

**Resolution Copper Project and Land Exchange
Environmental Impact Statement**

USDA Forest Service
Tonto National Forest
Arizona

March 21, 2020

Process Memorandum to File

Response to Public Statements about Stephen W. Carothers

This document is deliberative and is prepared by the third-party contractor in compliance with the National Environmental Policy Act and other laws, regulations, and policies to document ongoing process and analysis steps. This document does not take the place of any Line Officer's decision space related to this project.

**Prepared by:
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Purpose of Process Memorandum

The Draft EIS for the Resolution Copper project was released in August 2019, followed by a series of public meetings. During two of these meetings, public statements were made by a commenter, Mr. Chris Spidle, about an alleged conflict of interest involving Dr. Stephen W. Carothers.

The purpose of this memorandum is to summarize pertinent information gathered in response to these public statements.

Public Statements Made

Mr. Spidle spoke during the Queen Valley public meeting (October 8, 2019) and the Tempe public meeting (October 10, 2019). The comments made were captured by court reporter and included for comment analysis and response in the full project comment database.

A total of 7 individual submittals appear to be present in the comment database for Mr. Spidle. Six of these are related to the same topics. These include:

- October 8 – Public testimony at Queen Valley meeting
- October 8 – Public testimony at Queen Valley meeting
- October 9 – Written comment
- October 10 – Public testimony at Tempe meeting
- October 10 – Email forwarded from Tonto National Forest
- October 14 – Email forwarded from Tonto National Forest

These six comments are included in full and verbatim as Attachment 1. The seventh comment in the database concerns a different topic (alleged violations of accessibility laws) and has not been included.

Allegation of Conflict of Interest

The gist of the alleged conflict of interest is the following, quoted directly from the October 8 comments:

- “Back in the early 2000s, Nature Conservancy was given hundreds of thousands of dollars to rehabilitate the 7B Ranch which is 70% of the land swap.”
- “...SWCA stands for Steven W. Carothers. And Steve W. Carothers has been a member of the Board of Directors of Nature Conservancy since 1988.”
- “However, at the core of this is the fact that Mr. Carothers was a major part of this hundreds of thousands of dollars that was received by Nature Conservancy back in the early 2000s.”
- “And now he's [Dr. Carothers] kind of directing the direction of the ship on how this Draft Environmental Impact Statement goes.”

- “And, unfortunately, the guy who founded the company, SWCA, and who is the CEO, has been very deep into the major parcel in the land swap, the 7B Ranch, which represents about 70%.”
- “A couple of the references that you might want to look at, if you want to see his involvement with Nature Conservancy, is just go to the Nature Conservancy Arizona website and you'll find him listed there as one of the members of the Board of Directors. And in other places you can find there, he's been a member of the Board of Directors since about 1988.”
- “Unfortunately, this contract was awarded as what they call a general services account, a contract, a schedule. Where you go on and post all of this information about your company with your rates and so forth and if anybody in the government wants to buy that thing that you sell, they can go on and say, well, let me go buy a contract or award a contract to these guys. And that's what happened is that SWCA got a contract from the U.S. Department of Agricultural. Some contracting officer made the buy. He didn't know that Steven Carothers was heavily involved in the 7B Ranch.”

Follow-up Information Gathered

Mr. Chris Garrett (author of this process memo) was present at both public meetings (October 8 and 10, 2019) and heard these allegations raised first-hand. In response, Mr. Garrett undertook an investigation of the specific allegations several days later. The information gathered was provide to the Tonto National Forest project manager (Mary Rasmussen) on October 15, 2019. This information gathering concluded that:

- The relationship between Dr. Carothers and the Nature Conservancy alleged by Mr. Spidle does not exist.
- The controlling interest of Dr. Carothers in SWCA Environmental Consultants alleged by Mr. Spidle does not exist.
- The contracting mechanism identified by Mr. Spidle is factually incorrect.

Relationship between Dr. Carothers and the Nature Conservancy

Mr. Garrett first followed the suggestion raised by Mr. Spidle during his testimony and looked at the website for the Nature Conservancy. Two specific sites were reviewed:

- The Arizona-specific site: <https://www.nature.org/en-us/about-us/where-we-work/united-states/arizona/>. No mention of Dr. Carothers was identified on this page.
- Board of Directors: <https://www.nature.org/en-us/about-us/who-we-are/our-people/>. Note that this page includes several subheaders. All were reviewed. In particular, the “All” subheader is not only alphabetically listed but can be searched for keywords. No mention of Dr. Carothers was identified on this page.

Mr. Garrett then reviewed a recent CV of Dr. Carothers that he had available, included with this memo as Attachment 2. Under “Professional Affiliations” (see page 25, Attachment 2) this item is identified:

“Board of Trustees, Nature Conservancy, 1990–1995”

On October 15, 2019, Mr. Garrett then contacted two members of SWCA—Dr. Carothers himself and Dorothy House, a long-time employee and SWCA’s *de facto* historian, who has worked with Dr. Carothers for decades. Mr. Garrett asked for clarification on these topics:

- Confirmation that the information on the CV was correct
- Confirmation that Dr. Carothers was not currently on the Nature Conservancy board

Ms. House confirmed that the CV was indeed correct, and that Dr. Carothers had served on the board between 1990 and 1995 but was not on the board and hadn’t served on the board “for well over 20 years”. Ms. House noted that the only other connection she knew about between Dr. Carothers and the Nature Conservancy was that the organization has an office in the Federal Building in Flagstaff, as does SWCA. That building is owned by a company known as Limber Pine, which is owned by Dr. Carothers. She indicated that like SWCA, the Nature Conservancy has a lease and pays rent like every other tenant, through the building manager, not Dr. Carothers.

Dr. Carothers later confirmed with Mr. Garrett the information given by Ms. House, further noted that he had not heard of the 7B Ranch, and further provided the information that Dan Campbell had been head of the Arizona Nature Conservancy when Dr. Carothers was on their board, and was since retired but possibly could be reached if any follow-up was needed by the Forest Service.

Dr. Carothers’ Position at SWCA

Mr. Garrett also confirmed with Ms. House several points about Dr. Carothers’ position at SWCA over the years.

- Dr. Carothers is indeed the founder of SWCA Environmental Consultants. Indeed, originally the company name stood for “Stephen W. Carothers and Associates”. The company was founded in 1981 in Flagstaff, Arizona, stemming largely from biological work being conducted on the Colorado River for the National Park Service.
- Dr. Carothers no longer owns SWCA and has had no controlling interest for approximately 20 years. SWCA is a 100% employee-owned company. The Employee Stock Ownership Program (ESOP) was formed on December 31, 1998 and began buying stock from Dr. Carothers shortly after that; the ESOP became majority shareholder in December 1999 and 100% owner in September 2000. Dr. Carothers technically stopped controlling SWCA when he ceased to own 51% of the company, at the end of 1999. However, note that Dr. Carothers still owns shares of the company, as do all active participants in the ESOP. SWCA currently has almost 1,000 employees that potentially could be active participants, depending on their specific eligibility.
- With respect to a controlling position the company, Dr. Carothers is still actively involved in project work but has not had an executive position at SWCA for over 20 years (note on his CV that his title is “Founder/Senior Consultant”). Ron Borkan became CEO of SWCA in early 1999, and the management of the company was then under his direction, in concert with a senior management team.

- Dr. Carothers remained involved in corporate guidance as President (and later Chairman) of the Board of Directors until 2006. Dr. Carothers remains a member of the Board of Directors of SWCA.

Details of Contracting and Proposal Effort

The description of the contracting verbally mentioned by Mr. Spidle is not factually correct. Details of the contracting arrangements and conflict-of-interest controls have been summarized in a separate process memo titled “Process Memorandum to File - Summary of Selection Process, Contracting, and Conflict of Interest Management”, dated November 9, 2019.

Not noted in that November 2019 process memo are several further observations offered by Mr. Garrett (author of this memo). Mr. Garrett is currently project manager of the Resolution Copper NEPA team for SWCA Environmental Consultants, and personally led every step of the project including receipt of the RFP, preparation of the proposal, the Forest Service interview process, the contract award, and the awarding. Mr. Garrett notes two things:

- Dr. Carothers was at no point involved in the proposal effort, not even to the extent of a casual discussion. Mr. Garrett, as proposal and project manager, cannot recall any point at which Dr. Carothers spoke to him about the project in any way.
- At the time of the proposal (2015), SWCA and presumably all other bidders were unaware that the Nature Conservancy had any involvement with the 7B Ranch. While the parcel was identified by Congress for the land exchange, it is a private parcel owned by Resolution Copper and not publicly managed. The fact that the Nature Conservancy wrote a management plan for the 7B Ranch for Resolution Copper became known to the project team in the course of the project NEPA analysis. It is not known what financial arrangements might exist between the Nature Conservancy and Resolution Copper for actual management of the 7B Ranch, if any.

Based on the information in the 2010 management plan, the chain of ownership for the 7B Ranch was: originally owned by private farmers, sold to Newmont Copper Company (1950s), sold to Magma Copper, sold to BHP (1997), sold to Resolution Copper (2004).

ATTACHMENT 1

Comments from Mr. Spidle in Public Comment Database

OCTOBER 8, 2019 (FIRST VERBAL COMMENT, QUEEN VALLEY PUBLIC MEETING)

Hello. My name's Chris Spidle, C-h-r-i-s S-p-i-d-l-e. I live in Scottsdale and my business for the last 20-some years has been involved with the contracting processes that the U.S. government uses to award contracts. I've spent the last 15 years overseas advising small companies, small local companies on how to get the contracts and do it legally. This project needs to be shut down right now. This meeting should be brought to a halt. There should be no more work done on this project because the way that the contract was awarded, unfortunately, involves a violation of federal law. Back in the early 2000s, Nature Conservancy was given hundreds of thousands of dollars to rehabilitate the 7B Ranch which is 70% of the land swap. And that rehabilitation is a lot like putting a coat of paint on a dilapidated house to raise the value. Nature Conservancy is a great organization. It has a great Board of Directors. Unfortunately, SWCA stands for Steven W. Carothers. And Steve W. Carothers has been a member of the Board of Directors of Nature Conservancy since 1988. So he therefore has an organizational conflict of interest. SWCA should not be doing the environmental impact study because how can you possibly be unbiased and make your determinations correctly if you're playing for both teams. That's a fact. It's my opinion that this is an illegal contract. I don't think anybody of the -- the employees of SWCA had anything to do with it. I don't think they knew. I don't think the Forest Service has done anything wrong and I think they're doing an excellent job of carrying out their duties. However, at the core of this is the fact that Mr. Carothers was a major part of this hundreds of thousands of dollars that was received by Nature Conservancy back in the early 2000s. And now he's kind of directing the direction of the ship on how this Draft Environmental Impact Statement goes. Do you understand what I'm saying? This contract should not have been awarded to somebody who had an organization conflict of interest in accordance with the Federal Acquisition Regulations, which I know very well, all 1,934 pages of them. And I'm serious, I would advise, if they want to take my advice and I doubt they will, that SWCA and the Forest Service close this meeting right now and investigate how this came to be and if it's true, in their mind, then they should start this whole DEIS over again. Thank you.

