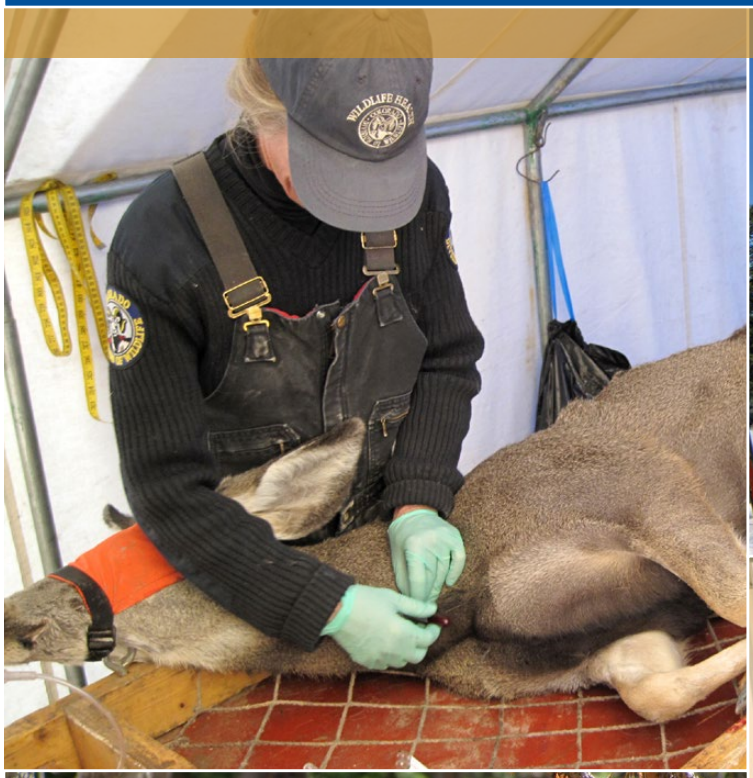
COLORADO PARKS & WILDLIFE

Research Contributions to Everyday Fish & Wildlife Management



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COLORADO PARKS AND WILDLIFE
RESEARCH POLICY AND PLANNING BRANCH
December 2019

Colorado Parks and Wildlife Research Contributions to Management Actions

Colorado Parks and Wildlife (CPW) is one of the most progressive and technically advanced parks and wildlife management agencies in North America. That is in no small part thanks to a dedicated professional staff working at all levels of the agency. Many of the most important things that our agency does are products of applied research by our research scientists. We have our own science program that has served this agency for over seven decades. Its work is devoted to developing and refining the tools and practices our agency uses on a daily basis to conserve and manage Colorado's fish, wildlife and park resources.

Aquatic Research

There has been a formal Fish Research Section at Colorado Parks and Wildlife since 1945. Personnel within the Aquatic Research Section of our agency are charged primarily with conducting research projects to answer fish culture and management questions. The Aquatic Research Section has been organizationally positioned at different time periods both inside and outside the larger Aquatic Section, which includes management biologists and hatchery personnel. The integration of research with the goals and objectives of the fish management and culture arms of the agency has always been a strong suit of the agency, leading to highly applicable studies and beneficial results. Some of the major areas of contribution include:

Hatchery Production

Early aquaculture research in Colorado included obtaining and rearing brood stock for use by our hatchery system, evaluation and development of hatchery construction techniques, and minimization of costs. In the 1960s, a program was initiated to evaluate hatchery facilities and rearing techniques, as well as to evaluate and improve characteristics of the hatchery fish themselves such as growth, stamina, and health. This work established higher standards for production and efficiency in the early hatchery system that are still in use today. Techniques to hatch and grow rare and difficult to rear species like Colorado pikeminnow, razorback sucker, Rio Grande sucker, and Greenback cutthroat trout were developed over the years at our Fish Research Hatchery in Bellvue for stocking into Colorado and surrounding states. The Fish Research Hatchery was also the first unit in the state to construct facilities for the sole purpose of isolating and rearing fish eggs and their progeny brought in from wild spawning operations. Due to disease policies, these mobile isolation facilities were the only way to rear those species without affecting the main facilities' disease certifications. These types of mobile and stationary isolation facilities are now used throughout the state system. Currently, new methods to improve spawning, hatching, feeding formulations, and fish stocking rates are tasked to researchers at our fish research hatchery.

