

*Habitat Conservation Planning
Under the Endangered Species Act:*

Is it Ecosystem Management?

by

Tracy L. Smith

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APPROVED:



John Randolph, chair



Richard Neves



Timothy Beatley



David Conn

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ABSTRACT

HABITAT CONSERVATION PLANNING UNDER THE ENDANGERED SPECIES ACT:

IS IT ECOSYSTEM MANAGEMENT?

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Tracy L. Smith

Dr. John Randolph, Chair

Department of Urban Affairs and Planning

Habitat conservation planning under the Endangered Species Act has been compared to ecosystem management by Secretary of Interior, Bruce Babbitt. Yet, ecosystem management, an emerging paradigm for public lands management, has not been defined or criteria established for determining if actions indeed follow it. This thesis addresses ecosystem management through the review of current literature and develops a set of criteria that fall into the following five topic areas: ecological orientation, time and spatial scales, human roles in management, management actions, and data collection. After a comparison of the criteria to five case studies of habitat conservation plans, it is determined that habitat conservation planning is not ecosystem management. A discussion of how habitat conservation planning could be more like ecosystem management further concludes that the Endangered Species Act may not be the only appropriate place for ecosystem management legislation to be. Local and state governments may be better suited to address ecosystem management in the context of habitat conservation planning.

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Table of Contents

Acknowledgments	iii
List of Tables	vi
List of Figures	vii
List of Abbreviations	viii
Chapter 1: Introduction	1
Chapter 2: Ecosystem Management	5
<i>The beginnings of ecosystem management</i>	
<i>Defining ecosystem management</i>	
<i>Ecosystem management criteria</i>	
<i>Ecological orientation</i>	
<i>Time and spatial scale</i>	
<i>Role of human beings</i>	
<i>Management actions</i>	
<i>Data collection</i>	
<i>Challenges facing ecosystem management</i>	
<i>Conclusion</i>	
Chapter 3: Habitat Conservation Planning	32
<i>Habitat conservation planning's beginnings</i>	
<i>Developing a habitat conservation plan</i>	
Chapter 4: Case studies of five habitat conservation plans	43
<i>Stephen's kangaroo rat HCP</i>	
<i>Metropolitan-Bakersfield HCP</i>	
<i>Desert Conservation Plan - Clark County Nevada</i>	
<i>Balcones Canyonlands HCP</i>	
<i>San Diego NCCP</i>	
<i>Conclusion</i>	

Chapter 5: Comparison of Habitat Conservation Planning and Ecosystem Management	71
<i>Comparing ecosystem management criteria to HCPs</i>	
<i>Time and spatial scale</i>	
<i>Data collection</i>	
<i>Role of human beings</i>	
<i>Management actions</i>	
<i>Ecological orientation</i>	
<i>Is the HCP process ecosystem management?</i>	
<i>How can it be more 'like' ecosystem management?</i>	
<i>Conclusion</i>	
Chapter 6: Conclusion	85
Literature Cited	91
Vitae	96

List of Tables

Table

2.1	Reasons for the increased interest in ecosystem management	10
2.2	Definitions of ecosystem management	14
2.3	Different characteristics of ecosystem management	19-21
2.4	Ecosystem management criteria	23
2.5	Challenges facing ecosystem management	29
3.1	Characteristics encouraged for future HCP efforts	35
3.2	The HCP process as outlined by the FWS	37
4.1	Status of SKR habitat conservation efforts as of June 1994	45
4.2	Considerations guiding SKR habitat reserve design	47
4.3	Species of concern in the MBHCP	50
4.4	Steering committee members for the DCP	56
4.5	Amount of remaining habitat to be protected in the BCCP	64
5.1	Ecosystem management criteria and the case study HCPs	72-73
5.2	Summary of comparison	82
5.3	How habitat conservation planning could be more 'like' ecosystem management	83

List of Figures

2.1	Diagrams of ecosystem management as a component of social, economic, and ecological factors	16
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List of Abbreviations