OCTOBER 8, 2019 (ADDITIONAL VERBAL COMMENT, QUEEN VALLEY PUBLIC MEETING, ALLOWED AFTER ALL COMMENTERS SIGNED UP TO SPEAK HAD FINISHED)

My name is Chris Spidle, C-h-r-i-s S-p-i-d-l-e. I thank the folks running this show, for giving me another swing at the ball. I wanted to cover some of the things that I went through quite rapidly. What I said may have caught some people off guard and may be a bit unclear about the sources of this information. Since the DEIS came out and I got a copy of it, the day that it was at the Forest Service, I've read most of it and I've conducted about 100 hours of research, most of it online, to develop this information. And I would like to give you the sources of this information so that you can check it out for yourself. But before I do that, I would really like to make sure that I'm very clear that there is nobody in this room that's at fault for this. The SWCA personnel have been very professional at every one of these meetings and the way they've handled it. And you have to admit that whether you agree with the DEIS or not, it's very professionally done. And the Forest Service has conducted themselves with the utmost professionalism. John Skaggs and Donna Morey are two of the people that I know from having dealt with them and I'm sure that everybody else, even though I don't know their name, has done a great job. My point is that you can't have the wolf guarding the henhouse. And, unfortunately, the guy who founded the company, SWCA, and who is the CEO, has been very deep into the major parcel in the land swap, the 7B Ranch, which represents about 70%. A couple of the references that you might want to look at, if you want to see his involvement with Nature Conservancy, is just go to the Nature Conservancy Arizona website and you'll find him listed there as one of the members of the Board of Directors. And in other places you can find there, he's been a member of the Board of Directors since about 1988. I'm certain that Steven Carothers is an excellent environmental scientist. There's no question about this and I'm not questioning the qualifications of any of the people doing this. Unfortunately, this contract was awarded as what they call a general services account, a contract, a schedule. Where you go on and post all of this information about your company with your rates and so forth and if anybody in the government wants to buy that thing that you sell, they can go on and say, well, let me go buy a contract or award a contract to these guys. And that's what happened is that SWCA got a contract from the U.S. Department of Agricultural. Some contracting officer made the buy. He didn't know that Steven Carothers was heavily involved in the 7B Ranch. He didn't know about those kinds of conflicts of interest. They weren't in front of him. However, I'm calling it to everybody's attention, the Forest Service and SWCA tonight that this needs to be resolved. You can't have the wolf guarding the henhouse. Either SWCA needs to go out or the 7B Ranch has to go out. They can't co-exist in this deal at the same time, in my opinion. And my opinion is based upon decades of understanding the Federal Acquisition Regulations. So I hope that everybody understands that I'm not picking fights with anybody. Everybody here is very honorable. But you now have a piece of information that you didn't have before and you are required to act on it. And I would suggest that everybody here contact the U.S. Department of Agricultural's Inspector General in the morning and inform them of this. Thank you very much.

OCTOBER 9, 2019 (WRITTEN COMMENT, EXACT DELIVERY MECHANISM UNCLEAR)

My son Nathan Spidle forwarded your alert.

Last night at a public hearing on the DEIS I dropped the bomb that an illegal organizational conflict of interest exists between the mine and the environmental consulting company SWCA. SWCA gets its name from Stephen W Carothers ... founder and CEO. Nature Conservancy was given hundreds of thousands of dollars to increase the ecological value of the 7B ranch ... a parcel that represents 70% of the land swap for Oak Flat.

Stephen W Carothers is a 30 year member of the Board of Directors for N.C. He is powerful and was involved no doubt in the transactions helping the mine arrange the land swap. By increasing the "ecological value" of the 7B it makes the land swap work. Resolution Copper benefits. Nature Conservancy benefits financially and achieves its goal of getting land its interested in, into federal hands where they can influence its use through lobbying.

Now Carother's Company SWCA is getting paid a huge sum by the forest service to conduct the Environmental Impact Study ... a cost that will be paid by the mine. If this deal gets done I bet Carothers will get a "big slap on the back" (\$) This plan began in 1996. It is a slow roll. But it was well planned and executed. It required about a hundred hours of research to uncover the connection between Carothers and the mine. This is called an "organizational conflict of interest" and is forbidden by Federal Acquisition Regulations (FARS).

The work on the EIS needs to stop immediately and all work performed should be sequestered as it is the fruit of the poison tree. A lawsuit to stop the work is probably going to be required.

You MUST act immediately.

I suggest you start by complaining to the US Dept of Agriculture Inspector General. I suggest indigenous groups immediately file a lawsuit for an injunction and a stop work order. I am available if you need further information

Right now the fox is guarding the hen house.

This may not stop the mine ... but if they are going to do it... they at least need to do it legally. They need to play by the rules.

OCTOBER 10, 2019 (VERBAL COMMENT AT TEMPE PUBLIC MEETING)

Chris Spidle, C-h-r-i-s S-p-i-d-l-e. I only have a short time, so I'm going to have to make this pretty blunt. I see a lot of people here, but very few people in the past have spoken up and those just won't get recorded. So if there's extra time, I suggest that you do something about that. Here's the problem, and I said I'm going to be blunt. I'm sorry, I've done a lot of research. I've spent about 100 hours investigating this deal on the Internet and I've spent time double-checking my facts, rechecking the sources, making sure that what I'm saying is what I believe in my heart to be true. And so this is my opinion, and I'm saying this based upon my right to free speech. So even though it may sound kind of rough, I want you to know that I think I have a right to say this. And that is that this whole deal is a sham. This whole deal is rigged. It's prewired. And the people in this room that had anything to do with it, meaning SWCA, the owner of SWCA, Nature Conservancy, people from the mine, people from the Forest Service are complicit in it. Because if they actively engaged in it or they didn't look the right direction when they should have. And I want you to know that I am not opposed to the mine. I'm not opposed to anything having to do with this, publicly. I have my personal feelings, but that's not what I'm speaking about. I'm telling you that this is a sham, because I believe that if they're going to do it, they need to do it legally and they need to follow the rules. And I'll tell you why it's a sham. The sham is that Steven W. Carothers, SWC, as in SWCA, has been a member of the Nature Conservancy Board of Directors since 1988. Nature Conservancy is heavily invested in 7B Ranch, which represents 70 percent of the land in the land swap. Without the 7B Ranch, the deal fails and they've been pumping up the value of that so that it can equal it. They're going to -- Resolution has spent approximately \$18 million to get access to \$130 billion worth of copper and they needed to make 7B Ranch look good. Now that's what they've done. Now, what you have is a contracting officer who went onto the GSA schedules and just selected somebody. And, you know what, it got to bothering me today because when he stuck his hand in the jar and pulled out a name, he just so happened to get Steven B. [sic] Carothers' company, who is heavily invested in the 7B Ranch for the last 30 years. Now you tell me how this DEIS can be unbiased. If you look at it and you see things that don't make sense, things that you think got glossed over, I'm telling you why I think that happened. It happened because it's a sham. It should be thrown out. It should be started again. The 7B Ranch and Steven Carothers cannot coexist in this deal. One of them has to go. You throw out 7B Ranch, it will invalidate McCain's deal. You throw out SWCA, you start all over again. And that's my comment. Thank you.

OCTOBER 10, 2019 (EMAIL FORWARDED FOR INCLUSION IN PUBLIC COMMENT DATABASE FROM TONTO NATIONAL FOREST)

John,

I just left a detailed voice mail with the USDA Office of Inspector General Investigations Unit describing the situation and Smokey Bear refusal to investigate. See link below for the phone number. John, I hate to take this approach. But refusal of the FS to take ANY action upon receiving credible information at the public hearing is disturbing.

You may want to get out in front of this by simply filing a report with the OIG. To do nothing is a defoliation of duty; and could possibly bring heat down on the Forest Service which has done an admirable job thus far. You have no position in this matter...(I hope) but that's starting to look doubtful.

I'm even beginning to think possibly the contracting officer reaching into the jar of names to hire for an environmental study and picking the worst possible choice... may NOT be luck of the draw.

Nature Conservancy has worked long and hard to get 7B in the hands of the government through this land swap. They have received hundreds of thousands of dollars over a period of 17 years. What luck that an unbiased contracting officer at GSA would just happen to pick a guy who has been a powerful board member of Nature Conservancy for 30 years; to write the final approval document. He picked the worst possible choice... was that just by luck?

Was FS decision to not act on information just a casual decision or a contemplated one. Do you suppose Carothers will just get a hearty slap on the back at the celebration party the night of approval? Or did he hit the jackpot with his conflict of interest.

When questions of this type present themselves... history has proven that investigative action is the best medicine. Let sunshine show the facts...

If you have any information that would alleviate my concerns, now would be the time to reveal it. Otherwise it looks as if Carothers through Nature Conservancy is working for the mine and not for an unbiased EIS.

Thanks

Chris

<https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.usda.gov%2Ffoig%2Fcontact.htm&data=02%7C01%7C%7C9090e48f9c8b4875e45408d74dc57a36%7Ced5b36e701ee4ebc867ee03cfa0d4697%7C0%7C0%7C637063382868983775&data=tp8OT%2FikrqisS3W6g31kwhTQdTvkUjf7Tc2fvi7%2F9cQ%3D&reserved=0>

Chris Spidle

OCTOBER 14, 2019 (EMAIL FORWARDED FOR INCLUSION IN PUBLIC COMMENT DATABASE FROM TONTO NATIONAL FOREST)

Donna and John,

I strongly urge you to be responsive to communications first by acknowledgement of receipt and second by response.

Sitting quietly will work against you. I say this from years of experience in protesting contract awards or disclosing corruption in places such as Afghanistan.

Often it seems the best response is no response. But failure to communicate is a form of communication that is seldom productive.

Your silence on matters of accusation will be used against you. Refusal to reply sends a message itself. It sends a negative signal that you don't care to communicate. That you don't feel communication is necessary and that you are fearful that communicating the truth will alter your own personal desire to steer the outcome.

The outcome is not or at least should not be your goal. Your goal should be to conduct the management of the process (John) and to ensure the integrity of the information in the DEIS (Donna).

From the beginning of my involvement the reluctance of FS and SWCA to disclose information reasonably requested has cast a pall over the process which led to the discovery of the organizational conflict of interest.

We may seem to be on opposite sides but we should not be. It may seem that I am trying to attack. I am not. I emphasized during my public comments that my goal is to ensure the rules are followed. I said "do what you want to do but do it legally". You both SHOULD want the same.

As an example of your manipulation of the process, you collect names, phone numbers and emails. You know who we are. But we are not allowed to know each other. That restricts our ability to organize and that limits our rights to constitutional free speech. You keep a mailing list to use for your purpose. We demand (sorry for the strong word) that mailing list. And we respectfully demand an extension of time for public comments equal to the time we initially requested the information and the time it is provided.

As you know, due to the inability of Forest Service to demonstrate and organizational control over the process, we seek to remove the current Forest Service personnel including the supervisor and see replacement with personnel better qualified to look after the interests of ALL parties affected, not just the interests of the mine. We believe he does not have the knowledge, skills or ability (SKA) to fulfill his role in making the final determination on the Environmental aspects of this project. If you do not agree, please provide his qualification including experience with like sized projects, big mining and big water.

That includes the replacement of the EIS consultant with one who does not come to the table with a preset agenda. If you have responses, now would be the time to hear them. Otherwise failure to respond is a loud response in and of itself.

This deal has all the ear markings of a “prewired”, corrupt “done deal”.

I will be seeking the removal of the hierarchy at USDA for their management failure and if possible the presentation of these facts to US Attorney for analysis of potential violation of US Code.

The best way to prevent this is to be open and forthcoming with information and serious professional dialogue.

The more Smokey Bear “turtles up” the more aggressive we will become in our fight for an unbiased conclusion. Our foundational philosophy is that not EVERY deposit of minerals or other strategic resource is extractible. Particularly one that desecrates ancient graves, sacred indigenous lands and “WORLD RENOWNED rock climbing and bouldering areas. Perhaps there is a precedent that could be set... that lands of the people of the United States are not up for grabs just because one explores on them. And that the strategic reserves of America cannot be bought for pennies on the dollar regardless of the cultural, religious and recreational value.