Fisheries Inventories, Sampling and Reporting Techniques

Other early work by fish researchers in Colorado was dedicated to implementation of fisheries inventories, methods to control rough fish, and improvement of productivity of natural systems. These efforts focused on producing optimal recreational benefit from available aquatic resources for sport fishing while maintaining ecological stability. Many of those early functions are now among the standard methods used by aquatic biologists throughout the state. Integral to improving fisheries populations and associated

recreation are sampling and assessment. Research work resulted in development of fish marking, sampling, and population estimation techniques that are in use by biologists today, including development of stream survey and lake sampling techniques.

In addition, creel survey methods were developed to provide assessment of angler use, catch, harvest, and satisfaction for waters throughout the state (C-SAP). Fisheries sampling and reporting techniques across the state were standardized and data entered into a centralized database (ADAMAS), which is a major component of CPW's fisheries management system. This centralization of all of Colorado's fisheries survey data was one of the first such systems in the nation.

Disease Control

Disease issues have long been a concern for fisheries managers and culturists in Colorado. Laboratory facilities equipped to conduct pathogen screening, clinical tests, and water analyses were first established at the Fort Collins Research Center in 1963. Early studies focused on identifying causes of fish kills, effects and methods of controlling diseases including parasitism, bacterial diseases, and disease due to nutritional issues.

One of the most important aquatic diseases over the past 20 years in Colorado has been whirling disease. Our research scientists were instrumental in identifying solutions to the effects of the causative parasite, which was a source of population losses of rainbow trout in the state. Their work included development of strains of rainbow trout that are resistant to the parasite, which are in use throughout our hatchery system and in other states, and are leading to re-establishment of rainbow trout populations. Another contribution was identifying methods to eliminate or reduce effects of the parasite in hatcheries, such as best management practices. Even more recently, our researchers have been able to successfully eliminate the parasite in the wild through depopulation and reclamation efforts.

Fish Habitat

Fish habitat evaluation and protection has historically been a part of the aquatic research function of our agency. Early researchers found that habitat and land use adjacent to stream fisheries are important limiting factors contributing to stream productivity and species composition. Biologically justifiable instream flow criteria have been developed by agency researchers to inform water use decision-making, which is especially important in locations where water is limited. Fish passage and barrier criteria have also been developed to either allow or prevent upstream passage of fish depending on management goals.

Aquatic researchers have designed, assessed, and constructed stream habitat projects across Colorado to improve fisheries in the state. The Aquatic Research Section oversees construction of these habitat improvements and works closely with contractors on design and implementation of habitat treatments where CPW is involved. Recent high-profile projects that aquatic research has been involved with are the upper Arkansas stream habitat improvement related to the Upper Arkansas Natural

Resource Damage Claim, the Dream Stream work in South Park downstream of Spinney Reservoir (done in coordination with the Vocational Inmate Program at Buena Vista), and the fish passage structure work with the city of Fort Collins on the Cache la Poudre River.

Native Species

Research information on native species is of great importance and helps guide decisions and strategies for conservation efforts in Colorado and surrounding states. The Aquatic Research Section has helped implement those conservation strategies through a variety of contributions including the development of rare broodstocks, collection of population and life history information, and key assistance with reclamation projects.

