed and produced mapping of development plans for the resort. This work was completed in 2014.

Brighton Environmental Support, Utah
Under contract with Brighton Resort, Cirrus has completed biological surveys for several projects, updated the ski area's air quality emission inventory (2009 and 2012), drafted decision memos for categorical exclusions of snowmaking projects (2009 and 2011), and completed plant and wildlife surveys for the Brighton-Pioneer, Sunshine, and Thor trails (2013). We recently assisted in proposal preparation and a range of resource surveys for development of a new beginner ski pod adjacent to the base area. That work is ongoing.

Brundage Mountain Land Exchange, Idaho
Under third-party contract with the Payette National Forest and Brundage Mountain Company, Cirrus completed NEPA analysis on a proposed land exchange involving federal land comprising the ski area's base facilities and two parcels of private land owned by BMC in the surrounding area. The full range of physical, biological, and socioeconomic impacts was assessed and documented in an EA, biological assessment, and biological evaluation. This project began late in 2004 and was completed early in 2006.

Crested Butte Mountain Resort Main Mountain Improvement Plan, Colorado
Under third-party contract with the Grand Mesa, Uncompahgre and Gunnison National Forest and Crested Butte Mountain Resort, our staff managed and implemented all phases of the NEPA analysis and the production of an EA, biological evaluation, biological assessment, and technical reports. These documents disclosed the potential impacts associated with proposed ski lift construction and realignment, ski and hike/bike trail construction and improvements, new and expanded on-mountain structures, and expanded snowmaking on Crested Butte Mountain. This project began in 2006 and was completed in 2007.

Crystal Mountain Master Development Plan Amendment, Washington
Under third-party contract with the Mount Baker-Snoqualmie National Forest and Crystal Mountain Inc., Cirrus completed NEPA analysis on a proposed master plan amendment which included relocation of an approved wastewater treatment plant, replacement of double chairlift with a quad, and revision of approved plans for redevelopment of a previously abandoned pod (chairlift and associated trail system). The full range of physical, biological, and socioeconomic impacts was assessed and documented in an EA, specialist reports, biological assessment, and biological evaluation. This project began in 2008 and was completed in 2010.

Deer Valley Resort, Stormwater Pollution Prevention Plan, Utah
Under contract with Deer Valley Resort, Cirrus prepared a StormWater Pollution Prevention Plan for resort construction projects including a new ski lift, extending an existing ski lift, removing old ski lifts, constructing new ski trails, modifying existing ski trails, and supporting infrastructure for all developments. Cirrus also provided site inspection services for construction activities on the mountain. The project began in June 2022 and will continue during 2023 until site stabilization is complete.

Eldora Mountain Pine Beetle Suppression, Colorado
Under third-party contract with the Arapahoe National Forest and Eldora Mountain Resort, our staff managed and implemented all phases of a categorical exclusion process addressing direct control efforts (removal and disposal of infested trees and spraying to protect sound trees) targeting mountain pine beetles on 200 acres of National Forest System land. A biological assessment, a biological evaluation, an MIS report, several technical reports, and a draft decision memo were produced. This project began in 2006 and was completed in 2007.

Jackson Hole Mountain Resort Recreation Enhancement Project, Wyoming
Under third-party contract with the Bridger-Teton National Forest and Jackson Hole Mountain Resort (JHMR), Cirrus completed NEPA review of a proposal to implement a number of improvements,

collectively referred to as the Recreation Enhancements Project. These enhancements included: constructing a new gondola and conveyor lift system, developing a number of new ski runs, expanding the hiking and mountain bike trail systems, adding snowmaking coverage, expanding and remodeling an on-mountain restaurant, building an equipment storage facility, building an on-mountain ski patrol facility, installing a GasEx avalanche control system, and developing several via ferrata routes and a zipline. An EA, biological assessment, biological evaluation, and decision notice, with all supporting documentation, were completed. This project began in February 2015, and the decision approving the project was issued in July 2015.

Jackson Hole Mountain Resort Recreation Enhancement Projects Phase 2, Wyoming
Under third-party contract with the Bridger-Teton National Forest and Jackson Hole Mountain resort, Cirrus completed NEPA review of a number of ski area enhancement projects from the approved master development plan, including the construction of conveyor and handle tow lifts, developing a number of ski runs, enlarging and replacing buildings to provide retail, restaurant, mountain snow sports, and restroom amenities, expanding the snowmaking system, building a zip line, and creating wetland mitigation sites. An EA, biological assessment, biological evaluation, and decision notice, with all supporting documentation, are being prepared. This project began in 2016, and the decision approving the project was released in 2017.

Following up on this initial work, we continue to provide permitting support to JHMR, including conducting resource surveys, preparing proposals to the Forest Service, and assisting in drafting Forest Service documents such as scoping notices, scoping reports, and decision memos for categorical exclusions. Categorically excluded projects have included a new primary power line connecting into the Compressor Building to meet growing electrical demand, modification of the existing terrain just below the top terminal of the Tram to provide required clearance during periods of deep snow accumulation, establishment of a venue for an international snowboard competition, accommodation of a new hotel on adjacent private land, construction of viewing platforms at high-elevation vantage points, addressing skier circulation bottlenecks and on-mountain safety issues, and providing various new seasonal and year-round recreation opportunities.

Kirkwood Resort Specific Plan EIR, California
Under contract to Alpine County, Cirrus managed all phases of a California Environmental Quality Act (CEQA) review process and completed an EIR and mitigation monitoring plan. The project involved the long-term development of the resort's base-area community, implementation of a new ski area master plan, and upgrading the community's wastewater treatment plant. The impact analysis covered the full range of physical, biological, and socioeconomic impacts. This project began in 1997 and was completed in 2002.

Lee Canyon Ski Area Master Development Plan Phase 1 EIS, Nevada
Under third-party contract with the Forest Service's Spring Mountains National Recreation Area and Lee Canyon Ski Area, Cirrus completed pre-NEPA surveys in advance of the ski area's Master Development Plan Phase I proposal. The pre-NEPA phase began in 2014 and was completed in 2015. Cirrus was then engaged to assist in completing all aspects of NEPA review of the proposal. In 2016, Cirrus's efforts began with surveys for threatened, endangered, and sensitive plant and wildlife species and continued into working with the Forest Service to complete the full EIS process. Cirrus also completed the first major biological assessment for the Mount Charleston blue butterfly in coordination with the USFWS and supported extensive Tribal consultation with the Nuwuuvi Working Group, representing the Southern Paiute bands whose sacred lands include the ski area. The Final EIS was released in 2019, the Record of Decision in 2021.

Logan City 600 West Recreation Trail Project, Utah
Under contract with the City of Logan, Cirrus completed all phases of the NEPA analysis and production of an EA for a recreational hiking/biking trail. The project was designed to link the existing trail network

to a proposed neighborhood park. Issues included working with the railroad to address pedestrian and right-of-way concerns, safety concerns relating to the proximity of the highway, and proximity of the trail to other hazardous facilities along the route. This project began in 1999 and was completed in 2000.

Loon Mountain Expansion, New Hampshire
As subconsultants under a third-party contract with the White River National Forest and Loon Mountain Recreation Corp, our staff assessed the environmental impacts of implementing this ski area's proposed expansion and facility upgrades. In the EIS prepared for the project, Cirrus personnel addressed all human resource disciplines as well as vegetation and wetlands. The proposal called for a major permit expansion, development of a new snowmaking water storage and delivery system, lift upgrades and new trail development on the existing mountain, and restoration of previously disturbed sites. Our involvement in this long-running project began in 2000 and was completed in 2002.

Mt. Bachelor Ski Area Improvements Project, Oregon
Under third-party contract with the Deschutes National Forest and Mt. Bachelor Ski Resort, our staff assessed the environmental impacts of implementing this ski area's updated master plan. The master plan included the development of the Eastside pod with the associated trails and lift, replacement or alterations to three other lifts, ski trail realignments, developing a new learning center and kids area, construction of an alpine training center, construction and expansion of lodges and other buildings in two separate base areas, upgrading culinary water, water treatment, parking, and power infrastructure, creating a lift-served, downhill mountain bike park, setting up a canopy tour zipline course, and developing new hiking trails. The full range of physical and biological impacts was assessed and documented in an EIS, specialist reports, two biological assessments, and two biological evaluations. This project began in 2010 and was completed in 2013.

Pursuit Tram, Montana
Under contract with Pursuit Collection, Cirrus provided the background, significance, and strategic response sections for the Glacier View Tram Red Flag Review. Potential effects on grizzly bears, other special-status wildlife species, and an inventoried roadless area are key concerns. This work was completed in 2019. Currently, Cirrus continues to work with Pursuit in their efforts to secure project approvals.

Silverton Outdoor Learning and Recreation Center, Colorado
Under third-party contract with the BLM and SOLRC, Cirrus completed all phases of an EIS process addressing a proposal to conduct "lift-served backcountry skiing" and other, four-season recreation and environmental education programs on private land and 1,300 acres of BLM-administered land in the San Juan Mountains. A biological assessment and a biological evaluation were also prepared. The major issues addressed were avalanche safety, potential impacts on Canada lynx, socioeconomic effects, and land-use conflicts. This project began in 2001 and was completed in 2004.

Snow King Mountain Resort On-Mountain Improvements Project, Wyoming
Under third-party contract with the Bridger-Teton National Forest and Snow King Mountain Resort, Cirrus provided a broad range of environmental compliance and support activities in the preparation of an environmental impact statement. Cirrus provided a NEPA review for authorization of on-mountain improvements including a permit boundary adjustment, terrain development, a new access road/skiway, a gondola, a chairlift, three conveyor lifts, several facilities (restaurant, observatory, ski patrol building, yurt camp, and wedding venue), expanded night skiing, expanded snowmaking, and summer activities (zip line, mountain bike trails, hiking trails, and service road removal). The full range of physical and biological impacts was assessed and documented in an EIS, biological assessment, and biological evaluation. Cirrus also supported extensive consultation on the historic landscape comprised by the ski area. The project began in 2018 and the Record of Decision was signed in 2021.

Snowbasin Master Development Plan Improvements Project, Utah
Under third-party contract with the Wasatch-Cache National Forest and Snowbasin, Cirrus completed NEPA review of a proposal to implement a number of projects from Snowbasin's approved master development plan, including: the Strawberry Quad lift installation, Wildcat lift replacement, Wildcat area snowmaking, Mt. Ogden Bowl ski run improvements, construction of summer trails, rehabilitation of the Upper Porky Face access road, and the Lower Penny Lane ski run improvements. An EA, biological assessment, biological evaluation, and decision notice, with all supporting documentation, were completed. This project began in January 2015, and the decision approving the project was issued in December 2016.

Following on this work, Cirrus is currently working with Snowbasin to develop a revised master plan, prepare project-specific proposals to initiate NEPA review, and complete environmental review aspects of the permitting process.

Snowbasin Resort Snowmaking Pond, Utah
As subconsultants under contract with Snowbasin and then Aqua Engineering, Cirrus addressed the environmental aspects of a feasibility study addressing a snowmaking pond proposed by Snowbasin resort. The pond was developed in a natural, on-mountain depression and held 15 million gallons of water pumped from on-mountain wells. Cirrus identified any red-flag issues involving: special-status plants or wildlife; floodplains, wetlands, or municipal watersheds; Congressionally designated areas; inventoried roadless areas; Research Natural Areas; Native American cultural sites; and other archaeological or historic resources. Cirrus subsequently provided biological, cultural resource, and NEPA support for a categorical exclusion addressing development of the pond. This work started and was completed in 2015.

Snowbird Gad Valley Improvements Project, Utah
Under third-party contract with the Wasatch-Cache National Forest and Snowbird Ski and Summer Resort, Cirrus assessed the environmental impacts of implementing the Gad Valley area projects included in their amended 2011 Master Development Plan. The improvements included developing a beginner skiing area; installing a conveyor lift; installing lighting for night skiing; expanding the existing pump station, Creekside Lodge, and mountain bike trail system; relocating the Lunch Run summer maintenance road; remodeling the Mid Gad Restaurant; and upgrading Gad 2 lift. This work involved completing the full range of physical, biological, and social impact analyses and producing an EA, biological assessment, biological evaluation, decision notice, and all supporting documents associated with the NEPA process. Work began in 2011 and was completed in 2013.

Snowbird Peruvian Lift Replacement Project, Utah
Under contract to Snowbird, Cirrus completed the studies and documentation necessary for Forest Service review and approval of a plan to remove the fixed-grip Peruvian lift and build a new detachable quad lift to the top of Peruvian Gulch, bore a tunnel through to Mineral Basin, and install a "people mover" type lift from the upper lift terminal, through the tunnel to Mineral Basin. Based on the biological evaluation, biological assessment, capacity analysis, and cumulative effects analysis prepared by Cirrus, the Forest Service categorically excluded the project from further NEPA analysis. The project was completed in 2005.

Snowbird Ski and Summer Resort Master Development Plan, Utah
Under third-party contract with the Wasatch-Cache National Forest and Snowbird Ski and Summer Resort, staff assessed the environmental impacts of implementing this ski area's updated master plan. The master plan included developing a new back-bowl area, day lodges, snowmaking, lift construction and upgrades, a number of ski-trail improvements, and summer recreation facilities. This work involved the completion of the full range of physical, biological, and social impact analyses and the production of documents associated with the NEPA process, including three biological evaluations, three biological assessments, an

EIS, and a mitigation monitoring plan. Work began on the project in 1995. The Final EIS was released in 1999, and associated work is ongoing. We have continued to work with Snowbird on a regular basis, completing numerous biological surveys, wetland delineations, environmental site assessments, proposal drafts, and drafts of associated agency documentation.

Solitude Mountain Resort Master Development Plan, Utah
As subcontractors under a third-party contract with the Wasatch-Cache National Forest and the ski area, Cirrus completed the portions of this EIS dealing with watershed resources (including sedimentation, other aspects of water quality, and water quantity) and biological resources (including wildlife, aquatic resources, vegetation, and wetland and riparian impacts). Both the watershed's mining history and the influence of resort development on the character of the area were key factors in the analysis. Cirrus compiled background information; conducted the analysis of direct, indirect, and cumulative impacts; developed mitigation measures; and prepared pertinent sections of the EIS document. This project began in 2000 and was completed in 2001.

Solitude Summit Lift Replacement, Utah
Under contract with Solitude Mountain Resort, Cirrus completed categorical exclusion surveys and documentation for the replacement and realignment of the Summit lift. This project began in 2014 and was completed in 2015.

Solitude Supplemental Information Report, Utah
Under contract with Solitude Mountain Resort, Cirrus completed a Supplemental Information Report regarding four ski trail, parking lot, and road projects that were previously approved on the basis of Solitude's 2001 EIS but required review for new information or changed circumstances prior to implementation. This work was completed in 2013.

Steamboat Ski Area Master Plan Amendment, Colorado
Under third-party contract with the Medicine Bow-Routt National Forest and Steamboat Ski and Resort Corporation, Cirrus completed NEPA analysis on a proposed master plan amendment which included: a base area redesign with a new, detachable, six-pack, out-of-base lift; other lift replacements, realignments, and capacity increases; new ski and summer trails as well as improvements to existing trails; extensive glading of forested ski terrain; expansion and improvement of the snowmaking system; and construction of several on-mountain structures. The full range of physical, biological, and socioeconomic impacts was assessed and documented in an EA, biological assessment, and biological evaluation. This project began in 2005 and was completed in 2006.

Strawberry Bay Recreation Expansion Project, Utah
Under third-party contract with the Uinta-Wasatch-Cache National Forest and Strawberry Bay Marina, Cirrus assessed the environmental impacts of implementing a number of recreation enhancement projects at Strawberry Bay Marina. The projects included constructing a new restaurant and lodge, remodeling an existing store and lodge, building a new boat fueling area, redesigning the existing parking lot and constructing a new parking lot, creating additional boat slips and footpaths near the marina, building a floating pump-out facility, an indoor storage facility, and realigning the access road to the dry boat/trailer storage area. Two major issues addressed were impacts on greater sage-grouse habitat and water quality. Public comment on the draft EA was solicited and analyzed in order to prepare the final EA. The full range of physical, biological, and socioeconomic impacts was assessed and documented in an EA, biological assessment, and biological evaluation. This project began in 2015 and was completed in 2017.

Sun Valley Heli-Ski Permit Renewal, Idaho
Under third-party contract with the Sawtooth National Forest and Sun Valley Heli-Ski, our staff managed and completed all phases of the NEPA analysis and production of an EA, biological assessment, and biological evaluation. The EA disclosed potential impacts associated with continued helicopter skiing in alpine areas surrounding Sun Valley. The major issues addressed were impacts on wildlife, on other forms of dispersed winter recreation, and on residents of the permit area. The project began in 2000 and was completed in 2002.