Just because one discovers something on federal property does not mean they get to exploit it. If a fair case is made according to the rules, then there is a path through the system to travel. Having a DEIS/EIS consultant with close ties to Big Copper and Big Water driving the process is wrong. Please look carefully at the role of both Forest Service and SWCA. When the decision is made, let’s try to make it one everyone is proud to be a part of.

For the record. Until my discovery of the connection between the founder and CEO (and his son) to Nature Conservancy and this the Resolution Copper, the general staff of SWCA and Forest Service had little to be criticized for. I believe that SWCA should be fully paid for its work up to this point.

However failing to act or respond to the information I presented reeks of corruption.

THE APPEARANCE OF IMPROPRIETY IS OFTEN WORSE THAN IMPROPRIETY ITSELF.

It doesn’t matter how the contract was awarded; GSA or whatever. I was told by a SWCA person that they were selected by Forest Service and the mine writes the check for whatever the cost is. There is a clear organizational conflict of interest.

I am always willing to engage in meaningful discussion of the issues I’ve brought to light. I hope any discussion will lead to a good solution. I do hope any discussion would not be an attempt to whitewash or bully.

Thank you

Chris Spidle

ATTACHMENT 2

CV of Dr. Carothers Reviewed by Mr. Garrett on October 15, 2019

Education

- Ph.D., Zoology, University of Illinois, Urbana, 1974
- M.S., Biology, Northern Arizona University, Flagstaff, 1969
- B.S., Biology, Northern Arizona University, Flagstaff, 1966

Experience Summary

Dr. Carothers is a terrestrial and aquatic ecologist with more than 40 years of experience in biological research, resource management, and environmental regulatory compliance. He is the founder of SWCA Environmental Consultants and a member of the firm's Board of Directors.

Dr. Carothers has long served as a facilitator between the environmental regulatory structure and various kinds of resource use and management. He specializes in developing creative conservation strategies for endangered species and their habitats that allow clients, whether they are individuals, businesses, non-profit organizations, or government agencies, to meet their specific objectives while preserving rare plants and animals. Over his career, he has resolved issues concerning a variety of listed species, including birds, mammals, fish, herpetofauna, cave invertebrates, and plants. Dr. Carothers has an established track record for identifying management options and developing regulatory compliance strategies for a range of environments, including complex riverine, terrestrial, and karst (limestone cave) ecosystems.

SWCA Project Experience

Current or On-Call Projects

Blackwater Canyon ESA Services; Tucker County, West Virginia (2016–present): Oversee development of a Habitat Conservation Plan for proposed timber harvest and residential development activities on private land in eastern West Virginia. Species of concern are the federally listed Cheat Mountain salamander, West Virginia northern flying squirrel, Indiana bat, and Virginia big-eared bat. *Role: Senior Scientist and Environmental Planning Consultant. Client: Allegheny Wood Products.*

Red Horse Wind 2 HCP and Golden Eagle Take Permit; Cochise County, Arizona (2015–present): Oversee development of a Habitat Conservation Plan, golden eagle take permit application, and associated NEPA documentation for the first wind-energy facility in southern Arizona. Species of concern are the federally listed lesser long-nosed bat and the golden eagle, a species protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. *Role: Senior Scientist and Environmental Planning Consultant. Client: Red Horse Wind 2 LLC.*

SW Bypass Strategy (WA 3); Williamson County, Texas (2015–present): Coordinate with the Williamson County Conservation Foundation (WCCF) and Prime Strategies regarding the approach to permitting the SW Bypass highway project, as well as the role of the WCCF in administering the Williamson County Regional Habitat Conservation Plan (RHCP), as it relates to this project. Prepare a "white paper" addressing the taxonomy of the listed cave invertebrates and their distribution within Karst Faunal Regions as established by the Williamson County RHCP, with focus on the distribution of the mold beetles *Batrisodes texanus* versus *B. cryptotexanus*. *Role: Senior Scientist and Environmental Planning Consultant. Client: Williamson County, Texas.*

SW Bypass Georgetown and Wolf Ranch Parkway Environmental Services; Georgetown, Texas (2015–present): Work with karst invertebrate specialists on assessing impacts of constructing the SW Bypass and the Wolf Ranch Parkway on listed karst species. Tasks include conducting biotic surveys of caves to meet new USFWS protocols, updating the relevant Geologic Assessment report, and guiding the project's Williamson County RHCP Participation Application through the approval process. *Role: Senior Scientist. Client: HDR Engineering, Inc.*

St. Anthony Tract Endangered Species Act Compliance; San Antonio, Texas (2015–present): Develop Best Management Practices to avoid incidental take of the federally listed Robber Baron Cave meshweaver (*Cicurina baronia*) during future construction activities and residential uses of the site. Work with the client to designate a "karst conservation area" on the property targeting *C. baronia* and prepare a restoration plan for the proposed karst conservation area. Prepare and implement a plan to close, in a biologically appropriate manner, three open caves on the site. *Role: Senior Scientist and Environmental Planning Consultant. Client: Confidential.*

Silver Peak Mine Migratory Bird Treaty Act Compliance; Henderson County, Nevada (2015–present): Assist the client in defining a path forward with wildlife agency relations, environmental compliance, and permitting for the Silver Peak lithium operation relative to migratory bird protection. Tasks include conducting an environmental data review and project site visits; meeting with the state and federal wildlife agencies to negotiate compliance strategies; and obtaining permit conditions that are the best possible for Silver Peak operations while minimizing potential harm to migratory birds. *Role: Senior Scientist. Client: Confidential.*

[Confidential] Arizona (2014–present): Provide expert biological opinion in ongoing water rights adjudication proceedings on the San Pedro River in southeastern Arizona. Assess the hydrologic requirements of the riparian corridor and the influence riparian habitat has on the larger biological community in the watershed and the hydrological regime. The work will eventually feed into a revised groundwater flow model to be used to predict future hydrologic changes from the various water right management approaches being proposed. *Role: Senior Scientist. Client: Confidential.*

Streaked Horned Lark Endangered Species Act Compliance Planning Assistance; Multnomah County, Oregon (2014–present): Provide technical assistance on development of a Habitat Conservation Plan and an Environmental Assessment for the development activities at the Portland International Airport and Rivergate Industrial District. The species of concern is the streaked horned lark, a federally threatened species. *Role: Senior Scientist and Environmental Planning Consultant. Client: Port of Portland.*

[Confidential] Arizona (2013–present): Determine the minimum hydrological requirements needed to preserve the wilderness character of a specific designated wilderness area as that character relates to aquatic and riparian resources. *Role: Senior Scientist. Client: Confidential.*

South Padre Island 2nd Access Project; Cameron County, Texas (2010–present): Oversee preparation of a Biological Assessment (BA) for approximately 18 miles of new four-lane highway, including a 7.9-mile-long causeway over the Laguna Madre connecting the Texas mainland to South Padre Island. A total of 14 listed and candidate species may be affected by the project. Project was on hold for an extended period but was reactivated in 2015 and the BA is nearing completion. *Role: Principal-in-Charge. Client: HNTB Corporation.*

ESA Compliance for the New Mexico Interstate Stream Commission; New Mexico (On-Call; 2000–present): Advise the NMISC on Endangered Species Act compliance alternatives for managing the waters of New Mexico for endangered fish species. Provide ecological consulting services regarding development and implementation of conservation strategies and monitoring programs, instream flow recommendations, field data collection and database management, evaluation of federal actions and documents, and litigation support. *Role: Principal-in-Charge. Client: New Mexico Interstate Stream Commission.*

Completed Projects

Points North Heli-Adventures Permitting Assistance; Cordova, Alaska (2015): Provided assistance in navigating the special use permit procedures for commercial helicopter ski operations in the Pyramid Peak area of the Chugach National Forest. *Role: Senior Environmental Planning Consultant. Client: Points North Heli-Adventures, Inc.*

Wildlife Conservation Plan; Bexar County, Texas (2014–2015): Assisted in the preparation of a comprehensive Wildlife Conservation Plan for a 1,851-acre Wildlife Conservation Area in central Texas. The purposes of the plan are to: 1) avoid “take” of federally threatened or endangered species from future land uses; and 2) generally support the conservation of native wildlife within the property. *Role: Senior Scientist and Environmental Planning Consultant. Client: Confidential.*

Southwest Region Endangered Species Act Delisting Petitions; Texas, New Mexico (2013–2015): Reviewed the current status and science used to support listings of species currently listed as federally threatened or endangered with ranges that overlap oil and gas interests in the Permian Basin and Eagle Ford Shale. Identified potential candidates for delisting petitions based on the best available science and other standards set forth in the Endangered Species Act. *Role: Senior Scientist. Client: CrownQuest Operating, LLC.*

SLDMWA Biological Consulting Services; Merced County, California (2014): Provided biological technical support for comments on the proposed federal listing of the western yellow-billed cuckoo and designation of critical habitat. *Role: Senior Scientist. Client: Confidential.*

Gaicho-Thistle Pipeline Environmental Services; Eddy County, New Mexico (2014): Provided environmental compliance services for a new, approximately 20-mile crude oil pipeline in southeastern New Mexico. The project traverses BLM, New Mexico state trust, and private land. *Role: Senior Scientist. Client: Enterprise Products Operating, LLC.*

Gila River Ecosystem Program; New Mexico (2013–2014): Developed the strategy and assembled the scientific team to assess the potential impacts to aquatic and riparian ecosystems of diverting and storing an additional 14,000 af/yr of water on the upper Gila River in New Mexico. *Role: Principal-in-Charge. Client: New Mexico Interstate Stream Commission.*

Verrado Shovel-nosed Snake Critical Habitat Review; Maricopa County, Arizona (2013–2014): Reviewed the proposed listing and designation of critical habitat for the Tucson shovel-nosed snake and the USFWS 12-Month finding on the species. Assessed potential for suitable habitat on the 3,500-acre Mesa Proving Ground and 8,500-acre Verrado property. *Role: Principal-in-Charge. Client: Confidential.*

Bosque Canyon Ranch; Bosque County, Texas (2013): Prepared an expert report on the conservation value of two conservation easements donated to the North American Land Trust in 2005 and 2007, respectively. The subject property contains occupied habitat for the federally endangered golden-cheeked warbler. *Role: Senior Scientist. Client: Confidential.*

Williamson County Salamander Listing Comments; Williamson County, Texas (2012–2014): Prepared comments regarding the proposed listing of the Jollyville Plateau, Georgetown, and Salado salamanders as endangered species. Includes overseeing extensive literature review, database review and analysis, and field monitoring. *Role: Senior Scientist. Client: Williamson County, Texas.*

Hopi Snowbowl Support; Coconino County, Arizona (2011–2012): Reviewed environmental compliance documents relating to the proposed snowmaking at the Arizona Snowbowl and provided subject matter expertise to the Hopi Tribe. Findings resulted in a revised Biological Assessment and reopening of consultation between the U.S. Forest Service and the USFWS. *Role: Senior Scientist. Client: Hopi Tribe.*

[Confidential] Chemical Company ESA Services; Texas (2011–2012): Oversaw development of a Biological Assessment in support of a New Source/PSD Air Permit Application to the U.S. EPA Region 6 for the proposed expansion of a chemical plant on the Texas Gulf Coast. *Role: Senior Scientist. Client: Confidential.*

Blackwater Canyon ESA Services; Tucker County, West Virginia (2011): Advised client on permitting options under the Endangered Species Act and NEPA compliance for proposed timber and residential development activities on private land in eastern West Virginia. Species of concern included the Cheat Mountain salamander, West Virginia northern flying squirrel, Indiana bat, and Virginia big-eared bat. *Role: Senior Scientist and Environmental Planning Consultant. Client: Allegheny Wood Products.*