One example of aiding in decision-making is an Eastern Plains native fish sampling protocol that established a sampling scheme that optimizes information collection by providing our biologists with a list of sites that meet important criteria. The sampling protocol tells us where to sample to get the most out of our investment of time, money, and effort. Another important study investigated bluehead sucker, flannelmouth sucker, and roundtail chub – known as the "three species". This includes work on evaluating levels of hybridization of native sucker species with longnose and white suckers and

information on influences of flows and temperatures, and evaluations of distribution. This work has led to management actions to selectively remove or exclude non-native suckers from key tributary streams. A substantial amount of work has been conducted to evaluate native cutthroat trout populations including investigations on inventory, migration, reproduction and harvest as well as taxonomy and life history. One of the most notable outcomes was the development of new molecular tests to evaluate purity and heritage, as well as the extensive testing of native trout DNA conducted since 2011 to characterize the remaining diversity and where it is distributed. This work has led to numerous management actions related to locating reclamation projects, barrier construction to protect unique populations, and securing water rights to protect streams where these populations occur. Highlights of these broad testing efforts include the discovery of the native cutthroat trout of the San Juan River basin, which was thought to be extinct, and the discovery of the true native trout of the South Platte River drainage in Bear Creek.

Water Quality and Sport Fishing Regulations

In the early days of our agency, water pollution and chemical analysis studies by aquatic researchers documented effects of beet sugar pollution and petroleum operations that resulted in fish kills. Evaluating the extent of pollution from mining and milling operations and their effects on biological systems and water supplies also was a major focus. This important work developed CPW's ability to determine levels of trace metals in biological samples and water**.** Colorado and nationwide water quality and temperature standards for regulatory protection of fish and other aquatic species have come specifically from work conducted by our Aquatic Toxicology lab in Fort Collins. Many of these nationwide standards are related to metals like cadmium, zinc, copper, selenium, and others.

Legal verdicts and settlements from mining contamination or from chemical and petroleum spills that occur quite regularly in Colorado have come directly from work conducted by CPW research. Another recent project of high value to management is the comparison of rotenone products on the market

with those historically used by CPW. Results were used by CPW managers to select piscicides and prescribe exposure levels and concentrations of detoxifying oxidizers for use during large-scale reclamation efforts.

In many cases, fishing regulations on the books today are products of prior research. Special regulations for fishing such as catch and release, size limits, and artificial fly and lure only regulations for Colorado were developed and assessed by aquatic research personnel. Recent research work, such as that of population modeling dynamics in Blue Mesa Reservoir with respect to kokanee salmon and lake trout, have provided management suggestions that are used to help set regulations and population objectives.

Avian Research

The Avian Research Program of Colorado Parks and Wildlife addresses applied research questions to benefit the management and conservation of birds and wildlife habitats in Colorado. In addition to conducting original research and synthesizing scientific information, researchers routinely serve on technical committees, work groups, and other partnerships with federal, state, and non-governmental organizations. The Avian Research Program has been organizationally positioned at different time periods inside or outside the Terrestrial Section, which includes management biologists and species conservation coordinators. Regardless, the integration of research with the goals and objectives of the terrestrial wildlife and habitat management units always has been a strong emphasis. A few examples of contributions from Avian Research include:

Sage-grouse Conservation

Sage-grouse have long been a focus of management and applied research in Colorado. Avian researchers led the development and evaluation of trapping methods that have been used for decades throughout the range of sage-grouse. This work has been cited in over 280 other publications. Avian researchers also conducted early work evaluating sage-grouse lek counts as a reliable index of population status and trends, and followed this up in later years with more intensive research. This research influenced lek count protocols and use of lek data in CPW and at rangewide levels. Most recently, CPW avian research has tested an alternative approach to conducting lek surveys. Although more costly, this method further illustrates the limitations of traditional counts and can be used periodically or when managers need more rigorous information at local scales.

Avian researchers led the work that initially identified the Gunnison sage-grouse as a separate species from the greater sage-grouse and the genetic characteristics of different populations of Gunnison sage-grouse. This research has guided conservation planning throughout the range of the species.

Waterfowl Hunting Management

For decades, avian researchers from Colorado have helped advance the cooperative management of migratory gamebirds in North America, providing benefits to migratory bird populations and hunters in Colorado. One example is Colorado's lead role in the establishment and maintenance of the High Plains Mallard Management Unit (HPMMU) in the Central Flyway. Extensive banding studies, waterfowl surveys, experimental hunting regulations, and hunter monitoring conducted in the 1960s and 1970s indicated that a portion of the mid-continent mallard population tended to consistently migrate through and winter in the western portion (High Plains) of the

Central Flyway, and that mallards and other ducks wintering in the High Plains were subject to lower hunting pressure and harvest rates than in the eastern portion of the Central Flyway and the Mississippi Flyway. The Central Flyway Council used this research to work with the U.S. Fish and Wildlife Service and other Flyway Councils to formally establish the HPMMU. Since 1973, in the HPMMU 10 to 23 additional days have been added to the federal frameworks for duck seasons for the Central Flyway each year, providing additional hunting opportunity for duck hunters in Colorado and throughout the High Plains.