BAT	Biological Advisory Team for the BCCP
BCCP	Balcones Canyonlands Conservation Plan
BLM	Bureau of Land Management
DCP	Desert Conservation Plan
DWMA	Desert Wildlife Management Area
ESA	Endangered Species Act
FWS	United States Fish and Wildlife Service
GIS	Geographic Information System
GYE	Greater Yellowstone Ecosystem - Federal program under the NPS
HCP	Habitat Conservation Plan
MBHCP	Metropolitan Bakersfield Habitat Conservation Plan
MHCOS	Multiple Habitat Conservation and Open Space Program
MHCP	North County Multiple Habitat Conservation Program
MSCP	Multiple Species Conservation Program
NCCP	Natural Communities Conservation Program (California Legislation)
NDOT	Nevada Department of Transportation
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NPS	National Park Service
OHV	Off-highway Vehicle
RCHCA	Riverside County Habitat Conservation Agency
RMP	Resource Management Plan for the BLM
SANDAG	San Diego Association of Governments
SKR	Stephen's kangaroo rat
SKR HCP	Stephen's kangaroo rat Habitat Conservation Plan
TMA	Tortoise Management Area
URTD	Upper Respiratory Tract Disease in Desert Tortoises
USFS	United States Forest Service

What is missing is the sense that we are part of this system—that it is not somehow “ours,” that it has a coherence of its own, depths of order and possibility that we may not even suspect. Most of the action has nothing to do with us. There are interchanges in which humans do not set the terms from the beginning. Nature conserves us, as the Naskapi Indians say, not we it.

Anthony Weston
Back to Earth: Tomorrow's Environmentalism
1994

Chapter 1



Introduction

Habitat conservation planning began with the requirement for a habitat conservation plan (HCP). Such a plan must be prepared by landowners to receive a Section 10(a) permit under the Endangered Species Act (ESA) for development on private land occupied by an endangered species. First implemented in 1983 when it was used to demonstrate an amendment to the ESA, HCPs are slowly gaining popularity as an environmental planning tool and process. In April, 1993, before a hearing of the Merchant and Marine Fisheries on preservation of natural habitats, Secretary of Interior Bruce Babbitt described three HCPs as examples of “ecosystem management,” an emerging concept for public lands management. This statement raises the question: Is the HCP process, and resulting planning, truly ecosystem management?

To address the question, several issues arise concerning the practice of habitat conservation planning and the concept of ecosystem management. First, neither is well defined and thus, it is difficult to determine not only what ecosystem management is, but how habitat conservation planning accomplishes ecosystem management. Second, if habitat conservation planning is not ecosystem management, the description of it as such may impede future efforts for true ecosystem management. Finally, it is unclear whether the ESA has the legislative power to achieve ecosystem management under its current implementation even with habitat conservation planning.

Hypothesis and Objectives

The hypothesis to be tested in this thesis relates to the statement given by Secretary of Interior Bruce Babbitt: “habitat conservation planning under the ESA is ecosystem management (U.S. Congress 1993).”

It is expected that by the current definitions of ecosystem management, habitat conservation planning will not fulfill the criteria to be identified by this thesis. The limitations of the Endangered Species Act as it is currently written and implemented will also probably not allow for the ecosystem-wide protection and analysis that is necessary under ecosystem management. It is not expected that the criteria established in this thesis will provide a definitive definition for ecosystem management, but they may tie together the common threads of many of the definitions that have been proposed.

The objectives to be accomplished by this thesis are:

1. To develop a common set of criteria drawn from the current literature that can characterize ecosystem management, and
2. To determine if habitat conservation plans currently being written meet ecosystem management criteria.

Approach

This thesis will first review the literature to develop criteria that characterize ecosystem management. A brief history of the development of the current concepts of ecosystem management will be addressed to give the study an historical perspective and show how the current definitions developed. The criteria to be developed will present a definition of ecosystem management and will combine the common characteristics in previous literature into a form to which habitat conservation planning can be compared.

Secondly, through case studies, the thesis will review the three habitat conservation plans Secretary of Interior Bruce Babbitt used as examples of ecosystem management in his address to the Committee on Merchant Marine and Fisheries for the House of Representatives. These habitat conservation plans include the Balcones

Canyonlands HCP, the San Diego County, California Natural Communities Conservation Program (NCCP), and the Clark County, Nevada HCP. Further examination will be done on the Western Riverside Stephen's Kangaroo Rat HCP and the Metropolitan Bakersfield HCP because these are more recent regional HCPs that incorporate many of the same strategies as the three previous HCPs. The HCPs will then be compared to the criteria established for the ecosystem management process to reach a determination of whether or not the HCPs are representative of ecosystem management.