Celanese BA Peer Review; Harris County, Texas (2012): Reviewed and recommended revisions to a draft Biological Assessment in support of a GHG permit for a proposed methanol production facility near Houston, Texas. *Role: Senior Scientist. Client: Sage Environmental Consulting.*

Kodiak Airport EIS; Kodiak Island, Alaska (2012): Reviewed and recommended revisions to a draft EIS and two draft Biological Assessments for an airport expansion plan. *Role: Senior Scientist. Client: Barnard Dunkelberg & Company.*

LCRA CREZ Section 10(a) Permitting; Central Texas (2010–2012): Provided biological expertise for an HCP and Environmental Assessment in support of a Section 10(a)(1)(B) permit to authorize the incidental take of federally listed endangered species during the construction, operation, maintenance, and repair of four renewable energy 345-Kv transmission lines. *Role: Senior Scientist. Client: Lower Colorado River Authority.*

Clearwater Ranch Conservation Bank; Burnet County, Texas (2009–2012): Negotiated with the USFWS on behalf of the client regarding creation of a conservation bank for the endangered golden-cheeked warbler and black-capped vireo on a 21,000-acre parcel in central Texas. The conservation bank was approved by the USFWS in 2012. *Role: Senior Scientist and Environmental Planning Consultant. Client: Cooper Station Holdings.*

Comal County Regional Habitat Conservation Plan/EIS; Comal County, Texas (2007–2012): Oversaw preparation of an RHCP/EIS for a rapidly growing county north of San Antonio, Texas. Species addressed in the plan include the golden-cheeked warbler and black-capped vireo. *Role: Senior Scientist and Environmental Planning Consultant. Client: Comal County, Texas.*

Pipeline Phase IIIA; Texas (2011–2012): Provided biological expertise for a nationwide permitting application under NWP 12 and General Permit for directional drills under Section 10 navigable waters for an 81-mile-long pipeline in Texas. *Role: Senior Scientist. Client: Confidential.*

Rosemont Copper Project EIS; Pima County, Arizona (2011): Provided biological expertise in support of an EIS for a proposed open-pit copper, molybdenum, and silver mine on the Coronado National Forest in southeastern Tucson, Arizona. The mine would be constructed on private and national forest lands. *Role: Senior Scientist. Client: Rosemont Copper Company.*

Desert Sunlight Tortoise Review; Riverside County, California (2011): Reviewed permitting and due diligence materials for a solar energy project, including a draft EIS, draft EIR, draft incidental take permit, and related consultant reports, in regard to the desert tortoise (*Gopherus agassizii*). *Role: Senior Scientist. Client: Crowell & Moring LLP.*

Dunes Sagebrush Lizard Review; New Mexico (2011): Reviewed literature pertaining to the federal listing of the dunes sagebrush lizard and contributed to a report on the results of the review. *Role: Senior Scientist. Client: Confidential.*

Horse Butte Wind Project; Bonneville County, Idaho (2011): Provided biological expertise in support of an Environmental Assessment and Avian and Bat Protection Plan for a 56-megawatt wind farm on private land. *Role: Senior Scientist. Client: The Utah Associated Municipal Power Systems (UAMPS).*

La Cantera Ecological Services; San Antonio, Texas (2001–2011): Oversaw management and monitoring of seven karst preserves established as mitigation for potential impacts to endangered karst invertebrate species resulting from land development. *Role: Senior Scientist. Client: La Cantera Development Co. / USAA Real Estate Co.*

Congressional Hearing Testimony; Grand Canyon National Park, Arizona (2010): Prepared a statement for the House Subcommittee on Water and Power and delivered oral testimony on the effects of current adaptive management of Glen Canyon Dam on downstream natural resources in Grand Canyon National Park. *Role: Senior Scientist. Client: At invitation of the House Subcommittee on Water and Power.*

Document Review for the American Wind Energy Association (AWEA) (2010): Conducted a technical review of the National Wind Coordinating Collaborative's *Studying Wind Energy/Wildlife Interaction: A Guidance Document* for AWEA. *Role: Senior Scientist. Client: Smith, Robertson, Elliott, Glen, Klein & Bell, LLP.*

Endangered Species Scientific and Technical Support; Wyoming (2009–2010): Assisted the client with scientific, technical, and regulatory support regarding the proposed construction of a 1,000-turbine wind farm, including issues related to the sage grouse and the potential listing of the species. Involves preparation of a Candidate Conservation Agreement with Assurances and extensive coordination with Wyoming State officials and the USFWS. *Role: Senior Scientist. Client: Power Company of Wyoming.*

Exhumation of Meriwether Lewis EA; Natchez Trace Parkway, Tennessee (2009): Oversaw preparation of an Environmental Assessment for the proposed exhumation of Meriwether Lewis for forensic analysis. Project terminated with decision by National Park Service to deny permit application on policy grounds. *Role: Senior Scientist. Client: Crowell & Moring LLP.*

Whispering Pines Ranch Wildlife Impact Assessment; Coconino County, Arizona (2009): Prepared an assessment of the potential impacts on wildlife of daily helicopter flights to and from a helipad on private property near Parks, Arizona, in support of an application for a conditional use permit from the County. *Role: Senior Scientist. Client: The property owner.*

Gulf Wind Energy Development Avian and Bat Protection Plan; Kenedy County, Texas (2008–2009): Oversaw preparation of an avian and bat protection plan for the Gulf Wind energy development project on the Texas coast. *Role: Senior Scientist. Client: Texas Gulf Wind LLC.*

Williamson County Road Bond Program PSA; Williamson County, Texas (2006–2009): Provided various environmental services for the Williamson County Road Bond Program, including endangered species surveys and permitting. *Role: Senior Scientist. Client: Williamson County, Texas.*

Environmental Planning and Endangered Species Services for Development; Central Texas (1996–2009): Provided environmental planning services and endangered species management (karst invertebrates, golden-cheeked warbler, black-capped vireo) strategies for several central Texas residential and commercial development projects totaling some 50,000 acres (Oliver Ranch, Indian Springs Ranch, Shavano Park, Steubing-Poerner Property). *Role: Senior Scientist and Environmental Consultant. Client: Denton Communities / Bitterblue Inc.*

Endangered Species Consultation for Williamson County; Williamson County, Texas (2007–2008): Assisted Williamson Conservation staff and County officials with land acquisition for endangered species preserves, development of operational and management criteria for endangered species habitat, and agency consultations regarding endangered species habitat. *Role: Senior Scientist. Client: Williamson County Conservation Foundation, Texas.*

South Padre Island Golf Club Habitat Conservation Plan; Cameron County, Texas (2008): Prepared a draft HCP for the endangered ocelot for an approximately 860-acre golf/residential resort on the Texas Gulf Coast. *Role: Senior Scientist. Client: South Padre Island Golf, a Landmark Land Company.*

Tucson Shovel-nosed Snake 90-Day Finding Response (2008): Reviewed the USFWS's 90-day finding on the Tucson shovel-nosed snake (*Chionactis o. klauberi*) and prepared a formal response. *Role: Senior Scientist. Client: DMB White Tank, LLC.*

Peñascal 2 Threatened and Endangered Species Report; Kenedy County, Texas (2008): Oversaw preparation of an analysis and report on the potential effects of the Peñascal 2 wind energy development project on federally listed species. *Role: Senior Scientist. Client: Iberdrola Renewables, Inc.*

Litigation Support for Wind Energy Development; Kenedy County, Texas (2008): Provided biological expertise in support of litigation in regard to potential effects of two new wind farms on federally listed species, including the ocelot and piping plover. *Role: Senior Scientist. Clients: Texas Gulf Wind LLC and Iberdrola Renewables, Inc.*

Williamson County Regional Habitat Conservation Plan/EIS; Williamson County, Texas (2006–2008): Prepared an RHCP/EIS for a rapidly growing county north of Austin, Texas. Species addressed in the plan included endangered karst invertebrates and the golden-cheeked warbler. *Role: Senior Scientist and Environmental Planning Consultant. Client: Williamson County Conservation Foundation.*

Sun City Salamander Monitoring; Sun City; Williamson County, Texas (2006–2008): Oversaw literature review and field studies to monitor status of the Georgetown Salamander, a federal Candidate species, in Sun City, Texas. *Role: Senior Scientist. Client: Sun City, Texas.*

Hart Triangle Habitat Conservation Plan History Review; Travis County, Texas (2006–2007): Reviewed and summarized the administrative record in support of litigation involving the Hart Triangle Property and provided expert witness testimony regarding endangered karst invertebrate issues on the property. *Role: Senior Scientist. Client: George & Brothers, L.L.P.*

Golden-cheeked Warbler Recovery Unit 5 Conservation Strategy; Central Texas (2005–2007): Identified potential golden-cheeked warbler habitat within Recovery Unit 5, identify managed lands that currently protect warbler habitat, and develop a strategy for expanding protected habitat to ensure long-term conservation of the species within the Unit. *Role: Senior Scientist. Client: Indian Springs Conservation Association, Inc.*

Fire Management Plan for Ranchlands; Northern Texas (2006): Prepared a fire management plan for the Mesa Vista Ranch, a 60,000-acre property dominated by fire-adapted grasslands managed for quail hunting. *Role: Senior Scientist. Client: BP Capital.*

Instream Flow Needs of Native Fish; Maui, Hawai'i (2003–2006): Assessed the scientific integrity and evaluated the results of a USGS study design for establishing instream flow criteria for at least 100 streams on the island of Maui, Hawai'i. Prepared independent studies on Maui stream ecology with a focus on life needs of native fishes. *Role: Senior Scientist. Client: Oshima Chun Fong & Chong, LLP.*

Cactus Ferruginous Pygmy-Owl Status Evaluation; Southern Arizona (2005): Wrote a rebuttal to a USFWS white paper on the significance of Distinct Population Status for the endangered cactus ferruginous pygmy-owl in Arizona. *Role: Senior Scientist. Client: Fennemore Craig, PC.*

Endangered Species Evaluation; Lake County, Montana (2005): Advised a community-based organization in Lake County, Montana, on endangered species issues and evaluate the potential for a resort development to adversely affect listed species, including the grizzly bear. *Role: Senior Scientist. Client: Swan Lakers.*

Bighorn Sheep Habitat Evaluation for Development; Riverside County, California (2005): Evaluated bighorn sheep habitat on the site of a residential development in Riverside County, California. Role: *Senior Scientist. Client: Venable LLP.*

Arkansas River Shiner Status Evaluation; Oklahoma (2004): Assessed the biological and scientific validity of existing USFWS listing and critical habitat final rules for the Arkansas River shiner; evaluated proposed management actions and conservation measures that could reduce the amount of future designated critical habitat; conducted a limited field effort to assess condition of existing aggregations of the shiner; and developed an alternate proposal for critical habitat as appropriate. Role: *Senior Scientist. Client: Oklahoma Agricultural Legal Foundation.*

Fire Management Plan EIS; Grand Canyon, Arizona (2004): Prepared an Environmental Impact Statement in support of a revised Fire Management Plan for Grand Canyon National Park. Role: *Project Manager. Client: Wildland Fire Associates.*

Special Status Species Consultation; Laguna Beach, California (2004): For the proposed Montage Property development in Laguna Beach minimized environmental conflicts with sensitive biological resources, in particular special status species, by reviewing technical reports prepared by another consulting firm and help to design strategy for coordinating and consulting with federal and state agencies. Role: *Senior Scientist. Client: The Athens Group.*

Riparian Habitat Restoration Design; Solano County, California (2004): Helped develop a conceptual design for a 70-acre habitat riparian restoration area around a proposed golf course in Lagoon Valley, Solano County, California. Presented the design concept at City of Vacaville Planning Commission hearings. Role: *Senior Scientist. Client: Triad Communities.*