Peregrine Falcon Conservation

From the 1940s through the 1970s, peregrine falcon numbers plummeted in the United States, due primarily to the effects of pesticides. Work in Colorado on peregrine nesting performance, captive maintenance and reintroduction techniques contributed greatly to nationwide efforts to restore this iconic bird. Today peregrine populations in Colorado and across the U.S. are recovered and the species has been removed from the federal list of endangered and threatened species.

Mountain Plover Conservation

In the late 1990s and early 2000s, the mountain plover was a candidate species for listing under the federal Endangered Species Act due to concerns about population declines and habitat loss. Colorado is a major breeding area for this shorebird, which prefers nesting in grasslands with sparse, low vegetation. A particular concern was that mountain plovers commonly nest on agricultural fields, and nesting success was assumed to be very low as spring plowing and planting can coincide with the nesting period, and food availability for chicks was thought to be low on agricultural fields.

The Avian Research Program conducted detailed studies that showed plover reproductive success was comparable in agricultural fields and rangelands. We also applied new survey methods and obtained the first extensive breeding population estimates for mountain plovers across eastern Colorado. Results from this research were instrumental in the U.S. Fish and Wildlife Service issuing a 'not warranted' listing decision.

Habitat Restoration and Cheatgrass Control

The Avian Research Program also conducts research on plant ecology and habitat restoration techniques that can be applied to management of a variety of terrestrial wildlife species. Over the past decade, CPW has conducted multiple experiments on soil and revegetation treatments to reduce dispersal and establishment of cheatgrass in grassland and shrubland environments. Based on this research, CPW has developed a modified disk implement that is now being used on habitat treatments in Colorado and Utah.

Mammals Research

The Mammals Research Section was formally established in 1961 to support the management of Colorado's wildlife resources. Mammals researchers conduct scientific-based original research that advances the agency's and the profession's collective knowledge about mammalian species, their habitats, and their future management. Research personnel collaborate with other sections of CPW to identify pressing information needs that will improve management of mammal species in Colorado. The evolution of research questions to inform management decisions in Colorado and elsewhere has transitioned from gathering basic information to establish management units and protocols to address herd health indices, population monitoring approaches, mammal/habitat relationships, population dynamics, and more recently to wildlife-human interactions. This work has generated over 2,000 scientific technical reports and peer-reviewed publications.

Basic Deer and Elk Management Information

During the 1960s and 1970s numerous investigations occurred throughout Colorado to address big game distributions, movement patterns and habitat associations to establish big game management unit delineations. Studies were conducted to identify annual data collection needed to monitor herd management objectives, and to assess wounding loss

rates, effects of antler point restrictions, and the influence of male harvest levels on pregnancy and recruitment.

Information about wildlife habitat associations lead to more detailed studies addressing food habits, plant palatability and digestion physiology, and seasonal habitat use patterns. Herd health (pregnancy, condition, disease) indices such as blood chemistry, fecal samples, kidney fat, bone marrow, carcass weights, fetal growth rates, and rump fat/body condition were evaluated to identify potential factors limiting big game populations.

Population Monitoring

The Mammals Research Section and contractors at Colorado State University (CSU) were instrumental in developing population monitoring methods that provide statistically valid herd composition and population estimates. These include helicopter quadrat and mark-resight surveys for most ungulates and line-transect surveys for pronghorn. These methods are now considered standard approaches in management and research investigations where reliable estimates with measures of precision are required.