Telluride Ski Area Expansion, Colorado
Under third-party contract with the GMUG National Forest and Telluride ski area, our staff managed and implemented all phases of the NEPA analysis and production of an EIS, biological evaluation, biological assessment, and technical reports. The EIS disclosed the impacts associated with proposed ski trails and lifts, a transportation gondola, additional structures, and expanded snowmaking. Staff subsequently completed a Supplemental EIS to address additional public concerns regarding the expansion. The supplement included analyses of wildlife, vegetation, wetland, socioeconomic, recreational, and aquatic resources issues. The project began in 1993 and the Final EIS was released in 1996. The Final Supplemental EIS was released in 1999, and associated work continued through 2001.

Wasatch Peaks Ranch Resort Stormwater Pollution Prevention Plan, Utah
Under contract with Wasatch Peaks Development, Cirrus prepared the Storm Water Pollution Prevention Plan (SWPPP) for a proposed private ski area near Petersen, Utah. Construction activities include clearing, grading, and contouring of mountain slopes to achieve the desired gradient for ski runs. Cirrus also provided site inspection services for construction activities on the mountain. The project began August 2020 and was completed in 2022.

Wasatch Powderbird Guides Permit Renewal EISs, Utah
Under third-party contract with the Wasatch-Cache National Forest and Wasatch Powderbird Guides, our staff managed and completed all phases of the NEPA analysis and production of an EIS. The EIS disclosed potential impacts associated with continued helicopter skiing in alpine areas in Utah's Central Wasatch Range. Key issues included highly contentious recreational conflicts, safety, noise disturbance, and impacts on nesting golden eagles. This project began in 1997 and was completed in 1999. In 2002, Cirrus was awarded an additional contract to complete an EIS for Powderbird's next permit renewal, which was completed in 2004.

Older recreation projects completed by Cirrus staff include:

- Aspen Highlands Ski Area Expansion EIS, Colorado
- Crested Butte Mountain Resort MDP EIS, Colorado
- Eldora Mountain Resort Master Development Plan and EA, Colorado
- Telluride Ski Area Improvements EA, Colorado
- Telluride Trails, Colorado

LIVESTOCK GRAZING PROJECTS

2005 Grazing Permit Renewals, New Mexico
Under contract with the Lincoln National Forest, Cirrus completed the NEPA analysis required on grazing permit renewals for seven cattle and horse allotments on the Forest. The allotments spanned from desert to high alpine ecosystems and included several federally listed plant and animal species. The proposed actions included adoption of recent changes in Forest Service grazing permit administration regulations. Four

separate EAs, with associated biological assessments, biological evaluations, and technical reports, were completed as part of this effort. The project began in 2004 and was completed successfully in 2005.

2006 Grazing Permit Renewals, New Mexico
Based on the successful experience in 2005, Cirrus was contracted by the Lincoln National Forest in 2006 to complete similar NEPA analysis addressing renewal of three more grazing permits. Two EAs and associated documentation were prepared. The project began in 2005 and was completed in 2007.

Bridgeport Southwest Rangeland Management Project Environmental Assessment, California
Under contract with the Humboldt-Toiyabe National Forest, Cirrus team is assisting with a NEPA assessment of the Bridgeport Southwest Rangeland Management Project, addressing issuance of grazing permits for cattle on what were previously sheep and goat allotments. Cirrus has completed the NFMA assessment, proposed action, public participation plan, scoping notice, disposition of comments, list of issues to be analyzed, and the administrative record. This project began in 2017 and is ongoing.

Bridger-Teton National Forest Range Specialist Report Project, Wyoming
Under contract with the Bridger-Teton National Forest, the Cirrus team completed a range specialist report to be used in a NEPA process addressing grazing permit renewals for two allotments on the Grey's River Ranger District. The task was to analyze existing range monitoring data, gather additional data, complete the NFMA assessment, prepare a list of issues arising from gaps between existing and desired conditions, and prepare a preliminary proposed action. This project began in 2017 and was completed in 2019.

Deseret Permit Renewal, Utah
Under contract with the BLM SLFO, Cirrus assisted in the NEPA analysis for renewing the livestock grazing permit for the Deseret Allotment in northern Utah. The analysis included formalizing an extension of the permitted grazing season to include early growing-season use of the allotment (i.e., before the permitted on date). The early grazing was desired by the permittee in order to allocate forage from the previous year to livestock, while leaving the majority of the forage from the current year available to wildlife. This shift also reduced grazing pressure during the period of active vegetation growth. An EA and cultural resources report were produced. The project began in 2013 and was completed in 2015.

Grand Staircase-Escalante National Monument Water Projects, Utah
Under contract with the BLM Kanab Field Office and the Grand Staircase-Escalante National Monument, Cirrus worked on three NEPA environmental assessments pertaining to wells and pipelines, water catchments, and vegetation restoration in southern Utah. The analyses addressed the construction of six wells and pipeline projects in six allotments, the construction of six water catchment projects in five allotments, and restoring vegetation in two allotments. The purposes of these projects were to improve the rangeland health within the allotments by improving livestock distribution and vegetation seeding. The water project EAs were completed and the vegetation restoration EA was put on hold. The work began in 2017 and was completed in 2020.

Livestock Grazing Authorization NEPA, Pinedale Ranger District, Wyoming
Under contract with the Bridger-Teton National Forest, the Cirrus team completed NEPA-compliant documentation for the purpose of informing a decision concerning whether or not to continue to authorize livestock grazing on the Sweetwater, Blucher Creek, and East Squaw Creek allotments on the Pinedale Ranger District. The analysis was documented in an EA to inform a decision notice and support a finding of no significant impact. This project began in 2018 and was completed in 2019.

North Sheep Grazing Authorization EIS, Idaho
Under subcontract, Cirrus worked with the Sawtooth National Forest to complete the NEPA analysis on allotment management plan revisions for four sheep and goat allotments on the Forest. The project was highly controversial because of strong pro and con sentiments regarding grazing in the local community, recreational conflicts, and a range of environmental concerns, including potential impacts on a number of federally listed species. The Forest was under federal court order to finish this EIS by the start of the 2004 grazing season, which allowed 8 months to complete the entire process, from Notice of Intent through Record of Decision. The project was completed on schedule and on budget. Along with the EIS, a biological assessment and biological evaluation were prepared. The project began in 2003 and was completed in 2004.

Roche Ranches Project, Nevada
Under contract with Roche Ranches, Cirrus developed a proposal and completed field analysis and reporting required by the BLM Elko Field Office to support a decision to convert two winter sheep allotments on the Nevada/Utah line to multiple use, allowing cattle use as well as sheep. Issues included bighorn sheep re-introduction, wilderness study area, highway safety, raptor migration routes, and other special-status species. The project began in August 2009, and the BLM opted not to process the proposal in 2014.

Santa Rosa Rangeland Management Project Environmental Assessment, Nevada
Under contract with the Humboldt-Toiyabe National Forest, the Cirrus team completed the first phase of a NEPA process conducted for the Santa Rosa Rangeland Management Project, addressing renewal of cattle grazing permits for all allotments on the Santa Rosa Ranger District. The task was to complete the NFMA assessment, proposed action and alternatives, public participation plan, scoping notice, disposition of comments, list of issues to be analyzed, study plans, EA Chapters 1 and 2, and the administrative record. This project began in 2017 and ended in 2019.

Squaw Valley Ranch Standards and Guidelines Assessment, Nevada
Under third-party contract with Barrick Gold Corp. and the BLM Elko Field Office, Cirrus supported efforts to renew grazing permits for three cattle and horse allotments comprised by the 360,000-acre Squaw Valley Ranch. We collected current upland, riparian, and wildlife monitoring data and prepared a Northeast Great Basin Standards and Guidelines Assessment that compiled and assessed all historic and current data then recommended appropriate management changes. Cirrus involvement with the renewal process began in February 2008 and was completed in 2009.

Star Valley Conservation District, Wyoming
Under contract with the Star Valley Conservation District, Cirrus completed field surveys gathering rangeland health assessment data across five vacant sheep allotments to assist the Forest Service in determining whether the existing conditions met desired conditions and objectives for rangelands and stream/riparian areas required by the Bridger-Teton National Forest Resource Management Plan. The field surveys were completed in accordance with the established rangeland monitoring plan. Field surveys were completed in the summer of 2020 and the data summaries were completed in 2021.

Three Creeks Grazing Allotment Consolidation EA, Utah
Under contract with the Rich County Commission, and under direction of the BLM Salt Lake Field Office and the Uinta-Wasatch-Cache National Forest Ogden Ranger District, Cirrus assisted in the NEPA analysis for consolidating five BLM and five Forest Service grazing allotments in northern Utah into a single management unit. The analysis also considered changes in grazing management and associated range improvements needed to support time-controlled grazing. An Administrative Draft EA, biological

assessment, biological evaluation, and other supporting documents were produced. This project began in 2010 and our involvement ended in 2015.

OIL, GAS, AND COAL PROJECTS

Arizona Gas Storage Project, Arizona
Under subcontract, Cirrus completed the Federal Energy Regulatory Commission (FERC) required resource socioeconomic resource report (#5) for El Paso Natural Gas Company. The Arizona Gas Storage Project addressed the potential socioeconomic impacts of installing a storage facility and approximately 9 miles of pipeline located in Pinal County, Arizona. Two other alternative pipeline alignments were also part of the analysis. The work was begun and completed in 2006.

Barrett Resources Corp, Colorado
Under contract with the energy company, our staff completed a number of projects over an 8-year span, ending in 2001 when Barrett was purchased by a larger corporation. We obtained 404 and stream alteration permits and threatened and endangered species clearances for a pipeline crossing the Colorado River. As environmental inspectors, members of the staff supervised the crossing of the river and adjacent wetland areas to ensure compliance with regulatory standards and guidelines.

Our staff secured all environmental permits and authorizations required to complete a 30-mile natural gas collector pipeline from the Parachute production fields to the Greasewood Compressor Station. Work included the following: completion and submittal of right-of-way applications and a plan of development; completion and/or coordination of all environmental surveys and analyses including wetlands, threatened and endangered and sensitive species, cultural resources, visual resources, land use, and socioeconomic impacts; planning appropriate mitigation and obtaining necessary permits, compliance documentation, and clearances; planning of right-of-way rehabilitation; and completion of an EA for the BLM.

Our staff conducted site clearance surveys for threatened and endangered species, wetlands, and unstable slopes potentially occurring in the vicinity of the Parachute and Rulison natural gas fields for five drilling seasons. Site clearances were provided for gas well sites, roads, and pipelines. The clearances were necessary for the BLM approval of Barrett's annual drilling programs. Our involvement in these clearances began in 1993 and continued through 2001.

Bull Mountain Pipeline, Colorado
Under contract to Trigon-EPC, Cirrus completed the biological surveys necessary for permitting of a 25-mile natural gas pipeline and associated facilities. Surveys for threatened, endangered, and sensitive plant and animal species, wetlands, noxious weeds, and vegetation were completed and documented in appropriate reports to support the NEPA analysis completed for the project. The pipeline traverses portions of the White River and GMUG National Forests as well as private and BLM lands. The work began in 2004 and was completed in 2005.

Cheyenne Plains Project, Colorado and Kansas
Under subcontract, Cirrus completed the Federal Energy Regulatory Commission (FERC) required resource socioeconomic resource report (#5) for El Paso Natural Gas Company. The Cheyenne Plains Project addressed the potential socioeconomic impacts of installing 380 miles of 30-inch, high-pressure mainline located in Weld, Morgan, Washington, Yuma, and Kit Carson counties in Colorado and Sherman, Wallace, Logan, Scott, Lane, Finney, Hodgeman, Ford, and Kiowa counties in Kansas. In addition to the pipeline itself, the analysis covered up to five new compressor stations; an amine processing facility; and

other associated facilities including block valve locations, meter stations, pig traps, pipe yards, extra work areas, and staging areas. The work began in 2002 and was completed in 2003.

Delta Petroleum Seismic Testing, Utah
Under contract to Western Land Services, Cirrus completed the NEPA analysis (determinations of NEPA adequacy and EAs) and biological work (special-status species surveys and preparation of biological assessments, biological evaluations, and wildlife technical reports) for Delta's Petroleum's seismic survey program that were necessary for Forest Service, BLM, and state permitting of seismic testing for underground oil and gas resources on several central and southern Utah tracts. These included the Parowan, Beaver, and Richfield areas. The surveys addressed federally listed and agency sensitive plant and wildlife species and raptors. Survey results were documented in reports and maps submitted to the land management agencies. Cirrus also surveyed a large tract of land with active Utah prairie dog colonies, mapped the colonies, located access around the colonies, and monitored the burrows during the seismic acquisition using vibroseis as required by the U.S. Fish and wildlife Service. Surveys were completed in 2005, 2006, and 2007.

Greens Hollow Coal Lease Tract Proposed Leasing and Underground Mining Project, Utah
Under third-party contract with the Price BLM Field Office, Manti-La Sal and Fishlake National Forests, and Ark Land Company, Cirrus supported all phases of the NEPA analysis and production of an EIS. Cirrus completed the biological assessment, biological evaluation, management indicator species report and other required technical reports, and Draft, Final, and Supplemental Draft and Final EISs disclosing the potential impacts of leasing and long-wall coal mining by the BLM and Forest Service. The EIS specifically addressed the consequences of implementing three alternatives. Impacts were assessed on a range of environmental parameters including geology, surface and groundwater, aquatic and terrestrial wildlife, vegetation, heritage resources, paleontology, socioeconomics, recreation, visual quality, rangeland, roadless areas, and air quality. The project began in 2007 with a Draft EIS published March 2009 and a Final EIS released in December 2011. A Supplemental Draft EIS was published in March 2014, and a Supplemental Final EIS was released in February 2015. We also assisted the Forest Service with the objection review process which was completed in 2015.

Greenwater Transmission Line Special Use Permit Renewal Environmental Assessment
This EA analyzed and disclosed the effects of renewing two special use permits for the Greenwater transmission line issued by the Snoqualmie Ranger District of the Mt. Baker-Snoqualmie National Forest, one for Puget Sound Energy and the other for CenturyLink. These permits were renewed because they were expiring and because the permit holders wished to make modifications to the existing transmission system. The renewals were for periods of 50 years for Puget Sound Energy and 20 years for CenturyLink. Puget Sound Energy's electrical system and CenturyLink's telecommunications lines are co-located, using the same system of poles and buried conduits. As part of this permit renewal process, the majority of the existing overhead system in this utility corridor was replaced with an underground system. This project was started in 2011 and completed in 2012.

High Plains Expansion Project, Colorado
Under subcontract, Cirrus completed the Federal Energy Regulatory Commission required resource socioeconomic resource report (#5) for Colorado Interstate Gas Company. The report addressed the potential socioeconomic impacts of installing four segments of 24-inch and 30-inch pipelines totaling about 164 miles located in Adams, Morgan, and Weld counties, in Colorado. In addition to the pipeline itself, the analysis covered associated facilities including block valve locations, meter stations, pigging facilities, pipe yards, extra work areas, and staging areas. The work began in 2006 and was completed in 2007.

Manti-La Sal Coal Tract Evaluation Project, Utah
Under direct contract with the Forest Service, Cirrus headed a team responsible for developing probable long-wall coal mining scenarios for two coal tracts, then assessing their impact on a range of environmental parameters including air quality, hydrology, geology, water quality, wetland and riparian resources, vegetation, wildlife, cultural resources, paleontology, visual resources, and recreation. The project required mine engineering, multi-year hydrologic and water quality data collection, and ground subsidence and groundwater modeling. Following the impact assessment and reporting, we worked with the agency to devise an appropriate mitigation and monitoring scheme. Our work products included technical reports that will provide the basis for preparing EISs addressing mining of these tracts once they are leased. The project began in 2000 and was completed in 2004.

In association with this work, Cirrus completed additional hydrologic monitoring in coordination with the coal tract evaluation. This monitoring effort was completed to meet the permitting requirements of the Utah Division of Oil, Gas, and Mining. Monitoring efforts included water quality and quantity measurements on springs and streams within two potential coal lease tracts. The monitoring effort began in 2002 and was completed in 2004.

NAH Helium Production Well EA, Utah
Under subcontract with Barr Engineering Co., Cirrus identified direct, indirect, and cumulative impacts on plants, wildlife, and soil resources in the San Rafael Desert necessary to drill and install helium extraction facilities and associated collection and transport infrastructure on land managed by the BLM. Cirrus used this information to prepare resource sections for an EA that was submitted to the BLM. This project began in 2021 and successfully concluded the same year.

Piceance Basin Expansion Project, Wyoming and Colorado
Under subcontract, Cirrus completed the Federal Energy Regulatory Commission (FERC) required resource socioeconomic resource report (#5) for El Paso Natural Gas Company. The Piceance Basin Expansion Project addressed the potential socioeconomic impacts of installing 142 miles of natural gas pipeline located in Sweetwater County Wyoming and Moffit and Rio Blanco counties in Colorado. In addition to the pipeline itself, the analysis covered associated facilities including compressors, meter stations, pigging facilities, pipe yards, extra work areas, and staging areas. The work began in 2004 and was completed in 2005.