Methodology

To test the hypothesis of this thesis and complete the objectives, the following tasks and analyses are undertaken:

Objective 1: Establish ecosystem management criteria.

1. Review literature on ecosystem management to demonstrate how and why ecosystem management developed as a concept as well as how it is defined.
2. Compile lists of characteristics contained in the definitions of ecosystem management in the current literature.
3. Compare lists to determine the common criteria for the establishment of the final criteria list to be used in the following analysis.

Objective 2: Determine if HCPs represent ecosystem management.

1. Describe the HCP process as it exists, its legal framework under the Endangered Species Act, and why they are used.
2. Perform case studies of each analyzed HCP describing where they occur, why they were undertaken, how protective measures were developed, and how the measures are being implemented. This analysis required:
 - the study of the plans,
 - review of literature on each plan, and
 - correspondence with key individuals involved in the process of developing and implementing the plans (phone calls and letters).

If an HCP had been approved and permitted by the Fish and Wildlife Service, that document is used for the HCP case study. In the case that the HCP had not been completed, relevant literature, draft plans, and correspondence are reviewed to complete the case study.

3. Compare each HCP and its processes to the criteria developed for Objective 1 determining whether ecosystem management is used in the development of HCPs. The information is presented in a table comparing each HCP to ecosystem management criteria.

Outline

Following this introduction, Chapter 2 will review the literature and develops ecosystem management criteria. Chapter 3 will describe the habitat conservation planning legislation, history, and reasons why it is used. Case studies are presented in Chapter 4 on the Western Riverside Stephen's Kangaroo Rat HCP, the Metropolitan Bakersfield HCP, the Clark County, Nevada HCP efforts, the Balcones Canyonlands HCP in Texas, and finally the San Diego County, California, NCCP. The comparison of the ecosystem management criteria with the case study HCPs follows in Chapter 5. Finally, the conclusion to the thesis (Chapter 6) will summarize the findings and pose unanswered questions in this area of research.

Chapter 2



Ecosystem Management

Why should we take an ecosystem based approach to forest management? Whether we choose it now or later, there really is no alternative.

*V. Alaric Sample (1994)
Directory, Forest Policy Center, American Forests*

In this quote, V. Alaric Sample stated the belief held by the federal government under the Clinton Administration. Interior Secretary Bruce Babbitt announced in April of 1993 that the Administration planned to encourage management of lands based on an ecosystem approach, moving away from the single species approach in an attempt to avoid controversies similar to the Northern Spotted Owl conflict in the Pacific Northwest (U.S. Congress 1993). Since that time, each major landholding agency of the federal government has made ecosystem management the goal of their land management. These agencies include the U.S. Forest Service (USFS), the National Park Service (NPS), the Bureau of Land Management (BLM), and the Fish and Wildlife Service (FWS). However, there has yet to be developed an effective operational definition or approach to ecosystem management. The lack of a working definition and approach has become increasingly problematic as implementation is undertaken. Both public and private sector land managers are facing the dilemma of implementing practices to accomplish the unknown goals of an undefined concept. “Public confusion is fueled by the lack of discussion about the meaning and implications of implementing an ecosystem approach to land management (Wood 1994).”

Ecosystem management acquired notoriety with the United States Forest Service (USFS) and their attempts to manage the Greater Yellowstone Ecosystem (GYE), which ended with a plan unacceptable to many of the key participants. The GYE plan was never implemented and therefore seen as a failure to some, but others hail it as a first attempt with lessons to be learned and used on future attempts at ecosystem management. Other lesser known demonstrations of ecosystem management have included the Watershed Restoration of the Chesapeake Bay, the Great Lakes Management Area, and others. These examples have been termed successes by their managers within the criteria being established in various agencies (see Muckenfuss 1994; Cawrse, Johns, and Jones 1994; Morelan, Mealy, and Carrol 1994, and Swanson 1994).

This chapter will attempt to clarify some of the issues surrounding ecosystem management. Discussion will begin with a brief description of the roots of ecosystem management and why it has increased in importance in recent years. Next, definitions and goals of ecosystem management gathered from literature will be presented. From this information a set of criteria for evaluating ecosystem management will then be developed. The chapter concludes with a discussion of the challenges faced in defining and implementing ecosystem management.