Habitat Assessment and Enhancement

Managing habitat for wildlife has always been a priority for Colorado Parks and Wildlife. The Mammals Research Section has traditionally been involved in investigations addressing vegetation responses to climate, disturbance, browsing pressure, habitat enhancement techniques, and evaluating animal responses to habitat treatments intended to improve forage conditions and herd performance. This information has been applied to past and current habitat management efforts by CPW, including application of mechanical treatment methods and establishment of the CPW seed warehouse to provide native seed for habitat enhancement and reclamation efforts.

Population Dynamics

CPW Mammals Researchers have conducted many studies over several decades addressing big game population dynamics. These studies have largely addressed factors influencing survival and evaluated the role of habitat, winter severity, disease and predation. Understanding the interactions among factors influencing population dynamics is complex and requires strategic data collection to inform sound management decisions. Examples of this are studies addressing the influence of severe winter conditions on mule deer survival, which provided recommendations for late winter carcass surveys and criteria required to prompt survey efforts to address population impacts.

CPW research in collaboration with Idaho, Montana and CSU reported the relative contribution of factors influencing mule deer population dynamics and noted these factors appear to be relatively consistent at large scales. They recommended measuring survival and sex/age ratios from a few representative monitoring areas for population modeling to inform annual management decisions, which has been applied by CPW since the early 2000s and has also been adopted by other state management agencies.

Wildlife Contraception

Interest in non-harvest management options for deer and elk in areas where hunting is not feasible, such as in National Parks and urban areas, became prominent in the late 1990s to the early 2000s. This resulted in several studies investigating development and remote delivery of contraceptives. A successful short-term approach was developed for a single breeding

interval, but it requires treatment of a large percentage of reproductive females (>50%) and recurring application for long-term success.

Wildlife-Human Interactions and Conflict Management

Research conducted by CPW during the 1980s identified deer disturbance distances to human and snowmobile activity during winter and provided winter range management recommendations. In addition, a series of investigations during the 1970s evaluated deer fencing, one-way gates, deer guards, roadway lighting, lighted signs and underpasses to reduce vehicle collisions and allow deer passage across fenced roadways.

Studies addressed deer and elk responses to hunting activity and reported minor shifts in habitat use for deer and variable response from elk. This resulted in recommendations to change elk season dates to enhance harvest success in areas where elk distribution is influenced by hunting. CPW researchers also experimentally evaluated elk and cattle competition in fenced pastures, and identified forage biomass thresholds where elk grazing may influence cattle weight gain, providing specific elk management recommendations. Research further addressed the cost/benefit of fencing designs that inhibit deer and elk use of valuable crops. Ongoing research is investigating mule deer-energy development interactions and providing development planning recommendations based on disturbance distances associated with varying levels of human development activity.

Mountain Goat, Bighorn Sheep, Moose, and Pronghorn and Management

Protocols were developed for bighorn sheep translocations to enhance struggling herds around the state, an approach that has been widely applied in Colorado and elsewhere. Evaluations of mountain goat and bighorn sheep competition suggested mountain goats can displace bighorn sheep and provided recommendations for harvest management to minimize mountain goat impacts to bighorn sheep populations. Studies also addressed potential for disease transmission from livestock to bighorn sheep and recommended minimizing overlap where feasible.

Research assessed success of moose introduction efforts during the 1970s and 1980s, which resulted in a substantial increase in moose hunting permits during the 1990s. Continued expansion and growth of moose populations in Colorado prompted additional research to develop cost-effective data-collection approaches to improve future moose harvest management. Pronghorn research investigations in Colorado were applied to the development of state agency pronghorn management guidelines published in 1998 and 2006.

Carnivore Management

Research projects have addressed basic black bear and cougar ecology and management in Colorado providing recommendations for management with respect to achieving management objectives and maintaining sustainable carnivore populations. Research evaluated feasibility and application of barbed-wire hair snags for collecting DNA samples to estimate black bear abundance and isotope analysis to provide bear and cougar diet information. Ongoing research is evaluating mark-resight estimates of cougar populations using camera grids, which appears promising for future management application. Recent studies have addressed black bear and cougar-human interactions. Developing and enforcing garbage storage ordinances has been shown to reduce bear conflicts, and carcass management from cougar kills along the urban interface can reduce the time cougars spend in close proximity to humans. Ongoing research is addressing the role of predation in limiting deer population growth when habitat conditions are non-limiting.