Walker Flats Coal Tract Leasing EA, Utah
Under subcontract with the BLM and Barr Engineering Co., Cirrus assisted in preparation of an EA addressing long-wall coal mining of a coal lease tract. Cirrus assisted with the NEPA process, review of BLM checklist, review of EA sections addressing air quality, cultural resources, watershed and soils, range/livestock, socioeconomics, and cumulative impacts. Specific assistance was provided for the migratory bird, burrowing owl, and prairie dog analyses. The project was initiated and completed in 2020.

Walker Flats Soil Survey, Utah
Under subcontract with Bronco Mine and Barr Engineering Co., Cirrus completed an Order I soil survey in August 2022 on areas that would be disturbed from development associated with proposed mine expansion activities. Survey methods followed all practices required by Utah Division of Oil Gas and Mining (DOGM) to characterize soil for remediation purposes following construction of a settling pond, turbine pump, vent shaft, and groundwater wells. Cirrus responded to DOGM comments following review. The updated report was submitted to DOGM for review in February 2023.

West Lease Modifications EA, Utah
Under third-party contract with the Price BLM and Fishlake National Forests, and Ark Land Company, Cirrus managed and implemented all phases of the NEPA analysis and production of an EA. In preparation of the EA Cirrus completed the biological assessment, biological evaluation, management indicator species, and other required technical reports. The EA disclosed the potential impacts associated with leasing and long-wall coal mining by the BLM and Forest Service. The EA specifically addressed the consequences of modifying three existing leases, and subsequent underground, longwall extraction of coal on the modified leases. Impacts were assessed on a range of environmental parameters focusing on surface and groundwater, wetlands, aquatic and terrestrial wildlife, and heritage resources. The project began in 2008 and was completed in 2009.

Williams Draw Hydrology Assessment, Utah
Under direct contract with the BLM, Cirrus managed a team responsible for completing a hydrologic evaluation for the proposed Williams Draw Coal Tract Lease by Application, located in the Book Cliffs coal region. Cirrus completed nine months of water quality and flow monitoring, interpreted impacts from a mine engineering analysis, and developed a hydrology report to provide the basis for an EIS addressing mining of the proposed tract. This project was completed in 2018.

Wolverine Gas and Oil of Utah Seismic Surveys, Utah
Under contract to Western Land Services, Cirrus completed the biological surveys for Wolverine's seismic survey program that were necessary for Forest Service, BLM, and state permitting of seismic testing for underground oil and gas resources on several central Utah tracts. The surveys covered about 560 miles of seismic lines in the Nephi-Richfield and Parker Mountain areas. Coordinated with agency counterpart biologists, the surveys addressed special-status (i.e., federally listed and agency sensitive) plant and wildlife species and raptors. Survey results were documented in reports and maps submitted to the land management agencies. This biological work has been ongoing since 2003. In 2008, Cirrus also drafted the BLM's categorical exclusion review and approval documentation for a Wolverine 3D seismic project in the Richfield area. Survey work with Wolverine continued through 2010.

Older oil, gas, and coal projects completed by Cirrus staff include:

- Aspen Products Pipeline, Utah
- Medicine Bow Lateral Project, Wyoming
- Questar Mainline 68 Replacement Project, Colorado
- Questar Mainline 104 Replacement Project, Utah
- Uinta Basin Lateral Pipeline, Wyoming, Colorado, and Utah
- Well Site Clearances, Colorado

HYDROELECTRIC PROJECTS

Ashton Conservation Easement Natural Resources Baseline Inventory, Idaho
Under contract with PacifiCorp, Cirrus completed a baseline resource inventory as part of the effort to establish the Jenkins-Reimann Conservation Easement on the south shore of Ashton Reservoir. Our specialists addressed baseline conditions for soil, vegetation, wetland, wildlife, and land use on the subject property. The report was completed and submitted in 2017.

Ashton Dam Hydroelectric Project Bathymetry and Sediment Study, Idaho
Under contract to PacifiCorp, Cirrus staff developed the scope of work for the bathymetric and sediment modeling as well as the water quality monitoring protocol during rehabilitation. Specifics included mapping

water and sediment depth in the reservoir using a boat-mounted, 3-frequency echosounder. Sediment depth was verified using a boat-mounted corer. The team also gauged all inflow into the reservoir, installed all long-term water quality monitoring equipment, collected and processed all water samples and performed monthly maintenance and calibration. The final product was to construct a sediment transport model (HEC-RAS) to predict the effect of various scenarios for lowering reservoir elevations. The study was completed in 2010.

Ashton Dam Remediation Project Water Quality Monitoring and Spawning Gravel Assessment, Idaho

Under contract to PacifiCorp, Cirrus staff designed and implemented plans to monitor the effects of the dam remediation project on water quality and spawning gravel downstream from the site. The water quality parameters addressed included total suspended solids, dissolved oxygen, and temperature, all of which could affect the renowned trout fishery below the dam. Spawning gravel monitoring addressed how downstream transport of fine sediments from the reservoir bed and deposition among coarser substrates suitable for salmonid spawning would reduce the interstitial spaces required for successful development and emergence. The Cirrus team established all monitoring sites, including instrumentation for real-time water-quality recording and transmission, collected and processed gravel samples, and completed all analysis and reporting of annual and overall results. Monitoring began in 2009 and was completed in 2013.

Ashton Reservoir Relicensing, Idaho

Under contract to PacifiCorp, Cirrus is providing support in the reservoir relicensing process with the Federal Energy Regulatory Commission (FERC). PacifiCorp has requested to use FERC's Traditional Licensing Process. As part of that process, Cirrus has prepared sections of the Pre-Application Document (PAD), responded to comments on the PAD, participated in agency and public presentations, prepared study plans and responded to comments on study plans. Cirrus will implement studies during the 2023 field season and submit study reports that summarize results in 2023-24. The full license application will be submitted on or before December 31, 2025.

Ashton Wildlife Enhancement Plan Update, Idaho

Under contract with PacifiCorp, Cirrus updated the 1995 wildlife enhancement plan for the FERC project area at Ashton Reservoir to reflect progress in implementing the earlier plan and changes in the wildlife management agencies' priorities. PacifiCorp subsequently submitted the updated plan for FERC review and acceptance. Cirrus completed this work in 2015.

Bear Lake Dredging Project, Utah and Idaho

Under contract to PacifiCorp, Cirrus completed an assessment of the environmental impacts of a proposal to dredge a channel to maintain flows of irrigation water pumped from Bear Lake. Our report described the proposed project and alternatives then discussed potential impacts in the areas of hydrology, water quality, socioeconomics, recreation, fisheries and wildlife, and noxious weed invasion. The report was subsequently submitted to the U.S. Army Corps of Engineers, where it provided the basis for their NEPA analysis and issuance of the required permits. The project began in 2001 and was completed in 2002.

Bear River Basin Water Rights Adjudication PacifiCorp, Idaho

Under contract with PacifiCorp and as part of the Bear River basin water rights adjudication. Cirrus worked as a subcontractor to Rocky Mountain Environmental Associates to prepare updated water rights claims, maps, and other supporting information needed to file for their existing water rights during the adjudication process. As part of this project, Cirrus completed work on water rights for all Bear River power plants in Idaho. This work began in 2021 and is ongoing.

Bear River Project Recreation and Traffic Safety Plan Update, Idaho and Utah
Under contract to PacifiCorp, Cirrus updated the Bear River Project Recreation and Traffic Safety Plan in accordance with permit requirements stemming from FERC relicensing of the Bear River Hydroelectric Project. Updates reflect work completed and changes in the physical and regulatory setting that affect recreation sites and traffic within FERC project boundaries. This work began in 2016 and was completed in 2019.

Bear River Project Site Plans, Idaho
Under contract with PacifiCorp, Cirrus completed site plans for all five hydroelectric projects operated by PacifiCorp on the Bear River in Idaho, in accordance with the FERC license for the Bear River Hydroelectric Project. These included the Oneida and Grace-Cove developments in 2005, and the Soda, Last Chance, and Grace Dam developments in 2009. The Oneida plan was updated in 2015. The plans detailed how public access, vegetation, wetland and riparian resources, and agricultural uses would be managed and coordinated with power-generation operations on PacifiCorp owned lands. The project was completed in 2015.

Black Canyon Fish Stranding Survey, Idaho
Under contract to PacifiCorp Energy, Cirrus completed a study of fish stranding associated with the Black Canyon boater-flow releases required by the FERC permit for the Bear River Hydroelectric Project. Eight study plots in the varial zone, representing high and moderate stranding hazard, were monitored for stranded fish during the down-ramp period following three releases each year for three years. The three days represented early spring, late spring, and summer, and the three years represented down-ramp rates of 0.25, 0.5, and 1.0 ft/hr. Annual reports summarized each year's findings, and a final report addressing all three years provided statistical analysis of the level of stranding observed and the influence of stranding hazard classification, seasonality, and ramp rate. The study began in 2008 and was completed in 2010.

Cove Hydroelectric Project Decommissioning Environmental Report, Idaho
Under contract to PacifiCorp, Cirrus prepared an environmental report detailing all physical, biological, and socioeconomic effects of decommissioning this century-old hydroelectric project on the Bear River. Impacts on the federally listed Bonneville cutthroat trout were a central concern. The report provided the basis for FERC's NEPA process prior to their approval of the decommissioning. The project began in 2004 and was completed in 2005. Once the environmental report was complete, Cirrus was contracted to assist PacifiCorp in acquiring the NPDES permit, 401 certification, stream alteration permit, and 404 permit necessary to complete the project.

Cove Dam Decommissioning Project Water Quality Monitoring, Idaho
Under contract to PacifiCorp, Cirrus conducted water quality monitoring during demolition of the Cove Dam on the Bear River in southeastern Idaho. Cirrus established remote datalogger monitoring sites above and below the dam and provided continuous water quality monitoring, sample analysis, QA/QC review, and reporting throughout the demolition process. Cirrus reported directly to the Idaho Division of Water Quality during the demolition process in support of their effort to control sediment release and its potential impact on the Bonneville cutthroat trout and other aquatic life. The project was completed in 2006.

Cutler Reservoir Relicensing, Utah
Under contract with PacifiCorp, Cirrus prepared four study plans, implemented the studies, and drafted initial study reports and draft license application sections. The studies included sedimentation, shoreline habitat characterization, land use, aesthetics, and rare, threatened, and endangered species. Cirrus also assisted in hydrologic modeling of potential operating scenarios as a basis for these and other resource

studies. This project began in 2019 and was successfully completed in 2022 when the license application was approved by FERC.

Oneida Bridge Joint 401/404 Permit Application, Idaho
Under contract with PacifiCorp, Cirrus prepared a joint 401/404 permit application that was submitted by PacifiCorp to the U.S. Army Corps of Engineers. The project would install a new bridge across the Bear River downstream of Oneida Dam on the Oneida Narrows Road. Cirrus worked with project engineers and PacifiCorp to identify all impacts including dredge and fill quantities, recommend BMPs, and prepare project maps, project details, and draft and final license applications. The project began in 2022 and was successfully completed in 2023 when the application was approved.

Oneida Dam Wetland Delineation and Joint Application support, Idaho
Under contract with PacifiCorp, Cirrus completed a wetland delineation and accompanying aquatic resources delineation report in June of 2019 for PacifiCorp for an area immediately below the Oneida Narrows Reservoir dam along the bypass reach of the Bear River, and at a potential wetland mitigation area in the old town site. The wetland delineation was requested to support the wetland permitting that would be required for the construction of an access road to the base of the dam. Cirrus submitted the report to PacifiCorp and prepared other supporting documents that were used with the joint 401/404 permit application. The project was completed in spring 2020 when the permit was approved by the U.S. Army Corps of Engineers.

Oneida Wetland Deed Restriction, Idaho
Under contract with PacifiCorp, Cirrus completed a baseline resource report precedent to the establishment of a deed restriction for a wetland complex below the Oneida Reservoir dam. Our specialists addressed baseline conditions for property location and condition, current and historical uses, structures/improvements, geology, soils, hydrology and water resources, vegetation cover, wildlife, significant ecological resources, visual resources, habitat management opportunities, a Phase I Environmental Assessment, and a preliminary mineral resource assessment for the subject property. The report was completed December 2021 and will be followed by four years of wetland monitoring.

Paris Hydropower Decommissioning EA, Idaho
Under contract with PacifiCorp, Cirrus completed an Environmental Assessment to allow decommissioning of PacifiCorp's 715-kilowatt Paris Hydroelectric Project (Paris Project) located on an irrigation canal that diverts water from Paris Creek, and amendment of the FERC license for the Bear River Hydroelectric System (Project No. 20) to authorize a reduction in minimum flows in the bypass reach of the Grace Development. Cirrus produced the Draft EA, responded to comments from legal review and a stakeholder group (Environmental Coordination Committee), and updated the Final EA. This project began in 2022 and successfully concluded the same year.

Paris Hydropower Joint 401/404 Permit Application, Idaho
Under contract with PacifiCorp, Cirrus prepared a joint 401/404 permit application that was submitted by PacifiCorp to the U.S. Army Corps of Engineers (Army Corps). The project would install a new intake structure near the facility, remove a headwater diversion on public land, and restore natural flow to 4 miles of Paris Creek. Cirrus worked with project engineers to quantify dredge and fill materials, recommend BMPs and prepare the joint permit application. The project started in 2022 and ended in 2023 when the Army Corps approved the application.

Soda Spinning Release Studies, Idaho
Under contract with PacifiCorp, Cirrus completed several studies to address the potential effects of proposed spinning reserve water releases from the Soda hydroelectric development. The Bear River Project's Environmental Coordinating Committee identified study needs. The studies addressed thermal impacts on Bonneville cutthroat trout, high-flow impacts on land use and channel stability, and inundation effects on nesting birds. This project began in 2017 and was completed in 2018.

Viva Naughton Dam Spillway Project, Wyoming
Under contract with PacifiCorp, Cirrus is supporting their Viva Naughton emergency spillway project by researching required permits and coordination steps necessary for the project. The proposed project will replace a sacrificial plug at the top of the dam with a concrete overflow spillway and riprap channel. Cirrus is conducting an initial literature search and initiating consultation with the Wyoming State Historic Preservation Office to determine if an assessment of eligibility should be undertaken; conducting a pre-permitting consultation meeting with U.S. Army Corps of Engineers to determine the permitting approach; consulting with the U.S. Fish and Wildlife Service to determine if any threatened or endangered species are present and potentially impacted by construction activities; and determining in coordination with the Wyoming Department of Game and Fish if any species of state concern would be potentially impacted. Cirrus is also reviewing requirements to determine if stormwater pollution prevention plan or general construction permit is required. Cirrus will prepare a document listing required consultation, authorizations and permits required for the project. This project began in 2019 and successfully concluded the same year.

Weber Relicensing Recreation Study, Utah
Under contract with PacifiCorp, Cirrus completed a study of recreational facilities, use, and issues associated with operation of the Weber hydroelectric development. The study and resulting report were part of the FERC relicensing process and concluded with recommendations for alleviating recreational issues. The scope was directed by the Recreation Technical Committee. This project was completed in 2017.

LAND-USE PLANNING PROJECTS

Ashley National Forest, Forest Plan Facilitation, Utah
Under contract with the Ashley National Forest, Cirrus and our subcontractor Kolibri Consulting Group are providing facilitation and documentation to assist the forest with their public involvement process. Tasks include facilitating meetings among Forest Service personnel and Cooperating Agencies and taking notes of action items for future tasks. The project began in 2021 and is ongoing.

Baseline Documentation Report Willow Creek Stanger Ranch, Idaho
Under contract with Sagebrush Steppe Land Trust, Cirrus prepared a baseline documentation report for the 1,200-acre Willow Creek-Stanger Ranch property. The report described the general condition and the physical, ecological, and scenic values of the property in Bingham County, Idaho for the purpose of establishing a conservation easement baseline. As part of the project, Cirrus also prepared an Agricultural Land Easement Management Plan. The project was completed in 2022.

Bridge Creek Land Exchange EA, Wyoming
Under third-party contract with the Bridger-Teton National Forest and the Herbert H. Kohl 2010 Trust, Cirrus completed NEPA review of a federal land exchange. The land exchange EA analyzed the effects of exchanging a 44.2-acre parcel of federal land for two parcels of private land totaling 94.6 acres. The exchange took place in the Gros Ventre Wild and Scenic River corridor. Primary issues were impacts on wildlife resources, including wildlife migration corridors, and on wild and scenic rivers, recreation, and

cultural resources. An EA, draft decision notice, BA, BE, and other supporting documentation were developed. This project began in 2017 and was completed in 2018.

Camp Williams Ecological Site Monitoring, Utah
Under contract with the Utah National Guard, Cirrus developed and implemented a plan to monitor and assess 58 established sites in accordance with USDA-Agricultural Research Service rangeland monitoring procedures regarding vegetation and soils. This required compliance with protocols for unexploded ordnance and coordination with range control to obtain safe access during military training and during fire danger restrictions. Deliverables include a database for inventory, monitoring, and assessment and a final report with numerical analysis, written summary of key issues, field photos, identification of new species, and recommendations to improve monitoring. The project began in 2020 and was completed in 2022.