The Beginnings of Ecosystem Management

Historical roots of ecosystem management extend back over a hundred years to the emergence of the concept of ecology. The late 1800's saw a growth in new concepts concerning the world and how it functioned. One of the new theories for describing the environment and its functions was ecology (though it was not given that name by Arthur Tansley until 1935). The theory held two fundamental concepts that now influence the definition of ecosystem management (Salwasser et al. 1991):

- Everything is connected to everything else in ecosystems, making it impossible to take only one action without causing a chain of other reaction (Hardin 1985).
- All ecosystems are parts of larger ecosystems that receive their "externalities" and, in turn, set the context for conditions in the subsystems (Allen and Starr 1982).

But what is an ecosystem? An ecosystem is a community of all the organisms that inhabit a particular area and the community's physical environment (Campbell 1990). They range in size from a decaying log in a forest to the entire world.

The concept of ecology and the ecosystem led to new ideas about the land. In the 1940's, Aldo Leopold expanded on the science base of ecology and other emerging environmental sciences and said that land management should follow a land ethic. Leopold redefined the way that land was perceived, saying people should consider the entire system (or ecosystem) of the environment when managing land. He defined land as something more than just rocks, soil, and some plants and animals. Land is defined as the beginning and end of all life (Leopold 1941). A system of life emerged from the definition in which each piece had a place, purpose and right to exist. These ideas were controversial when Leopold wrote them because they shifted the thinking from a human centered approach to a land centered paradigm. At the time and continuing through the 1960's, many people followed the paradigm characterized by Colby (1991) as frontier economics. A frontier economics approach to land management perceives nature as an "infinite supply of physical resources to be used for human benefit and an infinite sink for the by-products of the consumption of these benefits" (Colby 1991, 195). Leopold's land ethic and the growing interest in ecology within the circles of biology, forestry, and land management, lead to changes in the way people thought about the environment. The land ethic became part of the inspiration that influenced many who care for the land, as well as many environmentalists.

At about the same time as Leopold was developing his land ethic, public lands managers were developing the approach that has dominated management of public lands. This paradigm was multiple use and sustained yield (Cortner and Moote 1994, Wood 1994, Slocombe 1993a). It emphasized the ability of public lands to support many different uses on the same land in perpetuity. Multiple use and sustained yield recognized limits in the use of the environment and defined nature as being finite in both what it could provide as well as absorb. It still emphasized use of the land and tended to

focus on commodity output and development of components of the landscape for economic benefit (Wood 1994, 7). In the USFS this commodity focus meant emphasizing timber interests and in the BLM it meant emphasizing grazing interests. However, multiple use and sustained yield changed the perception that these resources were infinite to a belief that careful management was needed.

In the 1960's and 1970's, the public became aware of negative effects of land use practices. Rachel Carson published her book Silent Spring in 1962 raising awareness about the changes in the environment. Rivers and lakes were showing signs of stress as sediment levels increased due to runoff from logged forest areas and grazed pasture. Pollution levels were increasing and beginning to make people sick as well as destroying water supplies and the land. The number of species in the environment was changing, almost always becoming fewer. Furthermore, land managers realized that many of the problems were not limited to the land under their jurisdiction but also included surrounding landowners. Environmental degradation extended to areas outside of individual land areas. The problems culminated in an environmental movement that brought public concern for the environment to a new level. An environmental protection era in land management had begun (Noss and Cooperrider 1994). New legislation passed in the U.S. Congress in 1969 creating the National Environmental Policy Act (NEPA), and in the early 1970's to create the Clean Air Amendments, the Endangered Species Act (ESA), and the Clean Water Act, to name a few.

In the 1980's, still following the multiple use and sustained yield paradigm, the 'sustained' concept of the paradigm began to be emphasized (Cortner and Moote 1994) and evolved into the concept of sustainable development. Sustainable development went undefined through much of the decade until, in 1987, the World Commission on Environment and Development defined sustainable development as development that "meet[s] the needs of the present without compromising the ability of future generations to meet their own needs" (The World Commission on Environment and Development 1987, 8). However, the definition of sustainable development did not instigate a major

paradigm shift. It still “valued resources for their ability to achieve a politically, socially, or economically defined level of productivity” (Wood 1994, 8) while ignoring cumulative environmental effects of the action. Sustainable development did not take the additional step of restructuring the thinking, managing, and structural process of the multiple use and sustained yield paradigm; it merely refocused on different paths for accomplishing the same goals. However, it did expand the notion of long-term time horizons, from a 20-year horizon to 50 years and more.