Nongame Research

A variety of nongame research has been conducted by CPW scientists. Early research addressed beaver distribution, habitat use and recommendations for managing populations to minimize conflict situations. Status of kit fox in Colorado was evaluated resulting in reclassification as a Species of Special Concern and modified trapping regulations to enhance protection. Preble's jumping mouse research investigated ecology and conservation of the species and provided recommendations for protecting critical

habitat for a Species of Greatest Conservation Need in Colorado.

Recent nongame research has focused on assessing the success of lynx reintroduction in Colorado, habitat and prey relationships, and population monitoring methods. Standardized monitoring approaches developed by CPW have been adopted by other state and federal agencies for lynx and wolverine monitoring. Lynx habitat and prey associations have been used to inform USFS timber management practices. Successful lynx reintroduction in Colorado has contributed to lynx being considered for delisting as an endangered species in the lower 48 states.

Wildlife Health Program

The Wildlife Health Program's contributions to everyday wildlife management in Colorado include development of tools used by wildlife managers and biologists as well as essential knowledge used in management and policy decision-making here and elsewhere. Here we highlight a few of the most tangible and recognizable examples.

Capture Methods

The Wildlife Health Program has been a key player in developing better ways to capture and handle wildlife for human safety, conflict management, and conservation. This includes developing safe, effective, practical, and legally-acquired drug combinations for wildlife immobilization. This work resulted in two original, patented drug combinations, the newest one having the fewest federal regulatory constraints of any combinations that are legally available and effective. Additional work on this front has involved tailoring long-acting drug combinations case-by-case to reduce stress and improve translocation success.

Chronic Wasting Disease

The CPW Wildlife Health section investigated chronic wasting disease (CWD) impacts to mule deer populations and evaluated approaches to reduce disease prevalence rates, providing foundational work on surveillance, monitoring, and diagnostics that underpin contemporary testing and control programs in Colorado and elsewhere. Basics of transmission, disease dynamics, and impacts on herd performance described by this group continue to inform management planning and policy. Further, existing regulations based on CPW science are recognized as effective in minimizing spread via the captive wildlife industry. Implications of this work for key species other than deer and elk are widely applicable, for example the demonstrated lack of susceptibility of cattle to the disease. This work has provided insights into potential control strategies and enabled careful assessment of approaches suggested by others.

Plague

Suppression of this disease for species conservation and recovery has been a priority for CPW. Pioneering and institutionalized in-house monitoring and preventive plague management techniques have been used to determine that Gunnison's prairie dog did not require the protection of being federally listed as threatened or endangered. CPW innovated cost-effective "low tech" approaches critical for establishing independent, practical in-house management capacity, literally writing the book on plague management. These efforts catalyzed a streamlined approach to securing a federal regulatory pathway that has facilitated landscape-scale vaccine uses in wildlife.

Bighorn Sheep

The CPW Wildlife Health Program has provided new dimensions and directions in bighorn respiratory disease prevention, including insights about known and previously-unrecognized disease agents that contribute to persistent lamb pneumonia and herd stagnation. Research addressed the influence of pneumonia/lungworm in limiting bighorn lamb production and developed protocols for disease treatment. Other research identified sources and consequences of introduced pathogens that drive "all-age" die-offs.

Ungulate Nutrition

Understanding of deer and elk digestive physiology and nutrition requirements led to in-house development of a safe and effective emergency feed, the recipe which is now in the public domain. This pelleted food ration aids in preventing large die-offs of mule deer and elk during severe winter conditions. This knowledge about deer energetics further informed Commission policy on emergency winter feeding.

Human Dimensions

Human Dimensions inquiries within Colorado Parks and Wildlife span a diversity of topics, disciplines, and sections of the agency. The primary purpose for conducting this research is to better understand complex social processes as well as individual characteristics (e.g., beliefs, attitudes, and values) that influence people's relationship with nature. Specifically, human dimensions research uses these data and incorporates them into natural resource policy and decision-making processes.