Dry Creek Riparian Habitat Restoration Project, Utah
Under contract with the City of Sandy, our staff completed a pilot design project to restore 4 acres of riparian forest and stream habitat on Dry Creek as part of a wetland mitigation program. The project included all phases of restoration planning, from budgeting water needs, to channel design, to plant selection and landscape design. Work on the project began in 1998 and was completed in 1999.

Habitat Evaluation Report for CUPCA Bonneville Unit Wildlife Mitigation Parcels, Utah
Under contract with the Bureau of Reclamation (Reclamation), Cirrus assisted the Utah Reclamation and Mitigation Conservation Commission (Mitigation Commission) with the development of a habitat evaluation report to assess the relative wildlife habitat value of various parcels proposed for transfer from the federal government to the State of Utah. Reclamation and the Mitigation Commission have acquired lands in Duchesne and Wasatch counties since the 1980s for the purpose of fulfilling Central Utah Project wildlife and aquatic mitigation requirements. Reclamation and the Mitigation Commission proposed to transfer ownership of approximately 16,538 acres (and appurtenant water rights) of those acquired lands to Utah Division of Wildlife resources for fish and wildlife management purposes. The habitat evaluation report was developed to support decision making regarding the associated EA and for separate decisions regarding the fulfillment of wildlife mitigation commitments for the Bonneville Unit. The analysis also provided data and results for other potential adjustments to the mitigation plans developed under the Fish and Wildlife Coordination Act. The project began in 2018 and was completed in 2020.

Randolph Management Framework Plan Amendment, Utah
Under contract with the Coordinated Resource Management (CRM) Committee in Rich County, Utah, Cirrus assisted in the development of a management plan for rangeland resources countywide, including those administered by the Forest Service, BLM, state, and private landowners. Portions of the CRM plan involving BLM lands were the proposed action in a resource management plan (RMP) amendment. Cirrus was contracted to work with the CRM Committee to facilitate completion of the plan, then with the BLM on the NEPA analysis addressing the resulting RMP amendment. This project was particularly interesting because Cirrus's involvement started during the initial, planning phase at the county level and carried through to completion of the NEPA analysis. Management of this project required an additional level of facilitation, coordination, and planning, as well as the capabilities needed to complete the NEPA process. The project started in 2003, and Cirrus involvement ended with the preparation of the preliminary draft EIS in June 2006.

Snowbird Base Area Master Plan, Utah
Under contract to Snowbird, Cirrus prepared a master plan update and application for conditional use review by Salt Lake County. The submittal included: Snowbird's base area site plan with supporting

mapping, slope analysis, and density calculations; transportation analysis; on-mountain capacity analysis; water quality analysis; and assessment of the adequacy of utilities. The project was completed in 2006.

Transfer of Bonneville Unit Wildlife and Aquatic Mitigation Lands to State of Utah EA, Utah
Under contract with the Bureau of Reclamation (Reclamation), Cirrus assisted the Utah Reclamation and Mitigation Conservation Commission (Mitigation Commission) with the development of an EA to transfer lands to the Utah Division of Wildlife Resources. Reclamation and the Mitigation Commission have acquired lands in Duchesne and Wasatch counties since the 1980s for the purpose of fulfilling Central Utah Project wildlife and aquatic mitigation requirements. Reclamation and the Mitigation Commission proposed to transfer ownership of approximately 16,538 acres, and appurtenant water rights, of those lands to the Utah Division of Wildlife Resources for fish and wildlife management purposes. Cirrus' involvement with the EA included: pre-project meetings; assistance with the public scoping efforts; coordination with cooperating agencies; analysis of direct, indirect, and cumulative effects on the human environment; and preparation of the EA. The NEPA process required coordination with federal, state, and local agencies, local Tribal groups, associated Bureau of Indian Affairs offices, as well as the public. The project began in November 2018 and was completed in September 2020.

West Box Elder Coordinated Resource Management Plan, Utah
Under contract with the West Box Elder Conservation District, Cirrus worked with private landowners, grazing permittees, and federal, state, and county agency representatives to create the West Box Elder Coordinated Resource Management Plan. The purpose of the plan was to coordinate resource management activities between landowners and agencies to capitalize on opportunities to protect, improve, and maintain resources, while minimizing conflicts. The plan identified seven priority projects based on the analyses of feasibility and importance, and that would meet that purpose. The success of the coordinated planning effort led to the West Box Elder Coordinated Resource Management Group being awarded the Public Lands Foundation Award in 2013.

West Erda Improvement District, Utah
Under contract with Jones and DeMille Engineering, Cirrus completed an aquatic resources delineation and survey for suitable habitat of rare plants in saltbrush and grassland habitats. Following the field investigations and monitoring, Cirrus prepared a delineation reports and GIS mapping as per U.S. Army Corps of Engineers requirements. A memo was also prepared for the U.S. Fish and Wildlife Service that identified potential Ute ladies'-tresses habitat. The project began and was completed in 2017.

Older land-use planning projects completed by Cirrus staff include:

- Bureau of Reclamation Reservoir Management Plans, Utah and Wyoming.
- Emory Port of Entry Project, Utah.

REAL ESTATE ACQUISITION AND DEVELOPMENT PROJECTS

Blue Ox Development, Utah
Under contract with Blue Ox Development, Cirrus prepared a revegetation plan for the Lumberjack property just south of Willard, Utah. Blue Ox intends to develop the property as a rock and gravel mine, and then a residential development following mine reclamation. This revegetation plan supports their site reclamation plan and application for a conditional use permit for the mining operation. The project was completed in 2017.

Bear Hollow Channel Realignment, Utah
Under contract with Talisman Civil Solutions, Cirrus provided review and comments on a joint 401/404 permit application, completed a resource summary report, directed a level III cultural resource inventory, and prepared necessary forms in preparation for a Forest Service Small NEPA project meeting. The project began in 2022 and was successfully completed in 2023.

Bear Lake Sand and Gravel Mine Expansion, Utah
Under contract with Staker Parson Materials & Construction, Cirrus prepared a resource report for the Bear Lake Sand & Gravel Mine (project area) west of Bear Lake and south of Garden City, Utah in Rich County. Specifically, Cirrus was asked to complete an Order 3 soil survey, complete a vegetation survey, complete a wildlife habitat analysis, and prepare a cultural resources inventory. Staker Parson intends to develop the project area as a rock and gravel mine. This report is in support of their Utah Division of Oil, Gas and Mining (DOGM) Notice of Intention to Commence Large Mining Operations. The work was completed in the summer of 2022.

Box Elder Gravel Pit Categorical Exclusion, Utah
Under contract with Box Elder County, Cirrus provided an analysis of the effects of proposed gravel mining that resulted in a categorical exclusion from further environmental review of the proposed gravel pit. This project took place in 2018.

Christensen Ranch Phase I Environmental Site Assessment, Idaho
Under contract with Sagebrush Steppe Land Trust, Cirrus completed a Phase I Environmental Site Assessment (ESA) for the Christensen B&R Ranch properties located in Mink Creek Idaho. The ESA was included in a baseline documentation report used by the Sagebrush Steppe Land Trust, PacifiCorp, and the Bear River Environmental Coordination Committee to characterize existing conditions prior to transferring the private land to hold in trust from future alterations. This work was completed in 2022.

Club Med Site Preparation SWPPP, Utah
Under contract with Snowbasin, Cirrus prepared a Notice of Intent and Stormwater Pollution Prevention Plan to meet Utah Construction General Permit regulations and address preparation of the building site for construction of Club Med facilities. Cirrus filed both documents with Utah Department of Environmental Quality, provided routine inspections of the construction site and Best Management Practices recommended in the SWPPP, and filed inspection reports after each inspection. This work was completed in 2022.

Grantsville Quarry Resource Report, Utah
Under contract with Staker Parson Materials & Construction, Cirrus prepared a resource report for the proposed Grantsville Quarry (project area) west of Grantsville, Utah in Tooele County. Specifically, Cirrus was asked to complete an Order 3 soil survey, vegetation survey, and wildlife habitat analysis. Staker Parson intends to develop the project area as a rock and gravel mine. The report was prepared in support of their Utah Division of Oil, Gas and Mining (DOGM) Notice of Intention to Commence Large Mining Operations. This work was completed in the fall of 2022.

Hoth Boys Construction SWPPP, Utah
Under contract with Hoth Boys Construction, Cirrus completed a Common Plan Stormwater Pollution Prevention Plan (SWPPP) for a residential home and property. Cirrus worked with the construction manager and property owner to file the necessary paperwork with municipal and state agencies prior to construction, prepare the SWPPP, design BMPs that were efficient, cost effective, and easy to maintain, and responded to questions during construction about stormwater regulations and monitoring requirements. The project was completed in 2022.

City of Logan Fire Department Training Facility, Utah
Under contract with the City of Logan, Cirrus completed all phases of the NEPA analysis and the production of an EA for a fire department training facility. The lead agency for the work was the U.S. Department of Housing and Urban Development due to the use of their funds for the project. The project included building a four-story tower to train for search and rescue, high-angle rescue, and other related activities. Future phases of the project will include placement of hazardous materials and confined space props. This project was completed in 2003.

Logan City Zoo Education Building, Utah
Under contract with the City of Logan, Cirrus completed all phases of the NEPA analysis and the preparation of an EA for an educational building on the City's zoo property. This project was completed in 2000.

Parleys Canyon Resource Inventory and Planning, Utah
Under contract with Granite Construction Company, Cirrus completed resource inventories and revegetation planning for soils, vegetation, and wildlife in Parleys Canyon. The work consisted of creating base mapping of perennial streams, springs, and other bodies of water; determining and mapping different soil types within the project area to understand suitability for revegetation efforts; describing vegetation community types and percent cover that occur across the project area; identifying any threatened or endangered species or species of special concern that may occur in the surrounding area; and developing a reclamation plan for the area. The reclamation plan included soil material replacement, seed bed preparation, seed mixture, seeding method, fertilization and soil amendments, and any other procedures required. The work was started and completed in 2021.

Riley Ranch, LLC, Grantsville Section 32 – Vegetation Inventory and Reclamation Plan, Utah
Under agreement with Riley Ranch, Cirrus completed a vegetation inventory and prepared a revegetation plan for the Grantsville Section 32 property west of Grantsville, Utah. Riley Ranch proposed the development of a rock and gravel mine. The plan was prepared to guide the project through topsoiling, mining, and reclaiming of the rangeland property. The work was completed in 2020.

Real Estate of Bear Lake, Idaho and Windermere Real Estate, Utah
Under contract with Real Estate of Bear Lake, Cirrus was contracted to produce maps and update map-related brochures to show the current locations of real estate developments surrounding Bear Lake in Idaho and Utah. The work was completed in 2021.

Snowbasin Resort Base Area Aquatic Resources Delineation, Utah
Under contract with East-West Partners, Cirrus completed an Aquatic Resources Delineation Report that identified potential Waters of the U.S. (WOTUS) on 305 acres of Snowbasin property extending north of the existing resort base area. In addition to formal WOTUS delineation results, the report characterized hydrology, vegetation, and soil resources in the survey area. Survey results were organized in report appendices that could be submitted with a future 404 permit application. This work was completed in 2022.

Snowbird Ski and Summer Resort Environmental Site Assessments, Utah
Under contract to the resort, our staff has completed a Phase I ESA for refinancing of the entire resort base area and the Canyon Racquet Club, a Phase I/II ESA addressing all Snowbird-owed claims outside the ski area boundary for a potential 2010 land exchange, two Phase I ESA supporting the 2014 sale of Snowbird

itself, and 10 separate Phase I assessments for mining claims the client was considering purchasing. Two of these were followed by Phase II assessments. This work began in 1996 and continued until 2014.

St. Charles Wetland Delineation, Idaho
Under contract with a private landowner, Cirrus completed field surveys, prepared a formal wetland delineation report, and submitted it to the Army Corps of Engineer (Corps). Cirrus provided support to the client during Corps review. The project began and concluded in 2021.

Willard City Quarry, Utah
Under contract with Granite Construction, Cirrus prepared a resource report for the Willard City Quarry (project area) on the east bench above Willard City, Utah. Cirrus completed field surveys to assess the project area for wetlands and other Waters of the U.S., determine potential for existence of threatened, endangered, and State-listed sensitive species, and classify topsoil in the project area for use in remediation purposes. Granite Construction intends to develop the project area for construction aggregates mining. The work was completed in 2022.

Whitehill Reclamation Plan, Utah
Under contract with Granite Construction Company, Cirrus completed a revegetation plan for the Whitehill property in the City of North Salt Lake, Utah. The landowner intends to develop the property as a rock and gravel mine, and the revegetation plan was prepared in support of their site reclamation plan and application for a conditional use permit for mining operations. The revegetation plan was initially prepared in 2014, and then updated in 2017 to reflect changes in the development plan.

Older real estate acquisition and development projects completed by Cirrus staff include:

- Golden Corral Environmental Site Assessment, Utah
- Logan City Environmental Site Assessments, Utah
- Two Bear Ranch Resource Management Plan, Utah and Wyoming
- Wolf Creek Resource Management Plan, Utah

OTHER BIOLOGICAL SURVEY AND STUDY PROJECTS

Bluebell Road Realignment, Utah
Under contract with Jones and DeMille Engineering, Cirrus completed an aquatic resources delineation and multi-year rare plant survey in support of a Duchesne County road realignment project. The project was completed in the sagebrush uplands and scrub/shrub wetland habitats. Following the field investigations and monitoring, Cirrus prepared reports and GIS mapping as per U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service reporting requirements. The project began in 2015 and was completed in 2016.

Dell Creek and Forest Park Elk Feedgrounds EIS, Wyoming
Under contract with the Bridger-Teton National Forest, Cirrus is assisting the Forest Service to complete an EIS addressing the continued permitting and use of two elk feedgrounds by the Wyoming Game and Fish Commission for facilities and feeding grounds on the Big Piney and Greys River Ranger Districts to conduct their elk management activities. The proposed project is to continue long-term use (20 years) of the Dell Creek elk feedground (35 acres), Forest Park elk feedground (100 acres), and existing facilities for their winter elk-management program. Elk would be fed hay daily each year between November 15 and April 30, depending on winter conditions. The WGFC would maintain and operate existing facilities necessary for their ongoing winter elk-management activities. No new construction would be permitted. The Cirrus team is providing assistance with elk; socioeconomics; water, soils, and watershed; vegetation

and wetlands, other wildlife; cultural resources; recreation; public health and safety; and climate change resources. Cirrus is completing the Draft EIS, biological assessment (wildlife, fisheries, and botany), biological evaluation, and document production support. This project began in January 2022 and is ongoing.

Invasive Plant Species EIS for the Caribou-Targhee National Forest and Curlew National Grasslands, Idaho
Under contract with the Caribou-Targhee National Forest, Cirrus assisted the Forest Service to complete a Forest and Grassland-wide invasive plant species EIS addressing the treatment of noxious weed species. The proposal is to implement an integrated weed management plant treatment on currently infested areas and areas susceptible to invasion within the boundaries of the Forest and Grassland, including two wilderness areas. Treatment activities would include inventory and assessment designed to support early detection and rapid response, control methods, rehabilitation and restoration, and implementation and effectiveness monitoring. Activities would be implemented with partners at federal, state, and local levels where opportunities exist. The Cirrus team is providing assistance with wildlife, fish, vegetation, and recreation resources as well as overall technical editing. Cirrus completed technical reports for each resource, biological assessments (wildlife and botany and fisheries), biological evaluations, and document production support. This project began in August 2019 and was completed in 2021.

Jarbidge Biological Assessment for the Resource Management Plan/EIS, Idaho
Under contract with the BLM, Cirrus completed the slickspot peppergrass (*Lepidium papilliferum*) analysis for the biological assessment that accompanied the Jarbidge Resource Management Plan/EIS. The analysis addressed the effects of the preferred alternative in the Jarbidge management area, cumulative effects, and the effects determination. This project began in August 2014 and ended August 2015.

Koosharem Clay Mine Soil Assessment, Utah
Under subcontract with Holcim U.S., Inc., and Jones and Demille Engineering, Cirrus carried out data soil data collection and analysis to determine if, following kaolin clay removal, soil was suitable for use in site rehabilitation. This analysis was required by the Utah Division of Oil, Gas, and Mining as a condition of mining permit issuance. We collected soil samples, submitted them for laboratory analysis, and summarized the results in a report. The project was completed in July 2020.

Nez Perce-Clearwater National Forests – NEPA Support Wildlife Biologist, Idaho
Under contract with the Good Neighbor Authority, State of Idaho Department of Lands, Cirrus provided a temporary wildlife biologist to provide technical specialist support to the Nez Perce-Clearwater National Forests for data acquisition, project analysis, and document development and reporting. Tasks included: resource evaluation and effects analysis using common U.S. Forest Service programs and methodologies, National Environmental Policy Act (NEPA) specialist document development, and development of response to comments/objections. This project began in 2018 and was completed in 2019.