Humpback Chub Translocation and Non-Native Fish Removal Study; Grand Canyon, Arizona (2003–2004): Evaluated the feasibility of establishing endangered humpback chub populations in tributaries of the Colorado River in Grand Canyon National Park and the efficacy of removing non-native fishes to benefit native fishes. Provided logistical support for fieldwork. Role: *Principal-in-Charge. Client: Grand Canyon National Park (subcontract to Grand Canyon Wildlands Council).*

Colorado River Management Plan/EIS; Grand Canyon, Arizona (2002–2004): Assisted with the preparation of an updated Colorado River Management Plan/Environmental Impact Statement. Advised development of alternatives that address allocating user days between commercial and private river runners, motors vs. non-motorized craft, and environmental issues relative to recreational river use. Role: *Technical Adviser. Client: Grand Canyon National Park.*

Cactus Ferruginous Pygmy-Owl Critical Habitat Evaluation; Southern Arizona (2003): Conducted an in-depth review of the proposed critical habitat designation for cactus ferruginous pygmy-owl, including a study of the historical occurrence and distribution of the owl in Arizona. Role: *Senior Scientist. Client: Johnson-Haight Environmental Consultants.*

Blackburn's Sphinx Moth Consultation; Hawai'i, Hawai'i (2002–2003): Advised client regarding the proposed critical habitat designation for the endangered Blackburn's sphinx moth. Coordinated with the USFWS to permit development of the planned Ka'upulehu resort while preserving stands of native vegetation for the moth. Role: *Senior Scientist. Client: PIA-Kona Limited Partnership.*

Kauai Cave Amphipod and Kauai Cave Wolf Spider Consultation; Kauai, Hawai'i (2002): Advised client and coordinated with the USFWS on the appropriateness of removing portions of Grove Farm property on Kauai, Hawai'i, from the proposed critical habitat designation for two endangered species: Kauai cave amphipod and Kauai cave wolf spider. Conducted field reconnaissance for the presence and condition of caves on the property and determined the presence/absence of the primary constituent elements needed by the subject species. *Role: Senior Scientist. Client: Kiahuna Golf Club, LLC and KG Kauai Development, LLC.*

Biological Assessment and Evaluation; Central Texas (2001–2002): Oversaw excavation and biotic collecting in 30 karst features and the preparation of a biological assessment and evaluation of the potential of a proposed 440-acre limestone quarrying project to adversely affect listed and potentially listed species (golden cheeked warbler, black-capped vireo, and karst invertebrates). *Role: Senior Scientist. Client: Martin Marietta Materials.*

Habitat Conservation Plan; Tucson, Arizona (2001–2002): Consulted on the advisability of developing an HCP for the City of Tucson for endangered species issues (Pima pineapple cactus and cactus ferruginous pygmy owl). *Role: Senior Scientist. Client: City of Tucson.*

Endangered Species Compliance; Southern Arizona (2001–2002): Assessed potential endangered species compliance issues related to Arizona Portland Cement property, which was within cactus ferruginous pygmy-owl critical habitat and the biologically preferred reserve system as defined in the Sonoran Desert Conservation Plan. *Role: Senior Scientist. Client: Arizona Portland Cement.*

Colorado River Endangered Species Recovery Goals (1999–2002): Helped develop recovery goals (supplementing existing recovery plans) for the four endangered big river fish in the Colorado River system (humpback chub, razorback sucker, Colorado pikeminnow, and bonytail). *Role: Senior Scientist. Client: U.S. Fish and Wildlife Service.*

Environmental Planning Services; Central Texas (1998–2002): Provided environmental planning services and endangered species management strategies (golden cheeked warbler, black-capped vireo, and karst invertebrates) for a 1,000-acre development property in central Texas. *Role: Senior Environmental Planning Consultant. Client: Worth Enterprises / Medallion Homes.*

Environmental Planning Services; Central Texas (1998–2002): Provided environmental planning services and endangered species management strategies (golden cheeked warbler, black-capped vireo, and karst invertebrates) for multiple residential and commercial development projects in central Texas (Wind Gate Ranch, Escalara Ranch, Shadow Canyon Property). *Role: Senior Scientist and Environmental Planning Consultant. Client: Tom Dreiss and Co.*

Environmental Preservation; Central Texas (1993–2002): Oversaw field surveys and research and serve as a liaison between the USFWS and private landholders to determine and minimize development impacts on endangered species, design karst preserves, and worked with design groups to facilitate environmental preservation consistent with goals for proposed and ongoing development projects in central Texas. *Role: Senior Scientist and Environmental Planning Consultant. Client: La Cantera Development Co. / USAA Real Estate Co.*

Habitat Evaluation; Canyonlands National Park, Utah (2001): Evaluated the relative significance of the Upper Salt Creek ecosystem as a unique habitat in the Park and assessed the potential for that ecosystem to accommodate, or to be compromised by, the resumption of off-road vehicle traffic within the drainage. *Role: Senior Scientist. Client: Canyonlands National Park.*

Karst Invertebrate ESA Compliance; Central Texas (2001): Developed a strategy for endangered species compliance in support of a proposed land trade between the Federal Government and developers of Canyon Ranch. Excavated six karst features, conducted biota collections according to USFWS protocols, map caves, and wrote summary reports. *Role: Senior Scientist. Client: MaBe, Inc.*

Bexar County Cave Invertebrate Conservation Agreement; Bexar County, Texas (1996–2001): Provided consultation and served as a liaison with the USFWS for development of the Bexar County Cave Invertebrate Conservation Agreement for cave invertebrates in Bexar County, Texas. *Role: Senior Scientist. Client: Bexar County Coalition.*

Colorado Native Fish Monitoring; Grand Canyon, Arizona (2000): Collected monitoring data to evaluate the effects of Low Steady Summer Flow experimental releases from Glen Canyon Dam on endangered humpback chub and other native fishes of the Colorado River in Grand Canyon. *Role: Principal-in-Charge. Client: Grand Canyon Research and Monitoring Center.*

Lower Colorado River Multi-species Conservation Program; Arizona, California, Nevada (1999–2000): Developed a habitat restoration and species conservation element for the Lower Colorado River Multi-species Conservation Program (MSCP). This element constituted one of the primary “cores” of the final 50-year MSCP and was incorporated into the required NEPA/CEQA alternative packages. *Role: Senior Scientist. Client: Ogden Environmental and Energy Services, Inc.*

Research and Implementation Plan for Dam Releases; Grand Canyon, Arizona (1999–2000): Developed a research and implementation plan for a regime of experimental releases from Glen Canyon Dam to benefit endangered and other native fish. *Role: Principal-in-Charge. Client: Bureau of Reclamation.*

Research and Implementation Plan for Second Population of Humpback Chub; Grand Canyon, Arizona (1999–2000): Developed a research and implementation plan for establishing a second population of endangered humpback chub (*Gila cypha*) in the Colorado River ecosystem in Grand Canyon. *Role: Principal-in-Charge. Client: Bureau of Reclamation.*

Environmental Consulting Services for Land Exchange; Central Arizona (1999–2000): Provided environmental consulting services for the Spur Cross Ranch Project, a proposed three-way land exchange involving a private developer, the State of Arizona Land Department, and the U.S. Forest Service. *Role: Senior Scientist. Client: Pinnacle Group.*

Bighorn Sheep Consulting Services; La Quinta, California (1999): Provided consulting services regarding the impacts of proposed residential development on bighorn sheep in La Quinta, California. *Role: Project Manager. Client: KSL Development Corp.*

Bighorn Sheep Habitat Evaluation; Palm Springs, California (1998): Evaluated Peninsular bighorn sheep habitat for a proposed development near Palm Springs, California. *Role: Project Principal. Client: Preserve Golf Company.*

Colorado River Fish Data Synthesis, Grand Canyon, Arizona (1996–1998): Conducted a synthesis of all information about the Colorado River fish assemblages in Grand Canyon relative to releases from Glen Canyon Dam, identified data gaps, developed hypotheses to drive research designed to determine effects of steady flows on endangered fish, and conducted a scientific workshop. *Role: Principal Investigator. Client: Bureau of Reclamation.*

Loach Minnow and Spikedace Critical Habitat Review; Eastern Arizona (1996): Reviewed administrative records to support a judicial case regarding the designation of critical habitat for the federally listed loach minnow and spikedace in the Gila River Basin of eastern Arizona. *Role: Principal Investigator. Client: Phelps Dodge Mining Co.*

San Juan Basin Recovery Implementation Program, Northern New Mexico (1996): Advised the San Juan Water Commission on issues surrounding the San Juan Basin Recovery Implementation Program for the Colorado squawfish and razorback sucker in northwestern New Mexico. *Role: Principal Investigator. Client: San Juan Water Commission.*

Environmental Impact Assessment; Molokai, Hawai'i (1995–1996): Conducted research to determine the potential impacts of proposed recreational activities on reef fish and endangered species in Kaopoa, Hawai'i. *Role: Senior Scientist. Client: Molokai Ranch.*

Environmental Assessment for Development; Central Arizona (1995–1996): Completed threatened and endangered species surveys, held public scoping meetings, and performed additional tasks necessary for completion of the NEPA process for proposed development of land in central Arizona. *Role: Principal Investigator. Client: Del Webb Corporation.*

Endangered Species Mitigation Measures; Massachusetts (1995–1996): Provided consultation with the USFWS, client, and nonprofit groups to develop mitigation measures to protect threatened and candidate species for proposed development on Nantucket Island, Massachusetts. *Role: Principal Investigator. Client: Nantucket Golf Society.*

Environmental Assessment for Land Exchange; Northern Arizona (1992–1996): Prepared an Environmental Assessment, including threatened and endangered species surveys, public scoping meetings, and agency coordination, for a 5,000-acre land exchange with the U.S. Forest Service. *Role: Principal Investigator. Client: Starlight Pines.*

Glen Canyon Dam EIS Team; Northern Arizona (1991–1996): Participated in the Environmental Impact Statement team to develop alternative hydrographs (release scenarios) for Glen Canyon Dam, analyzed resulting impacts on cultural and natural resources in Grand Canyon, selected a preferred alternative, and designed an adaptive management program for future dam operations. *Role: Principal Investigator. Client: Hopi Tribe.*

Regional Habitat Conservation Plan and EIS; Washington County, Utah (1991–1996): Prepared a county-wide RHCP/EIS, including conducting field surveys for federally listed endangered species, holding public scoping meetings, preparing the EIS, and designing a preserve system for the Mohave desert tortoise. *Role: Principal Investigator. Client: Washington County, Utah.*

Environmental Consulting Services/EIS for Land Exchange; Northern Arizona (1991–1996): Assisted environmental planning, liaison with federal and tribal agencies and environmental organizations, designed and implemented public involvement programs, and prepared an Environmental Impact Statement for a proposed land exchange (Kaibab National Forest) and master-planned gateway community adjacent to Grand Canyon National Park. *Role: Principal Investigator. Client: Forest Canyon Village.*

Investigation for Cave Invertebrates; Hawai'i, Hawai'i (1995): Investigated lava tubes for cave invertebrates for the Ka'upulehu development project on the island of Hawai'i. *Role: Principal Investigator. Client: Belt Collins.*

Endangered Species Consulting Services/EA for Development; Molokai, Hawai'i (1995): Completed field surveys, prepared an Environmental Assessment, and designed endangered species compliance measures for the proposed development of a 50,000-acre property. *Role: Principal Investigator. Client: Molokai Ranch.*

Endangered Species Liaison for Land Exchange; Las Vegas, Nevada (1994–1995): Liaison between federal agencies and the client for a land exchange project involving endangered species and scenic corridors adjacent to a wildlife area. *Role: Project Director. Client: Del Webb Corporation.*