Ours was one of the first state fish and wildlife agencies in the nation to highlight the importance of and need for collecting social science data. The earliest human dimensions research occurred during the early-1980s to late-1990s, examining hunters' and anglers' perceptions about wildlife conservation. This research scope has grown in recent years and has become an increasingly integral part of Colorado's wildlife conservation and state parks planning.

Hunters, Anglers, and Wildlife Watching

Early research by Colorado Parks and Wildlife about hunting and angling focused on long-range forecasts to predict the demand for hunting, fishing, and wildlife watching. In addition, these studies modeled the direct and indirect impacts of these activities on the state and local economy. Research also focused on contentious issues related to hunting and fishing, specifically those involving access, crowding, and experience or satisfaction. Many of these efforts are ongoing to evaluate trends and preferences among various stakeholders. These include hunting-related surveys such as Herd Management Plan public involvement surveys, and fishing-related surveys such as statewide Angler Satisfaction Surveys. Data derived from these inquiries are used by agency staff when making on-the-ground management decisions about specific species or herds and they are also incorporated into decision making processes by the Parks and Wildlife Commission.

More recent hunter and angler-related research is exploring the efficacy of CPW's education outreach efforts (e.g., seminars, workshops, clinics, etc.), with an emphasis on how CPW staff measure the success of the agency's recruitment, retention, and reactivation programs. These data will help CPW to better understand the difference their programs are

making in and beyond Colorado while allowing the agency to create more targeted programs based on the needs and interests of the public. In addition, CPW is currently using qualitative research methods including focus groups to identify West Slope anglers' perceptions about and concerns with native and non-native fishery management. This study will help garner support for fisheries management activities while enhancing working relationships with anglers on the West Slope.

Wildlife Management

Human Dimensions research has been used to help wildlife managers better understand and navigate human-wildlife conflict resulting, in part, from increased recreational use and urban encroachment on wildlife habitat. Several studies from the 1990s assessed public perceptions about and attitudes toward species-specific wildlife management (e.g., mountain lion, coyote, beaver, black bear, Preble's jumping mouse, etc.). Findings from these efforts provided managers with important information about residents' perceptions of risk related to human-wildlife interactions as well as what they were (or were not) willing to tolerate with respect to wildlife management and issues around human safety.

Additionally, Human Dimensions research has been critical to understanding hunters' perceptions about wildlife disease and disease management. Specifically, in the early 2000s, research efforts helped agency staff understand deer and elk hunters' knowledge about, awareness of, and attitudes toward CWD. Results from this study also helped quantify the degree to which hunters' perceptions of risk would influence their immediate and long-term hunting behaviors. Current efforts to understand hunter perceptions, concerns, and management preferences related to CWD are ongoing and involve other states. Findings from this study will be used to create effective messages about the disease based on hunters' needs and interests.

Land Use Planning, Outdoor Recreation, Park Visitation, and Education

In the early 1990s, CPW's Human Dimensions section collaborated on various county land use planning and state-commissioned conservation programs. More recent efforts have helped identify outdoor recreation and broader socio-demographic trends in Colorado. Projects like the Statewide Comprehensive Outdoor Recreation Plan (2008, 2014, 2019) are reoccurring and provide a wealth of information about recreation activity participation, concerns facing land managers, and data describing Colorado's recreation economy. Work is also underway to more effectively evaluate CPW's education programs (e.g., Students and Outdoor Learning Environments [SOLE]), and state park visitor use, motivations, and satisfaction at all 41 State Parks. The latter represents a five-year study to better understand why people visit state parks, what activities they enjoy while visiting parks, and what amenities and recreation opportunities they believe would enhance their experiences. These data will be used by CPW staff to continue to provide visitors with exceptional outdoor recreation experiences at Colorado's State Parks.

Additional Resources

For additional information on past and present research activities at CPW, visit the CPW research web pages at:

https://cpw.state.co.us/learn/Pages/Research.aspx


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