Pygmy Rabbit GIS Model Development and Habitat Assessment, Utah
Under contract with the State of Utah and the BLM Salt Lake Field Office, Cirrus worked with the BLM and Utah Division of Wildlife Resources to create and test a pygmy rabbit habitat model for west Box Elder County. Deliverables under the contract included: a GIS raster and vector model for high, medium, and low quality habitat in west Box Elder County; results of surveys of 120 points within the area covered by the model; results of surveys of historic pygmy rabbit presence sites; and a final report discussing the results of the surveys. The project began in January of 2013 and was completed in September of the same year.

Pygmy Rabbit Inventory at Craters of the Moon, Idaho
Under contract with the National Park Service U.S. Department of the Interior, Cirrus was originally tasked with completing a burrow census, identifying occupied burrows using remote cameras, and creating a Resource Selection Function (RSF) to determine habitat features that pygmy rabbits select for and against in the area of interest. Adjustments were made during the survey to account for the small number of burrows and lack of signs that indicate burrows were occupied. Work scope shifted to completing a presence/absence survey. The project was completed in 2022.

Pygmy Rabbit Pellet Collections for Genetic Study in Rich and Box Elder Counties, Utah
Under contract with the State of Utah and the BLM Salt Lake Field Office, Cirrus worked with the BLM and Utah Division of Wildlife Resources to collect pygmy rabbit pellets from widely spaced sites in Rich and Box Elder counties. Deliverables under the contract included: collecting, storing, and shipping 791 pellet samples from a total of 109 sites, and providing GIS files of all sample sites. This two-year project began in 2013 and was completed in 2015.

Rio Tinto Aquatic Survey, Nevada
Under contract with the Humboldt-Toiyabe National Forest, Cirrus collected macroinvertebrate and water quality samples below the Rio Tinto Mine to monitor the quality of the water and the resultant effects on the aquatic environment. The project began in 2004 and was completed in 2005.

Skull Valley Nuclear Fuel Storage Project Wetland Delineation, Utah
Under contract to Private Fuel Storage, LLC, Cirrus specialists delineated wetlands, channels, and other jurisdictional waters of the U.S. along a proposed 32-mile rail spur from Low Junction to the Skull Valley Goshute Reservation, west of Salt Lake City. The spur would be used to transport spent fuel rods to the proposed storage site in Skull Valley. We completed mapping of these jurisdictional features, prepared a report submitted to the client and the U.S. Army Corps of Engineers, and assisted the client's legal staff in pursuing the permitting required under section 404 of the Clean Water Act. The project began in 2000, and our role was completed in 2001.

Snowshoe Hare Monitoring, Wyoming
Under contract with the Shoshone National Forest, Cirrus completed monitoring of snowshoe hare use in seven different habitat types from 2010 through 2011. The project included establishing transects through the vegetation types and estimating use based on presence of snowshoe hare pellets. This required the correct identification of species based on pellet types.

Threatened and Endangered Species Survey on the Uinta-Wasatch-Cache National Forest, Utah
Under contract with the Uinta-Wasatch-Cache National Forest, Cirrus completed surveys for several terrestrial animal and plant sensitive species within grazing allotments in three geographic areas on the Forest. Species surveys involved terrestrial bird species (boreal owl, goshawk, and flammulated owl), amphibians, and sensitive and recommended-sensitive plant species. Services provided for this work included all labor, supervision, equipment, transportation in both roaded and non-roaded forest environments, and mapping of primary habitat and survey areas. All surveys followed established protocols and direction from the Forest Service. Results of the survey work were documented in a written report, including all data gathered and GIS information. The project began in 2010 and was completed in April 2011.

Ute Ladies'-Tresses Survey, Utah National Guard, Utah
Under contract with Utah National Guard, Cirrus completed a survey for Ute Ladies'-tresses Orchid (ULT) (*Spiranthes diluvialis*) on a 50-acre parcel of land located between approximately 1700 and 1800 North and

600 and 1000 West in Logan, Utah. The survey was conducted to determine the presence of flowering ULT on the subject property and to assess the habitat quality relative to ULT. The project was completed in 2020.

Twelve Mile Canyon Goshawk Surveys, Utah
Under contract with Utah Division of Wildlife Resources, Cirrus conducted surveys for northern goshawk nests, individuals, and sign within an approximately 3,825-acre survey area in Twelve Mile Canyon, Utah. Goshawk surveys were conducted according to USDAs' Broadcast Acoustical Survey protocol described in the Northern Goshawk Inventory and Monitoring Guide. The project was completed in 2021.

University of Utah Cosmic Ray Telescope Array, Utah
Under contract to the University of Utah, Cirrus completed aerial and pedestrian surveys, following specified survey protocol, for various raptor species that were necessary for BLM and state permitting of proposed cosmic ray detectors. The surveys covered raptor nesting habitat in lowlands, on escarpments, rock outcrops, and mountainous regions in and around the entire desert valley west of Delta, Utah. Wildlife monitoring was also conducted during construction of the array. Cirrus began the project in 2007 and continued to monitor the area until 2010.

OTHER HYDROLOGY, WATER QUALITY, AND WATERSHED PROJECTS

12 Mile Watershed Assessment and Road Analysis, Utah
Under contract with the Manti-La Sal National Forest, Cirrus completed a comprehensive watershed analysis and roads assessment for the 12 Mile Watershed. Summer recreation in the watershed increased dramatically over the previous decade. As a result, issues surfaced with respect to the number of trails in the planning area and the associated watershed impacts. Cirrus determined the extent and severity of these impacts. The work began in 2001 and was completed in 2002.

Bear River Basin Adjudication, Idaho
Working with Rocky Mountain Environmental Associates, Cirrus identified point of diversion, place of use, developed water claims maps, and provided additional information needed to file water rights claims for irrigation companies and individual landowners as part of the adjudication process for the Bear River Basin. Cirrus worked closely with landowners to identify and accurately map water development (e.g., domestic, irrigation, livestock, etc.) and demonstrate beneficial use. This project began in 2021 and is ongoing.

Bear River TMDL Coordination Effort, Idaho, Utah, and Wyoming
Under contract with the Bear River Commission, Cirrus coordinated TMDL water quality studies for the Bear River watershed. The watershed includes three states, and numerous federal, state, and local agencies are involved in its management. Cirrus coordinated water quality improvement efforts to allow the Commission to more fully understand water quality issues in the watershed and how state boundaries are affecting water quality programs. This project began in 2002 and was completed in 2003.

Bear River Watershed Initiative, Idaho, Utah, and Wyoming
Under subcontract to Utah State University, Cirrus worked to update TMDL software and to document all existing water quality improvement projects undertaken in the three-state Bear River watershed. Cirrus reviewed developments within the floodplain and identified best management practices designed to reduce pollution in these areas. The project began in 2005 and was completed in 2006.

Corn Creek Wetland Riparian Inventory, Utah
Under contract with Franson Engineering, Cirrus completed a wetland riparian inventory along channels, ditches, and other areas that collect water in 612 acres of the Corn Creek watershed. The project objective was to document the nature of these systems in areas previously mapped as part of the National Wetland Inventory (NWI). Inventory points along ditches, channels, and other water features were documented with photographs and field observations. As requested by the client, a formal delineation of jurisdictional wetlands was not conducted. The work was completed as part of a larger EA prepared by Franson Engineering for the NRCS. The project was completed in 2023.

Ditch Bill NEPA Project for the Salmon-Challis National Forest, Idaho
Under contract with the Salmon-Challis National Forest, Cirrus was issued a task order for the Ditch Bill NEPA project. Cirrus prepared the scoping documents, technical specialist reports, and draft decision memos required under the Colorado Ditch Bill Act. Cirrus completed work for nine water diversion sites on the Challis-Yankee Fork, Salmon-Cobalt, and North Fork Ranger Districts within the Salmon-Challis National Forest and one site within the wild and scenic river corridor of the Main Salmon River on the West Fork Ranger District within the Bitterroot National Forest. This project began in 2016 and was completed in 2018.

Echo Reservoir TMDL Study, Utah
Under contract with the Utah Division of Water Quality, Cirrus completed a TMDL water quality study and remediation plan for the upper Weber River basin, one of the largest municipal watersheds on the Wasatch Front. This watershed has been heavily developed for storage and regulation of water and includes three of the seven reservoirs in the greater Weber River basin – Echo, Wanship (Rockport Lake), and Smith-Morehouse reservoirs. Cirrus identified pollutant loads of total phosphorus from five NPDES permitted point sources and recommended treatment alternatives for each facility. We utilized a reservoir/riverine computer model integrated with a customized GIS platform to allocate pollutant loads and determine concentrations of total phosphorus, dissolved oxygen, and temperature in reservoirs and streams in the project area. Cirrus also worked closely with the Weber Basin Water Conservancy District and various federal agencies to coordinate water improvement efforts focused on management of non-point source pollution. The project began in 2003 and was completed in 2006.

Eden Groundwater, Utah
Under contract with the landowners, Cirrus is completing water-level monitoring in Eden, Utah. The project includes installing and monitoring water-level sensors and providing the data for further analysis. The project began in 2018 and is ongoing.

Gateway West Shallow Groundwater Monitoring, Idaho
Under contract with PacifiCorp, Cirrus completed shallow groundwater monitoring in support of the Gateway West Transmission Line Project wetland mitigation program. Installation and monthly monitoring of 12 piezometer locations was continued for two growing seasons. The project began in 2013 and was completed in 2015.

JBS Discharge Permit Evaluation, Utah
Under contract with JBS Foods, Cirrus evaluated a new waste load allocation in a Utah meat-packing plant's Utah Pollution Discharge Elimination System permit to determine whether they were appropriate. The deliverables were spreadsheet data assessing the flow and water quality data used by the Utah Division of Water Quality to establish the new permit limits and a report summarizing these results and recommending how the limits could be revised. The project was completed in 2020.

Logan City 600 West Park Wetland Delineation and Groundwater Monitoring, Utah
Under contract with the City of Logan, Cirrus provided groundwater monitoring to determine the extent of wetlands on a site proposed for a city park. Cirrus worked with the U.S. Army Corps of Engineers to determine the proposal's potential wetland impact. This project began in 2000 and was completed in 2003.

Logan City Leachate Treatment and Logan River Trail, Utah
As a subconsultant under contract with the City of Logan, Cirrus prepared the biological and soils portions of an EA for Logan City leachate treatment and river trail projects, both of which involved development in wetlands. Cirrus also coordinated the NEPA portion of the project to ensure the process requirements were met. These projects were designed to address leachate concerns in the groundwater and provide additional recreational opportunities for the people of Cache Valley. Issues included surface and groundwater quality, wetland impacts, private property issues, wildlife and fisheries impacts, and impacts to soils. This project began in 2001 and was completed in 2003.

Lower Bear TMDL, Utah
Under contract with the Utah Division of Water Quality, Cirrus provided technical support to revisit a TMDL for total phosphorus that was originally completed in 2012. Due to budget constraints, the state took an unusual approach to this project by seeking technical help on selected portions of the TMDL only. Cirrus worked closely with the state to provide timely and accurate information, meet TMDL requirements, and stay within budget constraints. The watershed contributing to the lower Bear River includes some of the most productive agricultural land in Utah. It includes an extensive network of irrigation canals and field drains that divert, distribute and return irrigation water to the lower Bear River. Substantial livestock herds are maintained throughout the watershed in concentrated facilities and in larger pastures. Bank erosion occurs as water levels fluctuate in the Bear River during the irrigation season. Cirrus was responsible for identifying and characterizing sources of phosphorus and sediment, creating a spreadsheet model to link water quality with pollutant sources, and calculating pollutant loads from each source. The project began in 2016 and was completed in 2018.

Lower Jordan Flow, Utah
Under contract to the Jordan River Commission, Cirrus will conduct flow experiments to collect empirical data about the influence of flow on conditions that lead to chronic DO impairment in the Lower Jordan River. This project began in 2015 and is ongoing.

Jordan River DO TMDL Research Synthesis, Utah
In 2015, and again in 2020, DWQ contracted Cirrus to review and synthesize recent Jordan River research documents and data sets that were not available during the Phase I TMDL process. Cirrus worked closely with research scientists, TAC members, and agencies to ensure all relevant, recent data was addressed in the synthesis. The updated synthesis was released to the TAC for review, and we later presented the results during a TAC meeting. Cirrus worked closely with Lucy Parham (DWQ) to finalize the research synthesis following additional review by DWQ and TAC members. During these two projects, we formally responded to a total of 218 written comments, which were organized in table matrices with the final deliverables. Documentation totaled 39 pages for the first synthesis and 66 pages for the second, plus appendices. The first synthesis was completed in 2017 and the second synthesis was completed in 2020.

Jordan River TMDL Study, Utah
Under contract with the Utah Division of Water Quality, Cirrus is completing a TMDL water quality study and remediation plan addressing point and non-point source pollutant loads entering the Jordan River between Utah Lake and Farmington Bay. Point sources include three major municipal wastewater treatment facilities, and non-point sources include substantial urban stormwater runoff. Pollutants of concern include

dissolved oxygen, total dissolved solids, temperature and coliform bacteria. A thorough investigation of the linkages among pollutants of concern and the watershed processes that influence them was conducted. The project began in 2005 and was initially focused on the lower segments of the Jordan River. Based on our initial data review and pollutant-source characterization, the Division of Water Quality recommended the project deadline be extended to 2011 in order to incorporate additional data collection and analysis. Cirrus has assisted to date in that data collection and analysis. This project concluded in 2017.

Kloepfer Wetland Inventory, Idaho
Under contract with Kloepfer Inc., Cirrus completed a site visit and wetland inventory to document the presence or absence of wetland indicators on a private-land parcel based on existing properties of soil, hydrology, and vegetation. Survey results were documented in a signed memo with supporting data to submit to the Army Corps of Engineers, indicating that no wetland indicators were identified on the property. The project concluded in 2021.

Middle and Lower Sevier River Watershed Management Plan, Utah
Under contract with the Sevier Conservation District, Cirrus completed a watershed management plan for the middle and lower Sevier River. The plan was completed to restore full support of beneficial use to water bodies in the project area that were included on the Utah 2004 303(d) list. These water bodies were identified as impaired due to elevated levels of total dissolved solids (salinity), sediment, total phosphorus, and habitat alteration and assessed in the TMDL Water Quality Study of the Middle and Lower Sevier River Watersheds. The subsequent watershed plan contained management strategies and conservation practices designed to meet the water quality endpoints and target loads for each pollutant source as recommended by the TMDL study. The strategies and practices included in the plan were selected following discussions with agencies and private landowners in an effort to identify roadblocks and obstacles that would prevent implementation of projects to improve water quality. In order to obtain funding from the Section 319 Nonpoint Source Grants program, the plan met all minimum EPA requirements for watershed plan development. The project began in 2009 and was concluded in 2010.

Monticello/Blanding Infrastructure Improvement Project, Utah
Under contract with the Manti-La Sal National Forest, Cirrus completed a thorough watershed analysis for the Monticello/Blanding Infrastructure Improvement Project. Our work also included a watershed analysis of potential timber harvest areas. Our analysis was submitted as a technical report supporting preparation of an EIS by the Forest Service. The project began in 2001 and was completed in 2002.

Mt. Crested Butte Wastewater Treatment Facility Wildlife and Wetland Delineations, Colorado
Working with the local Water and Sanitation District, our staff completed wildlife and wetland surveys needed to satisfy regulatory requirements for a wastewater treatment plant expansion in this high-elevation resort community. Subsequently, we acted as the District's agents in securing Section 404 permits needed to complete the project. Our work began in 2000 and was completed in 2003.

Newton Reservoir TMDL Study, Utah
Under contract with the Utah Division of Water Quality, Cirrus completed a TMDL water quality study and remediation plan addressing non-point source pollutant loads of total phosphorus and subsequent low dissolved oxygen contributing to impairment of Newton Reservoir, Clarkston Creek, and Newton Creek. Cirrus worked closely with representatives from the Natural Resource Conservation Service and local stakeholders to assess specific streambank and upslope conditions associated with livestock feeding operations and agricultural use. Cirrus utilized a non-point source computer model developed specifically for the Newton watershed to assess current and future pollutant loads of total phosphorus. The project began in 2002 and was completed in 2004 following EPA approval of the final TMDL report.

Otter Creek TMDL Study, Utah
Under contract with the Utah Division of Water Quality, Cirrus completed a TMDL water quality study and remediation plan addressing point and non-point source pollutant loads contributing to impairment of the East Fork Sevier River, Otter Creek, and several reservoirs. The project area includes Otter Creek, Lower Box, and Tropic reservoirs. Management of land and water resources in the project area involves a number of federal, state, and county governments as well as private individuals. We completed detailed management plans incorporating watershed-scale efforts by federal and state agencies with those of individual stakeholders to achieve water quality goals in an efficient and cost-effective way. Cirrus also provided recommendations for managing flows from reservoirs and an assessment of how reservoir discharge impacts seasonal water quality conditions. The project began in 2002 and was completed in 2006 following EPA approval of the final TMDL report.