Feasibility Assessment for a Multi-Species Conservation Plan, Lower Colorado River; Arizona, California, and Nevada (1994–1995): Provided consultation and liaison services concerning Endangered Species Act compliance for water storage, water diversion, and power generation operations on the Lower Colorado River. Developed a feasibility assessment for a multi-species conservation plan for river operations. *Role: Principal Investigator. Client: Six-Agency Committee representing a coalition of state water and wildlife agencies, water districts, power users, and tribes.*

Feral Burro Management Program; Hawai'i, Hawai'i (1994–1995): Provided consultation and served as a liaison between federal agencies and the client for a feral burro management program. *Role: Principal Investigator. Client: Ka'upulehu Land Company.*

Biological and Archaeological Surveys for Land Exchange; Las Vegas, Nevada (1994): Provided oversight for biological and archaeological surveys for a land exchange project near Las Vegas, Nevada. *Role: Project Director. Client: NECI for American Land Conservancy.*

Endangered Species Field Surveys for Mining Project; Southern Texas (1993–1994): Conducted field surveys and provided consultation with the USFWS for a proposed coal mining project located in the habitat of endangered species in southern Texas. *Role: Principal Investigator. Client: Marston and Marston.*

Endangered Species Consulting Services for Hospital Development; Bakersfield, California (1993–1994): Provided consultation and served as a liaison to resolve endangered species issues for construction of a hospital facility in Bakersfield, California. *Role: Project Manager. Client: Thomas G. Olson and Associates.*

Environmental Assessment for Land Exchange; Northern Arizona (1993–1994): Prepared an Environmental Assessment involving the transfer of approximately 3,660 acres of private land for 1,400 acres of Coconino National Forest lands. Major issues included threatened and endangered species habitat, increased potential for flooding, and loss of recreational space. *Role: Principal Investigator. Client: Flagstaff II.*

Endangered Species Consulting Services for Development Project; Central Texas (1993): Conducted negotiations with the USFWS for an Endangered Species Act Section 10(a) permit (HCP) for the proposed Lake Pointe Property development. *Role: Principal Investigator. Client: Southwest Travis County, Ltd.*

Bald Eagle Study, Aberdeen Proving Grounds; Maryland (1993): Conducted a 3-year study of bald eagles on military property, and completed an environmental site analysis, habitat evaluations, population density studies, and a breeding census. *Role: Principal Investigator. Client: Aberdeen Proving Grounds.*

Mohave Ground Squirrel Status Review; Kern County, California (1992–1993): Conducted a status evaluation (literature review and interviews with scientists) of species included on the California Threatened and Endangered Species List. Documentation assembled by the evaluation supported the eventual removal of squirrel from the List. *Role: Principal Investigator. Client: Kern County, California.*

Riparian Vegetation, Wildlife, and Recreation Study; Northern Arizona (1992–1993): Conducted a study of riparian vegetation and listed bird species along the Colorado River in Lower Grand Canyon. *Role: Principal Investigator. Client: The Hualapai Tribe.*

Environmental Site Analysis for Development Project; Central Texas (1991–1993): Provided environmental site analysis, endangered species surveys, and U.S. Army Corps of Engineers 404 permitting process for the 1,200-acre Woodland Hills Development, including sensitive habitat for two bird species. *Role: Principal Investigator. Client: Cielo Vista Development.*

Grand Canyon Railway EIS; Northern Arizona (1990–1993): Prepared an Environmental Impact Statement for the Grand Canyon Railway line from Williams to the South Rim of Grand Canyon National Park and a spur line from Grand Canyon Airport to the Rim. Direct interest groups and agency coordination. *Role: Principal Investigator. Client: Grand Canyon Railway.*

Biological Assessment for Development Project; Central Texas (1992): Conducted field surveys and prepared a Biological Assessment for the Whitestone Property. *Role: Principal Investigator. Client: The Blanton Company.*

Squaw Peak Summit Trail Master Plan; Phoenix, Arizona (1992): Developed a trail reconstruction master plan for the Squaw Peak Summit Trail, one of the most heavily used urban trails in the nation. Directed public involvement and agency coordination. *Role: Principal Investigator. Client: City of Phoenix.*

Regulatory Approval Liaison for Development Project; Central Texas (1991–1992): Acted as a liaison between the client, the USFWS, and other agencies for regulatory approval of development on the Davenport Ranch property potentially occupied by endangered species (golden-cheeked warbler and black-capped vireo). *Role: Principal Investigator. Client: Fulbright & Jaworski.*

Biological Assessment for Development Project; Central Texas (1991–1992): Prepared a Biological Assessment for property occupied by endangered species including black-capped vireo and golden-cheeked warbler, resulting in regulatory approval from the USFWS for the development of the Bohls Ranch Property. *Role: Principal Investigator. Client: Southwest Travis County, Ltd.*

Environmental Consulting Services for Development Project; Tucson, Arizona (1987–1992): Developed solutions to environmental issues associated with the planning and development of a 7,000-acre development (Rocking K Ranch) immediately adjacent to Saguaro National Monument. *Role: Principal Investigator. Client: Rocking K Ranch.*

Yucca Mountain Site Characterization; Las Vegas, Nevada (1991): Served on Peer Review Committee. Provided review and commented on content and objectivity of the current status of the site with regard to the 10 CFR Part 960 citing guidelines as those guidelines related to biological and cultural resources. Reviewed background material and existing data to evaluate the suitability for the Yucca Mountain Site for a geologic repository for the disposal of radioactive waste and spent nuclear fuel. *Role: Principal Consultant. Client: Science Applications International Corporation.*

Environmental Analysis Report for Development Project; Palm Desert, California (1991): Prepared an environmental analysis report for the Altamira Project with particular emphasis on the State-listed Peninsular desert bighorn sheep and the Bighorn Institute in Palm Desert. *Role: Principal Investigator. Client: Alta-West Development.*

Resource Assessment and Mitigation Planning for Development Project; Central New Mexico (1991): Completed a resource assessment and mitigation/management plan for environmental factors on 1,000 acres of land in the Sandia Foothills to plan future development of the area with minimal environmental impacts to cultural and natural resources. *Role: Principal Investigator. Client: High Desert Corporation.*

Desert Tortoise Survey and Monitoring; Southern Utah (1991): Surveyed and monitored for the Mohave desert tortoise along transmission corridor. *Role: Project Scientist. Client: Utah Associated Municipal Power Systems.*

Desert Tortoise Survey and Monitoring; New Mexico and Arizona (1991): Surveyed and monitored for desert tortoise along a natural gas pipeline in New Mexico and Arizona. *Role: Project Scientist. Client: Transwestern Pipeline Company.*

Desert Tortoise Survey; Las Vegas, Nevada (1991): Surveyed for and relocated Mohave desert tortoises on property for the Lake at Las Vegas development. *Role: Project Scientist. Client: Transcontinental Lake at Las Vegas.*

Endangered Species Consultation; Las Vegas, Nevada (1991): Implemented requirements as stipulated in a Biological Opinion issued by the USFWS concerning Mohave desert tortoises. Facilitated Endangered Species Act Section 7 consultation with the Army Corps of Engineers for Lake Las Vegas Development, including implementation of an education program. Designed a five-acre wetlands as part of Corps Section 404 permit to mitigate for wetlands loss. *Role: Principal Investigator. Client: Transcontinental Lake at Las Vegas.*

Endangered Species Consultation; Central Texas (1991): Liaison between the client and government agencies, including the USFWS and the Army Corps of Engineers, overseeing Endangered Species Act Section 7 processes for threatened and endangered bird species for development property. *Role: Principal Investigator. Client: Cielo Vista Development.*

Lake Elaine Management Program; Northern Arizona (1987–1991): Developed a secondary treated effluent irrigation reservoir/lake management program and operation and maintenance plan addressing water quality, nuisance insect infestation problems, and bottom sediments. Balanced water quality using biological pest controls, especially the introduction of fish and other aquatic organisms to control nuisance insects. *Role: Senior Scientist. Client: Fairfield Flagstaff.*

Desert Tortoise Relocation; Las Vegas, Nevada (1990): Relocated the Mohave desert tortoise on 3,200 acres in the Las Vegas Valley. *Role: Project Scientist. Client: SUMMA Corporation.*

Desert Tortoise Relocation; Las Vegas, Nevada (1990): Relocated the Mohave desert tortoise on 1,000 acres. *Role: Project Scientist. Client: Peccole Ranch.*

Desert Tortoise Biological Assessment; Las Vegas, Nevada (1990): Prepared Biological Assessment for the Mohave desert tortoise on 4,875 acres in the Las Vegas Valley. *Role: Project Scientist. Client: Howard Hughes Properties.*

Desert Tortoise Biological Assessment; Las Vegas, Nevada (1990): Prepared Biological Assessment for the Mohave desert tortoise in three 1-square-mile study plots. Conducted field surveys for population density, growth rates, distribution, age class composition, health profiles, and habitat utilization. *Role: Project Scientist. Client: Bureau of Land Management.*

Desert Tortoise Biological Assessment; Las Vegas, Nevada (1990): Prepared Biological Assessment for the Mohave desert tortoise on more than 3,200 acres in the Las Vegas Valley. *Role: Project Scientist. Client: Foothills Corporation.*

Desert Tortoise Relocation Project; Las Vegas, Nevada (1990): Relocated the Mohave desert tortoise according to strict U.S. Fish and Wildlife guidelines. *Role: Project Scientist. Client: Howard Hughes Properties.*

Desert Tortoise Survey; Nevada (1990): Conducted a Mohave desert tortoise survey on the Moapa Indian Reservation. *Role: Project Scientist. Client: Sierra Delta Corporation.*

Reclamation Feasibility Study, Gilt Edge Expansion Project; South Dakota (1990): Reviewed the technical feasibility of a proposed open pit reclamation program including a lake. Researched the existing recreational supply and projected recreational demand for the northern Black Hills region to facilitate development of compatible alternative concepts. *Role: Principal Investigator. Client: Brohm Mining Company.*

Bighorn Sheep Environmental Impact Assessment; Palm Desert, California (1990): Studied the potential environmental impacts of project development, particularly on bighorn sheep and adjacent Bighorn Institute lands. *Role: Principal Investigator. Client: Westinghouse Desert Communities.*

Endangered Species Agency Liaison; Las Vegas, Nevada (1990): Acted as a liaison between client and government agencies, including the USFWS and the U.S. Army Corps of Engineers, for a development project. Designed desert tortoise mitigation. *Role: Principal Investigator. Client: Ranpac Engineering.*

Rio de Flag Floodplain Alternative Public Involvement Program; Flagstaff, Arizona (1990): Identified the public perception of flood hazards and resulting constraints and opportunities for Rio de Flag Floodplain management. Produced a Public Participation Report conforming to NEPA requirements. *Role: Principal Investigator. Client: City of Flagstaff.*

San Francisco Garter Snake Mitigation Plan; San Francisco, California (1988–1990): Provided coordination and assistance in developing a potential mitigation plan for the endangered San Francisco garter snake for the Half Moon Bay Development. Supervised on-site survey. *Role: Principal Investigator. Client: The Estes Company.*

Desert Tortoise Biological Assessment; Las Vegas, Nevada (1989): Prepared a Biological Assessment for the Mohave desert tortoise on more than 700 acres in the Las Vegas Valley. *Role: Project Scientist. Client: Foothills Corporation.*

Desert Tortoise Survey; Las Vegas, Nevada (1989): Surveyed for Mohave desert tortoise on development property. *Role: Project Scientist. Client: Somerset Properties.*