Otter Creek/East Fork Sevier Watershed Plan, Utah
Under contract with the Piute Conservation District, Cirrus completed a management plan for the Otter Creek watershed. The plan was completed to restore full support of beneficial use to water bodies in the project area that were included on the Utah 2016 303(d) list. These water bodies were identified as impaired due to elevated levels of total phosphorus, water temperature, E. coli, dissolved oxygen, OE Bioassessment, and sediment, as assessed in a TMDL study of the East Fork Sevier River, Otter Creek, and several reservoirs. The watershed plan presented management strategies and conservation practices that would meet the water quality endpoints and target loads for each pollutant source, as recommended by the TMDL study. The strategies and practices included in the plan were selected following discussions with agencies and private landowners in an effort to identify roadblocks and obstacles that would prevent implementation of projects that can improve water quality. In order to obtain funding from the Section 319 Nonpoint Source Grants program, the plan met all minimum EPA requirements for watershed plan development. The project began in 2017 and was concluded in 2019.

Oneida Bridge Replacement 404 Permit
Under contract with PacifiCorp, Cirrus prepared a CWA section 404 permit application that was submitted by PacifiCorp to the Army Corp of Engineers (Corps). As part of the project, Cirrus reviewed engineering plans to replace and update the existing Oneida Narrows bridge, confirmed Ordinary High Water Mark elevations, calculated dredge and fill amounts, completed all other sections of the permit application, and requested and participated in a prefiling meeting with Idaho DEQ to review the project. The permit was successfully approved by the Corps under Nationwide Permit No. 14 Linear Transportation Projects. The project began in 2022 and was completed in 2023.

Recapture Reservoir TMDL, Utah
Under contract with the Utah Division of Water Quality, Cirrus completed a TMDL water quality study and remediation plan addressing non-point source pollutant loads entering Recapture Reservoir. This water body was included on the Utah 2006 303(d) list as a result of low DO concentrations. The watershed contributing flow to Recapture Reservoir is comprised of a mixture of private and public land ownership that is utilized for livestock grazing, recreation, timber harvesting, and mining development. Cirrus worked with local stakeholders and federal resource specialists to define reservoir inflows and pollutant loading to the reservoir. Once consensus was reached on pollutant source characterization, load allocations were assigned along with recommendations for BMPs to achieve the TMDL end-points. The project began in 2007 and was completed in 2008.

Salt Lake City Stormwater Management Plan, Utah
Under subcontract with Salt Lake City Department of Public Utilities and Hansen, Allen and Luce, Cirrus provided technical assistance in development of an integrated stormwater management plan for the city. Phase 1 tasks addressed Management Area 4 and included: review and documentation of the existing stormwater system, treatment methods, and BMP implementation; providing input on sampling and analysis to predict the long-term effectiveness of the plan; participation in workshops to development a stormwater quality toolbox and integrate Jordan River TMDL requirements; and preparation of documentation of these tasks to set the stage for Phase 2, implementation of the plan and expansion of coverage to the city as a whole. Phase 1 began in 2019 and the work ended in 2021.

Salt Lake County Water Quality Stewardship Plan, Utah
Working with Salt Lake County Division of Engineering, Cirrus provided support in updating the Salt Lake County Water Quality Stewardship Plan. As part of this effort, Cirrus created a Watershed Function Index model used by Salt Lake County to establish baseline conditions in 17 major watersheds that comprise Salt Lake County and routinely monitor progress towards watershed goals. Cirrus completed an assessment of aquatic, riparian, and wetland habitat found in all major watersheds in Salt Lake County. Cirrus also completed an assessment of aquatic resources in each major watershed with regards to minimum instream flows needed to support these resources. Both assessments were to be included as part of the Water Quality Stewardship Plan. The project began in 2006 and was completed in 2008.

Spring Creek TMDL Study, Utah
Under subcontract, Cirrus worked with the Utah Division of Water Quality to complete the EPA-mandated analysis and remediation plan to clean up a stream with a long history of water quality degradation due to livestock feeding operations, fertilization of fields, and municipal wastewater treatment plants. Spring Creek is high on the Utah Division of Water Quality's priority list, and the TMDL study has served as a model for other, similar water impairment situations. The project began in 2000 and was completed in 2001.

Upper Bear River TMDL, Utah
Under contract with the Utah Division of Water Quality, Cirrus completed a TMDL water quality study and remediation plan addressing non-point source pollutant loads and subsequent low dissolved oxygen contributing to impairment of the Bear River in Rich County, Utah. Cirrus worked closely with representatives of the Natural Resource Conservation Service and local stakeholders to assess specific streambank and upslope conditions associated with livestock feeding operations and agricultural use. We utilized a water quality and flow model to assess current and future DO levels. The project began in 2005 and was completed in 2006 following EPA approval of the final TMDL report.

Water Hollow Wetland Survey, Utah
This project involved wetland surveys and mitigation planning completed for a private landowner in Wasatch County, Utah, to construct a series of pond structures for irrigation purposes. Surveys were completed along the existing stream channel to identify the extent of wetlands. An alternatives analysis was also completed in accordance with Section 404 of the Clean Water Act. The project was completed in 2003.

AVIATION PROJECTS

Parowan Airport Taxiway and Facilities Project, Utah
Under contract with Armstrong Consultants, Cirrus prepared a biological assessment to address impacts on threatened, endangered, and candidate species associated with a proposal to add a parallel taxiway and

adjunct facilities to the existing Parowan Airport. The primary species of concern was the Utah prairie dog. Surveys were completed to determine the potential impact to this species. This project began and was completed in 2002. In 2005, Cirrus completed another biological assessment to address impacts on special status species associated with a proposal to construct a taxi lane perpendicular to the existing taxiway and an access road parallel to the proposed taxi lane. Again, the primary species of concern was the Utah prairie dog. Surveys were completed to determine the potential impact on this species. This project began and was completed in 2005.

Older aviation project completed by Cirrus staff include:

- 11th Air Force Military Operations Area Improvement EIS, Alaska

LITIGATION SUPPORT PROJECTS

Broadmouth Fire, Box Elder County, Utah
Our staff completed a range and economics evaluation report supporting the plaintiff in litigation involving a rangeland fire. The work began in 2016 and was completed in 2019.

Connor Cattle Company v. Thiokol, Utah
Our staff provided analysis and expert witness services in a lawsuit pertaining to range/livestock production issues. This work began in 1999 and was completed in 2001.

Older litigation support projects completed by Cirrus staff include:

- Henrichson-Paramount Property, Spanish Fork, Utah
- Tony Chavez v. Murray City, Utah

RÉSUMÉS OF KEY PERSONNEL

SCOTT G. EVANS, PH.D.

Position

Owner/NEPA Specialist/Natural Resource Manager/Economist.

Education

Ph.D., Range Science (Range Economics), Utah State Univ., 1992.
M.S., Animal Science (Reproductive Physiology), Brigham Young Univ., 1988.
B.S., Range Science (Range/Livestock Management), Utah State Univ., 1986.

Relevant Experience/Qualifications

Employment History

2000-Present:	Owner and Project Manager, Cirrus Ecological Solutions, L.C.
1998-2000:	Business Leader, Project Manager, and Resource Management Specialist, KW Brown & Associates, Inc.
1994-1998:	Project Manager/Natural Resource Manager, Pioneer Environmental Services, Inc.
1992-1994:	Terrestrial/Rangeland Ecologist, Pioneer Environmental Services, Inc.

Areas of Expertise

Dr. Evans is experienced in natural resource, project, and business management, range science, economics, and livestock production. He has gained first-hand knowledge and experience in private as well as public aspects of resource use and management. In 2000, he became an owner/manager of Cirrus Ecological Solutions, LC and has been active in its day-to-day operations since its inception. Since 1992, he has served as a NEPA project manager, a resource specialist, an expert witness, and a pipeline inspector. As a project manager, he has led numerous small and large NEPA analyses (focusing on recreation, livestock grazing, and energy related projects), several water quality projects, resource management plans, and environmental site assessments. He demonstrates expertise in the management of complex projects and on-the-ground decision making as well as an in-depth understanding of the environmental compliance process.

Dr. Evans has been managing projects since 1994. Over that period, he has managed 15 NEPA projects addressing ski area development, recreation facility construction, energy development, livestock grazing. Most all of these projects included managing Cirrus staff as well as subcontractors to complete the work. Some of the projects he has managed required managing multi-agency concerns including agency co-lead projects between the Forest Service and BLM. He has also managed 12 other projects addressing recreation, energy, and water.

His skills include the following: environmental compliance and permitting, project management, small business management, natural resource management, environmental inspection, range livestock management, reclamation, and economics.

Relevant Experience

Ski Area Projects. Served as project manager on the following ski area projects: Alta Ski Lifts MDP Improvements EA, Aspen Highlands Ski Area Expansion EIS, Sugarbush Resort Proposed Improvement and Development EIS, Telluride Ski Area Expansion (master

planning, environmental permitting, Draft, Final, and Supplement EIS), Telluride Ski Area improvements EA. Responsibilities included: contract negotiation; process oversight; public involvement; agency coordination; environmental compliance documentation; collection, analysis, and reporting of physical, biological, and economic data; subconsultant oversight; technical review; document production and publishing; and budget control. Also worked as technical writer for the Kirkwood Specific Plan EIR and Loon Mountain Expansion EIS socioeconomic and other human resource issues.

NEPA projects in addition to Ski Areas. Served as project manager on the following NEPA projects: Dell Creek and Forest Park Elk Feedgrounds EIS, Invasive Plant Species EIS, Ditch Bill NEPA, Brooks Lake Lodge EA, Logan City 600 West Recreation Trail EA, Logan City Zoo Education Building EA, Logan City Leachate Treatment and Logan River Trail EA, and Parowan Airport BA/BE.

Grazing/livestock Management. Served as project director for the Grand Staircase-Escalante National Monument water projects EAs. Served as project manager on the Three Creeks Consolidation EA, and the Rich County Resource Management Plan Amendment and NEPA process. Served as range/livestock technical specialist on the North Sheep EIS (four sheep and goat allotments) and New Mexico Allotment Management Plan Renewal EAs (6 separate EAs on 10 cattle and horse allotments). Conducted detailed inventory and economic analysis of ranches in the Intermountain West and performed optimum combination techniques among improvement alternatives. Worked as an assistant ranch manager, participating in grazing management decisions, irrigation of hay fields and meadows, equipment operation, bull performance testing, breeding stock selection, and marketing of purebred breeding stock.

Water Projects. Project coordinator for the Middle and Lower Sevier River Watershed Management Plan, Rio Tinto Aquatic Survey, Upper Bear River, Echo Reservoir, Otter Creek and Newton TMDL studies. Project manager for the Bear River TMDL Coordination Effort. Project Manager for the 12 Mile Watershed Assessment and Road Analysis, Hydrologic Monitoring for Coal Tracts on the Manti-LaSal National Forest, and Monticello/Blanding Infrastructure Improvement Project.

Energy and Linear Projects. Served as project manager for the Greens Hollow Federal Coal Lease Tract, West Lease Modifications, Manti-LaSal Coal Tract Evaluations project, and the Wolverine Oil & Gas, Delta Petroleum, Armstrong Petroleum, and Royalite Petroleum seismic survey projects. Served as head environmental inspector in charge of compliance monitoring for Uinta Basin Lateral natural gas pipeline built by Colorado Interstate Gas, specializing in wetland and river crossings, reclamation efforts, NEPA compliance (i.e., document preparation, project management, data collection, monitoring, and conflict management), and follow-up vegetation monitoring and reclamation standards analysis. Primary author of a Noxious Weed EA used as a standard for weed control along the pipeline. Served as environmental inspector for Barrett Resources Corporation, supervising the crossing of wetland areas and the Colorado River to ensure compliance with agreed upon standards and guidelines. Served as reclamation and revegetation specialist on the Medicine Bow Lateral natural gas pipeline. Served as Socioeconomist for the Cheyenne Plains, Piceance Basin, High Plains, Arizona Gas Storage natural gas projects. Livestock specialist for the Grace/Cove Site Plan for PacifiCorp.

Land Use Planning and Development. Served as project manager for the Logan City 600 West Recreation Trail and Telluride area resource surveys for recreational trail development. Served as project manager on the Two Bear Ranch and the Wolf Creek Ranches Resource Management Plans. These plans focused on incorporating development with livestock and wildlife.

Reservoir Management Plans. Served as project manager for the Lost Creek Reservoir, Deer Creek Reservoir, Scofield Reservoir, and Starvation Reservoir Bureau of Reclamation resource management plans (four separate EAs and associated plans).

Environmental Site Assessments. Conducted Phase I and II ESAs on mining claims in the Mineral Basin and Mary Ellen Gulch areas of the American Fork River drainage, including the Miller Hill, Bradshaw, Excelsior, Globe and associated claims. Also worked on Phase I and II ESAs for the City of Logan, Goodyear Tire/Logan Laundry property. All were completed to American Society of Testing and Materials standards.

Litigation Support. Worked as livestock and range production specialist on Conner Ranch litigation project, completing analysis and serving as an expert witness. Prepared an economic analysis addressing the costs of a rangeland fire in northern Utah.

NEAL E. ARTZ, PH.D.

Position

NEPA Specialist/Natural Resource Manager/Social Scientist.

Education

Ph.D., Range Science, Utah State University, 1986.
B.S., Renewable Natural Resources and Communications, Univ. of Nevada-Reno, 1977.

Relevant Experience/Qualifications

Employment History

2000-Present: NEPA Specialist, Cirrus Ecological Solutions, L.C.
1998-2000: Business Leader, Project Manager, and Natural Resource Specialist, KW Brown & Associates, Inc.
1992-1998: Project Manager and Natural Resource Management Specialist, Pioneer Environmental Services, Inc.
1987-1992: Project Social Scientist, Lesotho Agricultural Production and Institutional Support Project (LAPIS), and partner in American Ag International, the LAPIS prime contractor.

Areas of Expertise

Dr. Artz is a broad-based natural resource professional who has emphasized human aspects – from rural sociology to conflict resolution to policy analysis – in his career. In the past, he has worked in rangeland management, vegetation/habitat analysis and fire control for federal agencies and spent several years as a social scientist and natural resource development specialist on government-funded projects in Africa. Since 1992 he has been in the environmental field, working as a business owner/manager, an environmental project manager, a natural resource management specialist, a socioeconomic analyst, and a pipeline inspector. He has demonstrated expertise in social and natural sciences, environmental compliance, rangeland management, reclamation, rehabilitation, and technical writing.

Dr. Artz has been managing projects since 1994. Since that time, he has managed more than 50 NEPA projects addressing ski area development, recreation facility construction, energy development, livestock grazing. Most all of these projects included managing Cirrus staff as well as subcontractors to complete the work. Some of the projects he has managed required managing multi-agency concerns, including agency co-lead projects involving the Forest Service and BLM.

His skills include: NEPA process, project management, range science, natural resource management, international development, rural sociology, socioeconomic impact assessment, environmental inspection, disturbed site rehabilitation, and French, Spanish and Sesotho languages.

Relevant Experience

Ski Area Projects. Served as project manager on the following projects: Bridger Bowl Ski Area Cartography, Brighton Plant and Wildlife Surveys, Jackson Hole Mountain Resort Recreational Enhancements Project EA, Snowbasin Resort Snowmaking Pond and 5-year Development Plan, Solitude Supplemental Information Report and Summit Lift

Replacement, Snowbird Master Development Plan Amendment EA, Snowbird Peruvian Lift Replacement, Snowbird Gad Valley Improvements EA, Mt. Bachelor Master Development Plan EIS, Crystal Mountain Master Development Plan EA, Crested Butte Mountain Improvement Plan EA, Steamboat Master Plan Amendment EA, Brundage Mountain Land Exchange EA, Alta Ski Area Master Plan Revision EA, Solitude Mountain Resort Master Development Plan EIS, Sun Valley Heli-Ski Permit Renewal EA, Silverton Outdoor Learning and Recreation Center EIS, Kirkwood Resort Specific Plan EIR, Brian Head Resort Master Plan Amendment EA, Snowbird Master Plan EIS, Wasatch Powderbird Guides Permit Renewal EISs (1997 and 2004), Crested Butte Mountain Resort Development Project (master plan update and EA), Eldora Mountain Resort Development Project (master plan update and two EAs), and Vail Category III Expansion (managed final editing and production of Draft and Final EISs only). Responsibilities included: contract negotiations, process oversight, public involvement; agency coordination; environmental compliance documentation; collection, analysis, and reporting of physical, biological, and economic data; subconsultant oversight; technical review; document production and publishing; and budget control. Worked as socioeconomic analyst on the Vail Cat III EIS and Telluride Ski Area Expansion EIS and Supplemental EIS.

Energy and Linear Projects. Served as project manager on the following projects: Bull Mountain biological surveys (TES plant and wildlife surveys and BA/BE production), Questar Pipeline Corp. Mainline 68 Replacement Project (threatened and endangered species and wetland surveys, biological assessment and biological evaluation), Barrett Resources Corp.'s Colorado River Pipeline Crossing Project (negotiating BLM right-of-way grant and Section 404 permitting), Barrett Resources Corp.'s Parachute Valley-Piceance Basin Natural Gas Pipeline Project (construction and environmental permitting, and EA), and Barrett Resources Corp.'s well site environmental clearances, 1994-2000. Worked as environmental inspector on the Colorado Interstate Gas Co. Uinta Basin Lateral pipeline, the Colorado Interstate Gas Co. Parachute Lateral Natural Gas Pipeline Project, and Barrett Resources Corp.'s Colorado River Pipeline Crossing Project.