Desert Tortoise Biological Assessment; Las Vegas, Nevada (1989): Prepared a Biological Assessment for the Mohave desert tortoise on 3,103 acres in the Las Vegas Valley. *Role: Project Scientist. Client: McCarran International Airport.*

Desert Tortoise Surveys; Southern Nevada (1989): Conducted desert tortoise surveys on three 1-square-mile study plots in Sand Hollow, Mormon Mesa, and Piute Valley. *Role: Project Scientist. Client: U.S. Bureau of Land Management.*

Land Management Plan, Spearfish Canyon Homeowners Association; South Dakota (1988–1989): Provided research and land management plan for a homeowners association that, along with the U.S. Forest Service, obtained ownership of property from the Homestake Mining Corporation. *Role: Principal Investigator. Client: Homestake Mining Corporation.*

Environmental Assessment for Street Realignment; Flagstaff, Arizona (1988): Prepared an Environmental Assessment of alternatives for the proposed Fourth Street extension traversing national forest lands. Conducted sensitive species surveys and develop a public involvement program. *Role: Principal Investigator. Client: City of Flagstaff, Arizona.*

Reclamation Plan for Pecks Lake; Central Arizona (1988): Prepared conceptual alternatives and preliminary cost estimates for the restoration and reclamation of Pecks Lake and Clarkdale Tailings Pond. Prepared alternative shoreline modifications and dredging programs to provide varying levels of aquatic habitat enhancement as well as a variety of land use and recreation alternatives. *Role: Principal Investigator. Client: Phelps Dodge Development Corporation.*

Land Exchange Programs; Arizona (1986–1988): Assessed ecological values of several non-mineral assets to support an appraisal for federal land exchange programs and developed a land trade package. *Role: Principal Investigator. Client: Federal Land Exchange.*

Indian School Property; Arizona and New Mexico (1986–1988): Provided consultation for a land exchange program involving property in the Phoenix metropolitan area and ecologically sensitive areas in New Mexico containing critical habitat for an endangered species. Provided expert testimony to the House Insular Affairs Committee regarding the ecological quality of proposed trade property. *Role: Senior Scientist. Client: Phelps Dodge Development Corporation.*

South Mountain Park Master Plan; Phoenix, Arizona (1986–1988): Developed a master plan for a 16,000-acre municipal park involving ecological enhancement, a trail network, and picnic and recreation facilities. *Role: Principal Investigator. Client: City of Phoenix.*

Ecological Appraisal of Non-Mining Assets; South Dakota and Wyoming (1987): Provided an ecological appraisal of non-mineral assets and develop enhancement concepts for increasing land value for a federal land exchange. *Role: Senior Scientist. Client: Homestake Mining Company.*

Habitat Restoration and Mitigation Program for Resort; Southern Arizona (1982–1987): Prepared a habitat restoration and mitigation program for Ventana Canyon Resort, a 1,100-acre master-planned destination resort. Conceptualized the integration of the resort into the surrounding environments to aid in project design and marketing. *Role: Principal Investigator. Client: Ventana Canyon Resort.*

Aquatic Ecological Analysis for Harbor Lake; Los Angeles, California (1986): Analyzed Harbor Lake aquatic ecological problems and propose solutions. *Role: Principal Investigator. Client: James M. Montgomery Consulting Engineers.*

Impact Analysis for Development; Southern Arizona (1981–1986): Determined project impacts to sensitive wildlife and wilderness issues for the La Reserve resort development. *Role: Principal Investigator. Client: The Estes Company.*

Additional Consulting Services (Selected)

- **Ethnographic survey on Navajo Nation lands for proposed coal haul railroad expansion near Ramah, New Mexico (1992).** *Client: Institute of the American West*
- **The Kaibab National Forest (1991).** *Client: Kaibab National Forest; Williams, Arizona*
- **Spotted owl, Mohave desert tortoise, and other Threatened and Endangered Species surveys throughout northern Arizona (1991).** *Client: Transwestern and El Paso Natural Gas Companies; El Paso, Texas*
- **Ecological evaluations for a land exchange involving six national forests throughout Arizona (1991).** *Client: Federal Land Exchange; Phoenix, Arizona*
- **Spotted owl surveys on the Dixie National Forest (1990).** *Client: Dixie National Forest; Cedar City, Utah*
- **Environmental Assessment for land exchange between the City of Williams and the Kaibab National Forest (1990).** *Client: City of Williams, Arizona*

- **Grand Canyon peregrine falcon population study (1987–1990).** *Client: Grand Canyon National Park; Grand Canyon, Arizona*
- **Spotted owl survey on the Gila National Forest (1989).** *Client: Gila National Forest; Silver City, New Mexico*
- **Black Mesa vegetation studies (1989).** *Client: Peabody Coal Company; Flagstaff, Arizona*
- **Baseline studies of soils, vegetation and wildlife at UPRC's Sage Mine site (1988).** *Client: Union Pacific Resources Company; Denver, Colorado*
- **Impacts of development on urban birds (1987).** *Client: Estes Company; Tucson, Arizona*
- **Interconnection facility electric fish barrier (1987).** *Client: Central Arizona Project/Salt River Project; Phoenix, Arizona*
- **Glen Canyon Environmental Studies scientific editorial services (1986).** *Client: Bureau of Reclamation; Salt Lake City, Utah*
- **Influence of wind energy on birds of prey (1986).** *Client: Zond Systems, Inc.; Tohachape, California*
- **Tuba City oil leak (1986).** *Client: Mangum, Wall, Stoops and Warden; Flagstaff, Arizona*
- **Analysis of development impacts on Lake Havasu water quality and fisheries (1986).** *Client: McCullough Oil Company; Lake Havasu City, Arizona*
- **Saddleback Mountain vegetation management plan (1986).** *Client: Realty Asset Management; Phoenix, Arizona*
- **Feral goat removal from San Clemente Island (1985).** *Client: Department of the Navy; San Bruno, California*
- **Harbor Lake storm drain upgrade for the City of Los Angeles (1985).** *Client: J.M. Montgomery Consulting Engineers; Pasadena, California*
- **Mittry Lake Wildlife Area revegetation project for the Bureau of Reclamation; Yuma, Arizona (1985).** *Client: J.M. Montgomery Consulting Engineers; Pasadena, California*
- **Wildlife and fisheries studies, Upper Gila River Water Supply Project, Arizona and New Mexico (1983–1985).** *Client: J.M. Montgomery Consulting Engineers; Pasadena, California*
- **Grazing management plan, Naval Weapons Center; China Lake, California (1983–1985).** *Client: J.M. Montgomery Consulting Engineers; Pasadena, California*
- **Lower Colorado River bankline modifications (1984).** *Client: Bureau of Reclamation; Boulder City, Nevada*
- **Aquatic habitat survey of China Lake Springs; Naval Weapons Center, China Lake, California (1984).** *Client: J.M. Montgomery Consulting Engineers; Pasadena, California*
- **Electrofishing of Cataract Canyon for endangered Colorado Squawfish (1984).** *Client: Bureau of Reclamation; Salt Lake City, Utah*
- **Human impact on Colorado River beaches in the Grand Canyon (1983).** *Client: Grand Canyon National Park; Grand Canyon, Arizona*

- **Assessment of biological resources of Airport Wash, Rillito River, and tributaries; Tucson, Arizona (1983).** *Client: U.S. Army Corps of Engineers; Los Angeles, California*
- **Bald Eagle Recovery Team Member (1980s);** *Client: United States Fish and Wildlife Service*
- **Interim wild horse management plan, Naval Weapons Center; China Lake, California (1982).** *Client: Phillips, Brandt, Reddick; Irvine, California*
- **Vertebrate survey of selected riparian habitats of the Naval Weapons Center; China Lake, California (1982).** *Client: Phillips, Brandt, Reddick; Irvine, California*
- **Impact of feral burros on vegetation and small mammals in the Mohave Desert, California (1982).** *Client: Phillips, Brandt, Reddick; Irvine, California*
- **Survey of the fishes, aquatic invertebrates, and aquatic plants of the Colorado River and selected tributaries from Lees Ferry (Mile 0) to Separation Rapids (Mile 240) (1981).** *Client: Bureau of Reclamation; Boulder City, Nevada*
- **Feral burro reduction program (1981).** *Client: Department of the Navy; China Lake, California*
- **Evaluation of the nesting and habitat requirements of the Black Hawk on the San Francisco River; Arizona and New Mexico (1981).** *Client: Apache / Sitgreaves National Forests; Springerville, Arizona*
- **Recreational impacts on Colorado River beaches in Glen Canyon (1981).** *Client: Glen Canyon National Recreation Area, Arizona*
- **Survey of potential natural landmarks of the southern Colorado Plateau, Arizona, New Mexico, Colorado, and Utah (1981).** *Client: Division of Natural Landmarks, Heritage Conservation and Recreation Service; Denver, Colorado*

Professional Experience

- **SWCA Environmental Consultants (2002–present).** *Role: Founder / Senior Scientist / Member of the Board (Chairman 2002–2006)*
- **SWCA Environmental Consultants (1984–2002).** *Role: Founder / President*
- **SWC Associates (precursor of SWCA, Environmental Consultants) (1980–1984).** *Role: Founder / Principal Consultant*
- **Museum of Northern Arizona (1980).** *Role: Research Ecologist / Research Associate*
- **Department of Biology, Museum of Northern Arizona (1974–1980).** *Role: Department Head*
- **Museum of Northern Arizona (1971–1974).** *Role: Curator of Zoology*
- **University of Illinois (1970–1971).** *Role: Teaching Assistant*

Concurrent Academic Appointments

- **University of Arizona (1985–2000).** *Role: Adjunct Professor*
- **Northern Arizona University (1984–2000).** *Role: Adjunct Professor*
- **University of Virginia, Department of Environmental Sciences (1978).** *Role: Instructor*

Peer-Reviewed Publications

Carothers, S.W., R.R. Johnson, and D.A. House. 2013. Amadeo M. Rea and the case of a vanishing owl. Pages 239–258 in *Explorations in Ethnobotany: The Legacy of Amadeo Rea*. Edited by M. Quinlan and D. Lepofsky. *Contributions in Ethnobiology*.

Carothers, S.W., and N.G. Sharber et al. 1994. Reducing electrofishing-induced injury in rainbow trout. *North American Journal of Fisheries Management* 14:340-346.

Carothers, S.W., and N.G. Sharber. 1988. Influence of electrofishing pulse shape on spinal injuries in adult rainbow trout. *North American Journal of Fisheries Management* 8:117-122.

Carothers, S.W., and R.R. Johnson. 1987. External threats: the dilemma of resource management on the Colorado River in Grand Canyon National Park. *Environmental Management* 11(1):99–107.

Carothers, S.W., and N.G. Sharber. 1987. Submerged, electrically shielded live tank for electrofishing boats. *North American Journal of Fisheries Management* 7(3):450-453.

Carothers, S.W., R.A. Johnson, and T.J. McGill. 1987. Demography of feral burros in the Mohave Desert. *Journal of Wildlife Management* 51(4):

Carothers, S.W., S.S. Beus, and C.C. Avery. 1987. Topographic changes in fluvial terrace deposits used in campsite beaches along the Colorado River in Grand Canyon. *Journal of Arizona-Nevada Academy of Science* 20(2):111-120.

Carothers, S.W., R.A. Johnson, and R. Dolan. 1984. Recreational Impacts on Colorado River Beaches in Glen Canyon, Arizona. *Environmental Management* 8(4):353–358.

Carothers, S.W., and G.A. Ruffner. 1982. Age structure, condition and reproduction of two *Equus asinus* (Equidae) populations from Grand Canyon National Park. *Southwestern Naturalist* 27(4).

Carothers, S.W., and M.F. Willson. 1980. Avifauna of habitat islands in the Grand Canyon. *Southwestern Naturalist* 24(2):563–576.

Carothers, S.W., and C.O. Minckley. 1980. Recent collections of the Colorado River Squawfish and Razorback Sucker from the San Juan and Colorado Rivers in New Mexico and Arizona. *Southwestern Naturalist* 24(4):686–687.

Carothers, S.W., G.A. Ruffner, and N.J. Czaplewski. 1978. Distribution and natural history of some mammals from the Inner Gorge of the Grand Canyon, Arizona. *Journal Ariz./Nev. Academy of Science* 13:85-91.

Carothers, S.W., and J. Laerm. 1977. Lead concentration in small mammals not correlated with exposures of tetraethyl lead. *American Midland Naturalist* 98(1):250–254.

Carothers, S.W., and R.R. Johnson. 1976. The Mississippi Kite in Arizona: a second record. *Condor* 78:114–115.

Carothers, S.W., R.R. Johnson, and S.W. Aitchison. 1974. Population structure and social organization of southwestern riparian birds. *American Zoologist* 14:97–108.

Carothers, S.W., and L.E. Beasley. 1974. Unusual feeding habits in two species of blackbirds. *Wilson Bulletin* 86(2):121.

Carothers, S.W., N.J. Sharber, and G.F. Foster. 1974. Scaly-leg (*Knemidokoptiasis*) in a population of Evening Grosbeaks. *Wilson Bulletin* 86(2):121–124.

Carothers, S.W., J.R. Haldeman and E. Aitchison. 1973. Ornithological literature of the San Francisco Mountains area: an annotated bibliography. Museum of Northern Arizona Technical Series No. 12.

Carothers, S.W., J.R. Haldeman, R.P. Balda, and G.F. Foster. 1973. Recent changes in status and distribution of some northern Arizona birds. Museum of Northern Arizona Technical Series No. 12.

Carothers, S.W., R.P. Balda, and J.R. Haldeman. 1973. Habitat selection and density of breeding birds of a coniferous forest in the White Mountains, Arizona. Museum of Northern Arizona Technical Series No. 12.

Carothers, S.W., J.R. Haldeman, and R.P. Balda. 1973. Breeding birds of a ponderosa pine forest and a fir, pine, aspen forest in the San Francisco Mountains, Arizona. Museum of Northern Arizona Technical Series No. 12.

Carothers, S.W., N.J. Sharber, and R.P. Balda. 1972. Steller's jays prey on gray-headed juncos and a pygmy nuthatch during periods of heavy snow. *Wilson Bulletin* 84(2):204-205.

Carothers, S.W., and G.A. Ruffner. 1971. Notes on *Tadarida macrotis* in northwestern Arizona. *Southwestern Naturalist* 15(3):389–404.

Carothers, S.W., and R. P. Balda. 1970. Abnormal bill of a Western Meadowlark, *Sturnella neglecta*. *Auk* 87:173-174.

Carothers, S.W. 1968. Fauna of Rio de Flag: I. Birds. *Plateau* 40:101–111.

Carothers, S.W. 1968. Additional records of *Notiosorex crawfordi* in Arizona. *Southwestern Naturalist* 13:449.

Carothers, S.W. and R.P. Balda. 1968. Nest protection by the Brown-headed Cowbird, *Molothrus ater*. *Auk* 85(2):324–325.

Other Publications

Carothers, S.W., K. White, and C. Berkhouse. 2002. An incidental take permit for endangered karst invertebrates in Bexar County, Texas. Proceedings, National Cave and Karst Management Symposium, Tucson, Arizona, October 13–16, 2001. Available online at <http://www.nckms.org/2001contents.html>.

Carothers, S.W., K. White, and C. Berkhouse. 2002. The Karst Fauna Region concept and implications for endangered karst invertebrate recovery in Bexar County, Texas. Proceedings, National Cave and

Karst Management Symposium, Tucson, Arizona, October 13–16, 2001. Available online at http://www.nckms.org/2001_contents.html.

Carothers, S.W., and D.A. House. 2000. Decommissioning Glen Canyon Dam: Key to Colorado River ecosystem restoration and recovery of endangered species? *Arizona Law Review* 42(2):215–238.

Carothers, S.W. and R.A. Valdez. 1998. The aquatic ecosystem of the Colorado River in Grand Canyon: Grand Canyon data integration project synthesis report. Grand Canyon Monitoring and Research Center, Flagstaff, Arizona.

Carothers, S.W. and D.A. House. 1996. The role of science in Colorado River management (draft). Issues paper for Grand Canyon Trust *Colorado River Workshop: Issues, Ideas, and Directions*, Phoenix, Arizona, February 26–28, 1996.

Carothers, S.W. 1993. The Glen Canyon Dam EIS: Random Thoughts and Revelations. *Grand Canyon River Guides: The News*. 6(1):6-9.

Carothers, S.W., and D.A. House. 1992. Raptors: birds of prey on the Colorado Plateau. *Plateau* 63(3).

Carothers, S.W. 1992. The living canyon. In *The Grand Canyon: Intimate Views*, edited by F.D. Tikalsky and R.C. Euler. University of Arizona Press, Tucson, Arizona.

Carothers, S.W., and B.T. Brown. 1991. The Colorado River Through Grand Canyon: Natural History and Human Change. University of Arizona Press, Tucson, Arizona.

Carothers, S.W., and L. Propst. 1991. Rocking K's Rincon Institute. *Urban Land* 50(6):15.

Carothers, S.W., B.T. Brown, Stephen W. Hoffman, and Richard Glinski. 1990. Abundance of Peregrine Falcons in Grand Canyon National Park has implications for region-wide recovery. *Park Science: A Resource Management Bulletin* 10(2):7.

Carothers, S.W., B.T. Brown, and R.R. Johnson. 1987. *The Birds of Grand Canyon*. University of Arizona Press, Tucson, Arizona.

Carothers, S.W. 1987. Wildlife of the Colorado Plateau. *Plateau* 57(4) and 58(1), 48 pp.

Carothers, S.W. 1986. Mountain Islands. In *Arizona: Its Land and People*. University of Arizona Press.

Carothers, S.W. 1985. Too Thick to Drink, Too Thin to Plow. *Arizona Wildlife Views*, Arizona Game and Fish Publications.

Carothers, S.W., and D.A. House. 1985. The San Francisco Peaks as a Resource: What Does the Future Hold? (update of 1977 issue) *Plateau* 56(3):19-23.

Carothers, S.W., and R.R. Johnson. 1985. *Status of Riparian Ecology and Management*. Proceedings of National Wetland Assessment Symposium. Portland, Maine, June 17-20, 1985.

Carothers, S.W., B.B. Brown, L.T. Haight, R.R. Johnson, and M.M. Riffey. 1984. *Birds of the Grand Canyon Region: An Annotated Checklist*. 2nd Edition. Grand Canyon Natural History Association. Monogr. No. 1.

Carothers, S.W. 1983. Status of the Colorado River ecosystem in Grand Canyon National Park and Glen Canyon National Recreation Area. Pages 139-160 (Chapter 10) in *Aquatic Resources Management of the Colorado River Ecosystem*, Proceedings of the 1981 Symposium on the Aquatic Resources Management of the Colorado River System, November 16–18, 1981, Las Vegas, Nevada, edited by V.D. Adams and V.A. Lamarra. Ann Arbor Science, Ann Arbor, Michigan.

Carothers, S.W., and R. Dolan. 1982. Dam changes on the Colorado River. *Natural History* 91(1):74–83.

Carothers, S.W., and R.R. Johnson. 1981. Southwestern riparian habitats and recreation: inter-relationships and impacts in the Rocky Mountain Region. Contract with Eisenhower Consortium.

Carothers, S.W., R.R. Johnson, and J.M. Simpson. 1981. *A Riparian Classification System*. Proceedings of California Riparian Systems: A Conference on Their Ecology, Conservation and Productive Management. University of California, Davis. September 17–19, 1981.

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Carothers, S.W., C.O. Minckley, J.W. Jordan, and H.D. Usher. 1980. Infestations of the copepod parasite, *Lernaea cyprinaceae*, in native fishes of Grand Canyon. National Park Service *Transactions and Proceedings Series*, Washington, D.C.

Carothers, S.W., H.D. Usher, C.O. Minckley, and J.W. Jordan. 1980. Age and growth rate of the flannelmouth sucker, *Catostomus latipinnis*, and Bluehead mountain sucker, *Pantosteus discobolus*, in the Colorado River, Grand Canyon National Park. National Park Service *Transactions and Proceedings Series*, Washington, D.C.

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Carothers, S.W. 1979. Natural resources, white water recreation and river management alternatives on the Colorado River, Grand Canyon National Park. Proceedings of the First Conference on Scientific Research in the National Parks, New Orleans, November 9–13, 1976, National Park Service *Transactions and Proceedings Series* WOC No. 5, pp 253–260.

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Carothers, S.W. 1979. *Enchanted light*. Museum of Northern Arizona Press, Flagstaff, Arizona.

Carothers, S.W. 1978. Biology. *Plateau* 50(4):24-32.

Carothers, S.W., B.T. Brown, P.S. Bennett, L. T. Haight, R.R. Johnson, and M.M. Riffey. 1978. Birds of the Grand Canyon Region: an annotated checklist. Grand Canyon Natural History Association Monograph No. 1.

Carothers, S.W. 1977. The San Francisco Peaks as a resource: What Does the Future Hold? *Plateau* 49(5):18-23.

Carothers, S.W. 1977. Let's carry it all out. *Down River*, August.

Carothers, S.W. 1977. Man's use of the Grand Canyon: is it time for change? *Plateau* 49(4):24-31.

Carothers, S.W., and N.H. Goldberg. 1977. Life after the rain of fire: the biology of the Wupatki and Sunset Crater region. *Plateau* 49(2):14-21.

Carothers, S.W. 1977. The importance, preservation and management of riparian habitats: an overview. Proceedings of the Symposium on Riparian Habitats, Tucson, July 9, 1977. U.S. Forest Service General Technical Report WO-2.

Carothers, S.W., R.R. Johnson, R. Dolan, B.P. Hayden, and A. Howard. 1977. Man's impact on the Colorado River in the Grand Canyon. *National Parks and Conservation Magazine* 51:13-16.

Carothers, S.W., S.W. Aitchison, and R.R. Johnson. 1977. Some ecological considerations associated with river recreation management. Proceedings of River Recreation Management and Research Symposium, January 24-27, Minneapolis, Minnesota.

Carothers, S.W., and R.R. Johnson. 1976. The effects of stream channel modification on birds in the southwestern United States. Proceedings from Symposium on Stream Channel Modification. Harrisburg, Virginia, August 15-17, 1975.

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Carothers, S.W., and S.W. Aitchison. 1976. An ecological survey of the riparian zone of the Colorado River between Lees Ferry and the Grand Wash Cliffs. Technical Report No. 10, National Park Service.

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Carothers, S.W., and R.R. Johnson. 1975. Water management practices and their effects on nongame birds in range habitats. Proceedings of the Symposium on Management of Forest and Range Habitats for Nongame Birds. U.S.D.A. Forest Service General Technical Report WO-1, July.

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Professional Affiliations

- American Fisheries Society
- Advisory Council, Lady Bird Johnson Wildflower Center, 2012
- Board of Trustees, Museum of Northern Arizona, 1998–2000, 2002
- Council Member, National Parks and Conservation Association, 1991
- Board of Trustees, Nature Conservancy, 1990–1995
- Fellow, Arizona/Nevada Academy of Science, 1985

Awards / Honors

- Governor's Commission on Arizona Environment Award, 1984
- Elected to Beta Beta Beta Biological Honorary Society, 1969