Grazing/livestock Management. Served as project manager on the following projects: New Mexico permit renewal EAs in 2006 (two EAs addressing three cattle and horse allotments), North Sheep EIS (four sheep and goat allotments), and New Mexico permit renewal EAs in 2005 (four separate EAs on seven cattle and horse allotments). Served as NEPA specialist on the Rich County Resource Management Plan and NEPA process. Provided socioeconomic input in the design and implementation of programs to increase small-holder, commercial production of high-value livestock products and crops in Lesotho, southern Africa. Investigated cattle-supply constraints to privatizing a meat processing plant in Somalia. Provided editorial consulting on a National Academy of Science book entitled, *Improvement and Management of Arid and Semi-arid Rangelands*. Designed and conducted a two-week course on the principles of range management for participants in Utah State Univ.'s International Range Management and Extension Short course.

Resource and Water Development Projects. Served as project manager for the Cove Hydroelectric Project decommissioning project and Grace-Cove, Oneida, Alexander, Grace Dam, and Last Chance site plans, as project coordinator for the Lower Jordan TMDL project, as project manager for Bear Lake Channel Dredging Environmental Report Project. Served as technical coordinator on the Central Utah Project's Central Valley Water Reuse Project

EIS. Provided review and oversight on the Spring Creek TMDL Project. Served as project manager on the Elkhead Reservoir Expansion Project.

Environmental Site Assessments. Conducted Phase I ESAs for the Snowbird Ski and Summer Resort and Canyon Racquet Club, the Melville Property in Little Cottonwood Canyon, the War Eagle claim in Mineral Basin, and the Bradshaw Estate claims in American Fork Canyon.

Aviation Projects. Project Manager for the 11th Air Force Military Operation Area Improvement in Alaska.

Litigation Support Projects. Project Director for Henrichson-Paramont Property and Tony Chavez v. Murray City.

Training Projects. Project Manager for Federal Energy Regulatory Commission Seminar and Rocky Mountain Capshell Snail Training Seminar.

ERIC K. DUFFIN, M.S.

Position

Watershed Scientist/Hydrologist.

Education

M.S. Watershed Science, Utah State University, 1999.
B.S. Watershed Science (Hydrology), Minor Soil Science, Utah State University, 1993.

Relevant Experience/Qualifications

Employment History

2000-Present:	Watershed Scientist/Hydrologist. Cirrus Ecological Solutions LC
1999-2000:	Watershed Specialist/Hydrologist, KW Brown & Associates, Inc.
1996-1999:	Research Associate, Biology Department, Idaho State University.
1993-1996:	Graduate Research Assistant, Watershed Science Unit, Utah State University.
1992-1993:	Hydrology Technician, USDA Intermountain Experimental Research Station, Logan, Utah.
1990-1992:	Lead Forestry Technician, Wasatch-Cache National Forest, Logan Ranger District, Utah.

Areas of Expertise

Since 1993, Eric has gained professional experience with a wide range of watershed issues emphasizing hydrology and water quality. His hydrologic specialties include assessing impacts of proposed management activities, surveying and assessing channel morphology for stability and aquatic habitat condition, and collecting, managing, and assessing streamflow data. Eric has managed and participated in stream surveys covering more than 100 miles of stream channels in the western U.S., including channel banks and floodplain areas. He is experienced with multiple computer models of water quality and flow. He is a water quality expert with knowledge of the Clean Water Act (CWA) and other federal, state, and local regulations that require Best Management Practices (BMPs) to protect and improve water quality. In the past 15 years, Eric has served as a hydrologist on 16 NEPA project teams that addressed impacts of ski resort development, energy development, and livestock grazing on watershed resources. During this time he has managed or provided support as a water specialist on eight other projects that did not involve NEPA. Eric has also managed or provided support on 10 Total Maximum Daily Load (TMDL) assessments and two watershed/water quality management plans.

Eric is experienced in characterizing point and non-point source pollution, computer modeling to link pollutant sources with water quality conditions, projecting flow and water quality impacts from development scenarios, and providing BMP recommendations to restore impaired water bodies and degraded watershed areas. He has practical experience with BMPs included in the Forest Service 2012 National BMPs for Water Quality Management handbook. He has proven experience interacting with agency personnel and other stakeholders on controversial NEPA projects.

Relevant Experience

Ski Resort NEPA Projects. Completed watershed/hydrology analyses and/or other components (including soils, transportation, noise, energy, and land use) on the following major NEPA projects: Alta Ski Area Master Plan Amendment EA, Jackson Hole Mountain Resort EA, Snowbird Ski and Summer Resort EA, Solitude Mountain Resort EIS, Crested Butte Mountain Resort EA, Kirkwood Resort Specific Plan EIR, Loon Mountain Ski Resort Development and Expansion EIS, Mt. Bachelor Ski Area EIS, Silverton Outdoor Learning and Recreation Center EIS, and Steamboat Ski Area Master Plan Amendment EA. Duties included: identified impacts of proposed management activities on (1) hydrologic regime (peak flow timing and magnitude), (2) channel and floodplain stability and function, (3) aquatic habitat (pools, riffles, runs), and (4) water quality (sediment, dissolved metals, nutrients); identified and recommended BMPs and monitoring activities based on Forest Plan requirements (i.e. standards, guidelines, and design criteria) including many that are consistent with and included in the FS National Best Management Practices for Water Quality Management; identified cumulative effects on watershed resources including the remedial influence of BMPs.

Hydrology: Served as project hydrologist on projects including Greens Hollow Coal Tract EIS, West Lease Modifications EA, Manti-LaSal Hydrologic Monitoring, Manti LaSal Coal Tract Evaluation, Monticello/Blanding Infrastructure Improvement Project and 12 Mile Watershed Assessment and Road Analysis. Duties included: identified impacts on watershed resources due to mining subsidence (including diversion of surface/groundwater, and changes in channel morphology from mine discharge), collected multiple years of monitoring data (flow and water quality) in remote locations on the Manti LaSal National Forest from springs, streams and reservoirs, completed longitudinal and cross section stream surveys in remote locations using total station survey equipment, analyzed data for trend and support of beneficial use, and inventoried and evaluated sites where roads and trails crossed stream channels and floodplains. Served as watershed specialist for the Salt Lake County Water Quality Stewardship Project. Duties included: developed Watershed Function Index protocol and field survey methods for assessing ecological health and function of riparian corridors in Salt Lake County, developed science-based watershed function targets, assessed baseline riparian habitat conditions for roughly 295 miles of stream channels in all management units in Salt Lake County.

Water Quality Projects. Served as Project Manager for the Middle and Lower Sevier Watershed Plan and Echo Reservoir, Otter Creek Reservoir, Recapture Reservoir, Newton Reservoir, Upper Bear River, Lower Bear River and Jordan River TMDL studies. All projects included some watershed areas and interaction with FS specialists in stakeholder capacity. Served as Assistant Project Manager for the Spring Creek TMDL study. Duties included: identified, interpreted, and applied CWA regulations to meet TMDL requirements; characterized point and non-point pollutant sources using monitoring data, computer modeling, and other scientifically based methods; projected future loads and developed load allocations for point and non-point pollutant sources on federal, state and private land; modeled flow and water chemistry in rivers and to link pollutant sources to water quality conditions (including project experience with QUAL2KW, RUSLE2, HEC-RAS, HSPF, and STEPL computer models); managed and participated in stream surveys documenting channel, stream bank and flood plain stability, channel morphology, aquatic habitat, and non-point pollutant loading (protocols included PFC, MIMs, SVAP, Rosgen, and Pfankuch) on more than 100 miles of channels and floodplains; identified and recommended BMPs based on effectiveness (i.e., pollutant removal efficiency), TMDL

targets, and agency requirements; assessed stream survey data; presented project results to agencies, scientists, and general public. Many BMPs recommended by these TMDL projects are similar to, or included in, the FS National Best Management Practices for Water Quality Management. Served as watershed scientist for the Bear River TMDL Coordination Effort and Bear River Watershed Initiative projects. Duties included: catalog previous BMPs and watershed improvement projects, developed customized GIS database to visually identify previous TMDL data in the Bear River Basin. Presented results of water quality projects to watershed steering committees, technical advisory committees, and the general public. Served as water quality specialist on three Phase 1/Phase II site assessments on Uinta-Wasatch Cache National Forest land. Duties included: identified sources of potential flow and pollution to receiving streams, interpreted sample data.

Grazing/livestock Management NEPA. Completed watershed/hydrology analyses on five major livestock NEPA projects: North Sheep EIS (four sheep and goat allotments), Three Creeks EA (ten cattle and sheep allotments), Deseret EA (one cattle allotment), New Mexico Grazing Permit Renewal EA – 2005 (seven cattle and horse allotments), and New Mexico Grazing Permit Renewal EA – 2006 (three cattle allotments). Duties included: assembled and analyzed agency monitoring data; defined baseline conditions of stream channels, stream banks, riparian areas and floodplains; determined compliance with State water quality regulations; identified grazing impacts on baseline conditions for the project area and downstream areas under different grazing management scenarios (e.g. timing and intensity); reviewed and recommended BMPs to meet agency standards and guidelines including many BMPs that are consistent with and included in the FS National Best Management Practices for Water Quality Management.

Environmental Site Assessments. Authored reports on several Phase I ESAs conducted on mining claims located in American Fork Canyon, including the Bradshaw, Acme, and Excelsior claims. Provided field assistance in Phase II ESAs by collecting water quality and soil samples from areas disturbed by hard-rock mining and ore processing.

JOHN W. STEWART

Position

Terrestrial Ecologist/Wetland Specialist.

Education

M.S., Biological and Agricultural Engineering, University of Idaho, 2016
B.S., Range Science, Minor in Spanish, Utah State University, 1993.

Relevant Experience/Qualifications

Employment History

2000-Present:	Terrestrial Ecologist/Wetland Specialist, Cirrus Ecological Solutions, LC
1998-2000:	Biologist/Wetland Specialist, KW Brown & Associates, Inc.
1993-1998:	Biologist, Pioneer Environmental Services, Inc.
Summer 1992:	Forest Technician, USDA Forest Service.
Summer 1990:	Range Technician, Bureau of Land Management.

Areas of Expertise

Since 1993, John has gained extensive professional experience with a wide variety of natural resource issues, with emphasis on ecology, botany, wildlife, wetlands, and range management. He has served on 23 NEPA project teams as the botanist/vegetation specialist and wetland specialist. Areas of expertise include surveys for federally-listed threatened, endangered, and candidate species, Forest Service sensitive species, and state-listed species; project impact assessment and impact mitigation; and preparation of biological assessments/evaluations, botanical reports, EIS/EA specialist sections, and coordination with agency counterparts and specialists. His wetland expertise includes wetland ecology and plant identification, jurisdictional delineations, impact assessment and avoidance planning, Section 404 permitting, and mitigation planning and implementation.

John has worked in a wide variety of ecosystems across the United States, ranging from desert to montane and alpine communities.

In addition to being a botanist, he is resource generalist, having worked in and with many other resource disciplines in the biological, physical, and social realm. This breadth of experience facilitates his role and contribution on the ID team as the botanical resource specialist.

Relevant Experience

Ski Area/Recreation NEPA Projects. Served as the botanist and wetland specialist for numerous ski area/recreation projects: Brian Head Resort Master Plan Amendment EA, Snowbird Ski and Summer Resort Master Plan EIS, Snowbird Peruvian Lift Replacement Project, Snowbird Base Area Master Plan, Snowbird EA, Sun Valley Heli-Ski Permit Renewal EA, Wasatch Powderbird Guides Permit Renewal EIS, and Brundage Mountain Land Exchange. Duties included: threatened, endangered, and sensitive plant and wildlife surveys, habitat mapping and assessment; preparation of biological assessments/evaluations, botanical reports, and NEPA document sections; general

vegetation surveys; community type descriptions and mapping; updating and augmenting vegetation and wetland surveys; wetland delineation and mapping; Section 404 permitting; authoring wetland and vegetation sections for NEPA documents; contributing other sections to NEPA documents, including avalanche control, transportation, noise, cultural resources, and land use; and coordinating with federal, state, and local agency representatives.

NEPA projects in addition to ski areas. Worked as vegetation resource specialist on the Brooks Lake Lodge EA, Gypsum Hills, Logan City 600 West Recreation Trail EA, Logan City 600 West Park Wetland Delineation and Groundwater Monitoring, Logan City Zoo Education Building EA, Logan City Leachate Treatment and Logan River Trail EA, and the cellular tower EA for Voicestream.

Grazing/livestock Management. Served as the botanist for grazing related projects, including the following projects: the North Sheep EIS for four allotments on the Sawtooth National Forest, and the Three Creeks Grazing Allotment Consolidation project on the Wasatch Cache National Forest, Squaw Valley Ranch Grazing Permit Renewal, North Sheep EIS and the six 2005 and 2006 New Mexico Allotment Management Plan Renewal EAs. Duties included special status species surveys; assessment of livestock grazing on plant communities, particularly the impact of grazing on special status species; the assessment of differences in management actions on special status species and vegetation communities; coordination with agency specialists; and preparation of biological assessments/evaluations, botanical reports, and NEPA specialist sections.

Energy Projects. Served as the botanist for numerous energy-related projects, including the following projects: Wolverine Gas and Oil seismic survey projects on the Fishlake National Forest (multiple projects over a five-year period), Delta Petroleum Company seismic survey projects, Greens Hollow Coal Lease Tract Proposed Leasing and Underground Mining Project, Manti-LaSal Coal Tract Evaluations Project, West Lease Modifications EA, and Aspen Products Pipeline Project. Duties included project oversight and management; coordination with agency specialists; surveys for threatened, endangered, and sensitive species; preparation of biological assessments/evaluations and botanical/survey reports; noxious weed surveys; jurisdictional wetland delineations and Section 404 permitting; and preparation of NEPA specialist sections.

Resource Management Planning Projects. Served as the botanist on numerous resources management and related projects, including the following projects: the Manti-LaSal Hydrology Project - Monticello/Blanding Infrastructure Improvement Project, Manti-LaSal Hydrology Project - 12 Mile Watershed Assessment and Road Analysis project, Brooks Lake Lodge EA, Wasatch-Cache grazing allotment surveys, and preparation of the impact assessment section for the Jarbidge Resource Management Plan for *Lepidium papilliferum*. Duties included resource assessment and inventory; habitat assessment and survey planning and management; preparation of survey reports, and management action impact assessment.

Water Development Projects. Worked as the vegetation resource specialist for the Dry Creek Riparian Habitat Restoration Project. Assisted in completing the Spring Creek and Otter Creek TMDL Projects, assessing wetland and riparian aspects and supporting GPS/mapping activities, providing field expertise especially in regard to assessing the

impact of grazing practices, developing responsive BMPs, and identifying and inventorying vegetation communities and wetland/riparian resources. Worked as wetland specialist for the Central Valley Water Reuse Project EIS. Duties included delineation, mapping, typing, and description of jurisdictional wetlands along the pipeline right-of-way; direct and indirect impact assessment; preparation of a technical report and section for the EIS; coordination with federal and state agencies; and preparation of the air quality section for the EIS.

Land Use Planning and Development. Worked as vegetation and wetland specialist for the Two Bear Ranch Resource Management Plan, the Genstar development, and the proposed Town of Crested Butte Expansion. Duties included: jurisdictional wetland delineation; wetland mapping from aerial photographs; wetland functional values assessments; threatened, endangered, and sensitive species surveys; and coordination with federal, state, and local officials.

Environmental Site Assessments. Conducted Phase I and II ESAs on mining claims in the Mineral Basin and Mary Ellen Gulch areas, including the Miller Hill, Bradshaw, Excelsior, Globe and associated claims.

JUSTIN BARKER

Position

Aquatic Ecologist/Hydrologist.

Education

B.S. Geography Utah State University 1996.

Relevant Experience/Qualifications

Employment History

2010-Present	Field Scientist, Cirrus Ecological Solutions
2013-Present:	Senior Scientist, Redfish Environmental.
2007-2013:	Project Manager/Senior Scientist, Symbiotics Energy Corp.
2004-2013:	Senior Scientist/GIS Analyst, Ecosystems Research Institute.
1997-2004:	Junior Scientist/GIS Analyst, Ecosystems Research Institute.

Areas of Expertise

Justin is a broad-based natural resource professional who has emphasized environmental aspects from environmental field research to data analysis to written and oral presentations in his 19-year career. As both a scientist and writer, he has gained experience in a wide range of environmental areas over his tenure with an emphasis on data analysis planning and permitting, FERC licensing and relicensing, wetland determinations and permitting, fisheries surveys, water quality collection and analysis, threatened and endangered species surveys, modeling and technical writing.

Mr. Barker has managed the fish data collection on the Madison River in Montana, Henrys Fork River in Idaho, Row and Deschutes Rivers in Oregon, and the San Juan River in New Mexico and Utah from 2000- 2012; he has over 3000 hours of boat electrofishing experience. Additionally he has over 1000 hours of experience with backpack electrofishing throughout western rivers and streams including those listed above.

Skill include:

- Study Design.
- Habitat Assessments.
- Water Quality.
- Hydrology
- Sediment Transport.
- Reservoir Modeling.
- Data Management.
- Fisheries.

Relevant Experience

<u>Monitoring and Reporting</u>

Served as a watershed scientist, water/soil scientist, or aquatic scientist for Ashton Dam Remediation Project, Alexander Reservoir Water Quality Monitoring, Snowbird Phase 1 reports, and San Juan Recovery Implementation Program. Duties included:

- Developed SAP for monitoring Turbidity and DO per Idaho DEQ protocol and for client to meet ASTM Practice standards and sample protocol for hazardous waste; and
- Collected bathymetric measurements and sediment core samples, installed and maintained multiparameter water quality sondes; and.

- Data collection, analysis and reporting; collection of soil samples from surface and at-depth; and
- Collected water quality samples from springs, wetlands, streams, and mine portals; and
- Sampled and measured macroinvertebrates, water quality, river stage, sediment depth, zooplankton, invertebrates, periphyton, and river primary production; and
- Completed river habitat mapping across San Juan Basin; created habitat mapping in one mile reaches including sampling over 1,200 habitats; and
- Collected fish samples using seines
- Conducted physical and biological habitat monitoring at river restoration sites; and
- Developed and implanted intensive bathymetric surveys of Ashton Reservoir along with river and in reservoir sediment collection to characterize and map sediment throughout the reservoir for a HecRas model used to predict sediment releases when the reservoir was lowered to rebuild the dam; and
- Developed and implemented the water quality monitoring program, installed two instantaneous water quality monitoring stations to monitor construction and post-construction impacts; and
- Used continuous monitoring data to develop a Turbidity TSS relationship and continuously monitor sediment loading during the rebuild.
- Monitored turbidity and dissolved oxygen during the spill gate rehabilitation at Alexander Reservoir with instantaneous water quality probes.

Other Monitoring and Reporting

- PacifiCorp Grace Hydroelectric Project, Idaho. Project Manager for the Boater Flow water quality study; senior field scientist for the collection and analysis of water quality data during high flow releases (2008-2010).
- Grace-Cove Hydroelectric Project, Idaho. Project manager for 401 Certification compliance related to operation of the Grace power plant located on the Bear River and data collection. As part of the 401 Certification, we were contracted to monitor and model water quality parameters to quantify operation effects on the Bear River system which could be attributed to the project (2004-2007).
- Oneida Hydroelectric Project, Idaho. Project manager for 401 Certification compliance related to operation of the Oneida power plant located on the Bear River and data collection. As part of the 401 Certification, we were contracted to monitor and model water quality parameters to quantify operational effects on the Bear River system which could be attributed to the project. Ramping rates for the project were analyzed in order to determine if operational constraints of the project were necessary to reduce bed load and bank erosion from project operations (2004-2009).
- Bear Lake Monitoring, Utah. Project Manager for long term monitoring of Bear Lake water quality; collection, analysis and reporting of nutrients in Bear Lake (1997-2007).

- Bear Lake Dredging at Lifton Pumping Station, Idaho. Project Manager for water quality monitoring dredging activities to remove sediment on the north shore of Bear Lake (2007).

Assessment

Served as the aquatic scientist for San Juan Recovery Implementation Program including 17 years in a variety of roles from field scientist to an alternative Biology Committee member, involved with numerous opportunities on a wide range of research projects and monitoring programs (1997-2013). Notable studies include:

- Senior field scientist for the programs annual habitat mapping which included mapping river habitats over a 180 mile section of the San Juan River annually. This served multiple purposes to tract changes in river habitats as water projects depleted natural flows and provided researchers a point of reference for habitats and complexity for native fishes river wide.
- Field scientist collecting data for a Bioenergetics modeling effort to develop a food web model to predict the carrying capacity for the Colorado Pikeminnow. Data collection included intensive fisheries surveys, including boat and backpack electrofishing and seining, to develop population estimates and collecting invertebrates and periphyton over multiple seasons.
- Senior scientist for the detailed habitat and young of year study, the goal was to better understand habitat utilization and identify preferred habitats in complex reaches of the San Juan River for the native fish population. Data collection included, seining and mapping over 1200 habitats throughout the study period. Other data collection included; cover type, flow, substrate and temperature data.
- Other projects include; primary production analysis to look at the effects of perturbation events on primary producers and invertebrates. Spawning substrate and location analysis for the Razorback sucker. Mapping locations of endangered fishes during annual population estimates and removal programs.

Other Assessments:

- FERC Licensing of Clark Canyon Reservoir Hydro Electric Project, Montana. Wetland determinations, macroinvertebrates and water quality monitoring and transmission permitting. Intensive water quality surveys were conducted to model reservoir water quality and gassing issues associated with the existing regulating outlet. Additionally, modeling of dissolved oxygen to determine potential oxygen issues associated with the hydroelectric facility. project (2003-2013).
- Re-operation Swift Creek Hydroelectric Project, Wyoming. Wetland mapping, bathymetric modeling of sediment within Swift Creek Reservoirs and long term water quality monitoring during construction and operation. We were contracted to map and model sediment accumulations within two small reservoirs in order to comply with FERC license articles prior to construction. Long term water quality monitoring stations were installed to monitor construction activities as well as operational effects of the projects. Additional studies included stranding surveys for fish and channel morphology surveys (2007-2011).
- FERC Licensing Dorena Lake Project, Oregon. Senior Scientist for studies associated with fisheries, water quality, benthic invertebrates, and habitat mapping

in the Row River. We conducted extensive surveys in the Row River and Dorena Lake which included water quality studies (nutrient studies, oxygen and methylmercury). Fishery studies completed included; Mercury contamination in macroinvertebrates, bass and salmonids, population estimates for young of year fishes in the Row as well as spawning substrate studies (2003-2008).

- FERC Licensing Applegate Reservoir Project, Oregon. Senior Scientist for studies associated with fisheries, water quality, benthic invertebrates, and habitat mapping in the Applegate River. We conducted extensive studies for both water quality and fishes. Water quality parameters were measured above, below and in Applegate Lake. Entrainment studies were conducted using a rotary screw trap at the out flow of the dam. Redd surveys and spawning substrate was completed below as well as channel morphology studies. Additional studies include a habitat assessment for spawning substrate above Applegate Lake in 60 miles of tributaries following Forest Service protocols (2003-2009).
- FERC Licensing Hebgen Lake Project, Montana. Fisheries, wildlife studies, water quality studies. Madison River, Montana. We conducted extensive fisheries studies including; population estimates on the Madison River, Hebgen Reservoir and Earthquake Lake using various techniques; electrofishing both backpack and raft, entrainment studies, fry studies, and spawning surveys. Water quality studies in both the lake and river were also conducted. Amphibian studies for toads were conducted, along with various raptor and migratory bird surveys (2001-2005).
- FERC Licensing Chester Diversion Project, Idaho. Fisheries, wildlife, bathymetric mapping, and recreation studies. Henrys Fork River, Idaho. Conducting extensive fisheries studies including; population estimates on the Henrys Fork River using both backpack and raft shockers for adult and YOY salmonids, entrainment studies using various shockers, rotary screw traps, various nets and seines, spawning surveys above and below the dam. Water quality studies, macro invertebrate and substrate studies were also completed. Amphibian studies for toads were conducted, along with various raptor and migratory bird surveys. Additionally, water quality monitoring of construction activities through startup testing (2001-2011).
- Uinta Hydroelectric Project Hydrology Investigations, Utah. Senior Scientist for developing a water budget for the small hydroelectric project. Installation of pressure sensors and gages for flows. Modeling past allocations of water through the project, developed rating curves for generators (2015-Present).
- Uinta Hydroelectric Project Fish Habitat Investigations, Utah. Senior Scientist/GIS Analyst mapping fish habitat in the bypass reach of the Uinta River. Data collection included detailed habitat mapping, substrate and bank analysis, collection of flow data (2015-Present).
- Uinta Hydroelectric Project Fisheries Investigations, Utah. Senior Scientist/GIS Analyst for population estimates in the Uinta River (2015-Present).
- Kuskokwim River Juvenile Salmon Investigation, Alaska. Senior Scientist/GIS Specialist mapping fish habitats and fish surveys in six detailed reaches over a 240 mile section of the Kuskokwim River (2014).

ADAM CLIFFORD, M.S.

Position

Wildlife Ecologist

Education

M.S. Ecology, Utah State University, 2022.
GIS Certification, Utah State University, 2021.
B.S. Wildlife Ecology and Management, Minor International Resource Management and Biology, University of Wisconsin-Stevens Point, 2011.

Relevant Experience/Qualifications

Employment History

2022-Present:	Wildlife Ecologist. Cirrus Ecological Solutions LC
2020-2022:	Graduate Research Assistant, Wildland Resources Department, Utah State University
2015-17, 2020:	Project Lead and Research Technician, HawkWatch International
2016-2020:	Wildlife Biologist, WEST, Inc.
2011-2016:	Biological Science Technician, various Federal and State agencies

Areas of Expertise

Adam is a wildlife ecologist familiar with a range of general, game, and special-status wildlife species in aquatic, riparian, and upland habitats ranging from desert to alpine environments. He has been involved in multi-year and short-term research projects focusing on behavioral characteristics or habitat relationships of species including the greater sage-grouse, prairie chicken, ptarmigan, golden eagles, songbirds, several species of bats, mule deer, and several others. He has experience with numerous habitat, fish, and wildlife sampling and surveying techniques including: vegetation surveys, rangeland assessments, electrofishing, gill netting, nest surveys, songbird point counts, bird-call broadcasting, aerial wildlife counts, radio-telemetry, scat surveys, animal track surveys, bird and mammal trapping, and remote camera sampling. In addition to his field expertise, Adam is experienced with lab-based data analyses including: mammal scat-based diet analysis, bird crop content-based diet analysis, big game necropsies. Adam also has extensive experience with Geographic Information Systems (GIS) and remote sensing software. He earned a GIS Certification and has performed a wide range of spatial analyses on data from many different sources. He is experienced with vegetation and landcover classification, as well as habitat modeling.

Relevant Experience

Biological Research Projects. Involved in multi-year and short-term research projects focusing on behavioral characteristics or habitat relationships of species including the greater sage-grouse, prairie chicken, ptarmigan, golden eagles, songbirds, several species of bats, mule deer, and several others. He has experience with numerous habitat, fish, and wildlife sampling and surveying techniques including: vegetation surveys, rangeland assessments, electrofishing, gill netting, nest surveys, songbird point counts, bird-call broadcasting, aerial wildlife counts, radio-telemetry, scat surveys, animal track surveys, bird and mammal trapping, and remote camera sampling.

GIS Mapping and Cartography. Completed GIS analysis, mapping, and problem solving associated with numerous studies, reports, and publications. Performed the full range of spatial analysis on data from many different sources. Experienced with vegetation and land cover classification, as well as habitat modeling.

Energy. Served as the wildlife ecologist on several wind and solar energy projects across the US. Duties included: coordinating survey activities and protocols with agency counterparts; conducting wildlife surveys; writing survey reports; analyzing impacts on special status species.

Rangeland. Performed range assessments and rangeland vegetation surveys on restoration and reclamation projects across Utah with USDA Agricultural Research Center.

JUDITH (JUDY) SEAMONS

Position

Document Production Specialist/Office Manager.

Education

Professional Word Processor, Certified Careers Institute, 1987.
B.S., Home Economics Education, Utah State University, 1982.

Relevant Experience/Qualifications

Employment History

2000-Present:	Document Production Specialist/Office Manager, Cirrus Ecological Solutions, L.C.
1998-2000:	Document Production Specialist/Administrative Assistant, KW Brown & Associates, Inc.
1996-1998:	Document Production Specialist/Administrative Assistant, Pioneer Environmental Services, Inc.
1989-1996:	Marketing and Administrative Assistant, Lundahl Instruments, Inc.

Areas of Expertise

Judy has worked in document production since 1989. She has managed document production support for NEPA efforts, landscape analyses, watershed assessments, travel management, and other programs. Her efforts demonstrate excellence in completing numerous high-quality environmental documents, including EISs, EAs, and biological assessments. She has also been responsible for the Project Records on all projects completed by Cirrus. These records are created using the PAL database protocols utilized by the Forest Service. The project records meet the Project Record Management requirements of the Forest Service Planning Appeals and Litigation System database and have been used when necessary for appeals on previous projects. Her skills include:

- All phases of production and printing of documents including creation of documents that are 508 compliant and web-posting ready in either PDF or Microsoft WORD formats.
- Creation of project records that are electronic, complete, and OCR readable PDFs.
- Production of proposals, qualifications statements, catalogs, and ad campaigns.
- Office administration and coordination of activities including travel.

Relevant Experience

Ski Area Projects. Provided administrative assistance, document production support, and project record creation on these projects: Bridger Bowl Ski Area Cartography, Brighton Plant and Wildlife Surveys, Jackson Hole Mountain Resort Recreational Enhancements Project EA, Snowbasin Resort Snowmaking Pond and 5-year Development Plan, Solitude Supplemental Information Report and Summit Lift Replacement, Alta Ski Area Master Plan Amendment EA, Aspen Highlands Ski Area EIS, Brian Head Resort Master Plan Amendment EA, Crested Butte Mountain Resort Proposed Improvements EA, Crystal Mountain MDP Amendment #1, Eldora Mountain Resort Master Development Plan, Eldora Mountain Pine Beetle Suppression, Kirkwood Resort Specific Plan EIR, Loon Mountain Expansion EIS, Mt. Bachelor Ski Area Improvements Project, Snowbird Ski and

Summer Resort Master Plan EIS, Snowbird Peruvian Lift Replacement Project, Snowbird Base Area Master Plan, Silverton Outdoor Learning and Recreation Center EIS, Proposed Improvements and Developments at Sugarbush Resort EIS, Solitude Mountain Resort Master Development Plan EIS, Steamboat Ski Area Master Plan Amendment EA, Sun Valley Heli-Ski Permit Renewal EA, Wasatch Powderbird Guides Permit Renewal EIS, Telluride Ski Area Proposed Improvements EA, Telluride Ski Area Expansion EIS, and Vail Category III EIS. Specific duties included: layout and formatting of documents, production of final copy in 508 compliant format (where required), delivery and coordination of production with the print shop, compilation of mailing list, coordination and mailing of the documents, and compilation of Project Record.

Grazing/livestock Management. Served as administrative assistant and document production specialist on 6 New Mexico EA's in 2005 and 2006, the North Sheep EIS and New Mexico Allotment Management Plan Renewal EAs, and Threatened and Endangered Species Surveys on UWCNF. Specific duties included: layout and formatting of documents, production of final copy in 508 compliant format (where required), delivery and coordination of production with the print shop, compilation of mailing list, coordination and mailing of the documents, and compilation of Project Record.

Resource Management Planning Projects. Provided administrative assistance and document production support on the following projects: Bear Lake Channel Dredging Environmental Report, Logan City 600 West Park Wetland Delineation, Greens Hollow Coal Lease Tract Proposed Leasing and Underground Mining Project, Manti-LaSal Coal Tract Evaluations Project, Manti-LaSal Hydrology Project - Monticello/Blanding Infrastructure Improvement Project, Manti-LaSal Hydrology Project - 12 Mile Watershed Assessment and Road Analysis, and Rich County Grazing Permit EA.

Water Development Projects. Completed layout and formatting of technical reports for the 12 mile Watershed Assessment and Road Analysis, Bear River TMDL Coordination Effort, Bear River Watershed Initiative, Central Utah Project's Central Valley Water Reuse Project, Cove Dam Decommissioning Project Water Quality Monitoring and Environmental Report, Salt Lake County Water Quality Stewardship Plan, Rio Tinto Aquatic Survey, Water Hollow Wetland Survey and Middle and Lower Sevier River Watershed Management Plan. Completed layout and formatting of TMDLs for Otter Creek Reservoir, Echo Reservoir, Newton Reservoir, Recapture Reservoir, Spring Creek, Upper Bear, Lower Bear, and Jordan River.

Land Use Planning and Development. Completed layout and formatting of technical reports for the Brooks Lake Lodge Additions, Brundage Mountain Land Exchange, Bureau of Reclamation Reservoir Management Plans, Dry Creek Riparian Habitat Restoration Project, Emory Port of Entry Project, Grace-Cove Site Plan, Logan City 600 West Recreation Trail Project, Logan City Zoo Education Building, Oneida Site Plan, Randolph Management Framework Plan Amendment, and Two Bear Ranch and Wolf Creek development projects.

Office Management. Duties have included development and supervision of office protocols to ensure smooth operation of the facilities, accounting, bookkeeping, payroll, and other duties as required.