Developing parallel to the concepts of sustainable development in the 1980’s were new ecologically oriented sciences in forestry, fisheries management, and biological conservation. Leopold’s land ethic and ecological theories influenced these sciences. The field of conservation biology became a professional association in 1985 when it organized into The Society for Conservation Biology and focused on the protection of biodiversity. It differs from past science in that it involves many disciplines to accomplish one ‘mission.’ That mission is “to conserve as much of global biodiversity as possible and to allow evolution to continue generating biodiversity” (Noss and Cooperrider 1994, 85-86). Conservation biologists began developing new strategies and tactics to accomplish the mission of sustaining biodiversity. They believe that past approaches to conservation are inappropriate to their new science because they fail to conserve biodiversity; therefore, they need to create a new set of tools.

Ecosystem management is a culmination of these many different changes in perception of the environment and the practice of environmental management. Multiple use and sustained yield has not addressed the issues many see as problems. Under the land management practices being used, solutions have not kept up with the problems (see Table 2.1 for a list of the unresolved problems). The first problem is demonstrated by the increasing number of people believing in the need for conservation biology and believing past practices have not slowed the loss of biodiversity. In fact, in many areas (mostly urban), the loss of biodiversity is a major issue in land use practices as development of the land is blocked due to the presence of an endangered species. The U.S. has almost

Table 2.1: Reasons for the increased interest in ecosystem management

- The biodiversity crisis continues to accelerate (for an overview, see Noss and Cooperrider 1994).
- No policy initiative has as yet been shown to decelerate environmental deterioration (Soule 1991).
- Calls for ecosystem management have increased in conjunction with the theoretical and empirical development of conservation.
- The safety net of U.S. environmental laws is being stretched thin as society reaches and exceeds environmental limits through industrial expansion, population growth, and resource consumption (Doremus 1991).
- Environmental groups have increasingly used administrative appeals and litigation to challenge successfully current resource management policies and practices.
- Federal management, as exemplified by national forest planning has (so far) failed legal tests, ignored conservation biology concerns, and left the public's expectations for meaningful participation in decision-making unfulfilled.
- Societal views of appropriate relationships between people and nature are in a state of flux (Dunlap and Mertig 1992).

Source: Developed from text in Grumbine, R. Edward. "What is Ecosystem Management?" Conservation Biology. March 1994. v. 8, n. 1, 29.

800 species listed as threatened or endangered. Every year more and more species have been added to the candidate list for proposed listing as threatened or endangered. In fact the list is growing so fast that there is not enough time to do biological surveys on all of them to determine if they need to be federally protected or not.

These facts lead to the second reason for increased interest in and need for ecosystem management: legislation, mostly initiated in the early 1970's, has not satisfactorily slowed the rate of environmental deterioration (Soule 1991). The presence of the ESA has not reduced threats to species extinction (Bean 1988). Numbers of listed endangered species and species on the candidate list, as stated above, increase each year. Very few of these species have shown any improvement and many are continuing to decline (Noss and Cooperrider 1994). The ESA is failing to stop the deterioration of species loss.

Third, with the advent of conservation biology and the approaches conservation biologists follow for biodiversity conservation, demand for ecosystem management has increased (Grumbine 1994). These tactics involve not only biological conservation measures, but political and social measures as well (Noss and Cooperrider 1994), making a more holistic approach to land management necessary for addressing these demands.

The fourth reason for ecosystem management is the “thinning” of U.S. environmental laws that protect the environment (Doremus 1991 in Grumbine 1994). In other words, the environmental laws of the United States are not protecting as much as in the past because there is more to protect. They are simply not keeping up with the environmental issues being raised. As society continues to grow through industrial expansion, population growth, and resource consumption, environmental limits are being exceeded. Norman Myers (1993) uses the examples of ozone layer depletion and mass species extinction to demonstrate the problem on a global scale but these problems are witnessed in the U.S. as well. Despite clean air regulations, cities in the U.S. greatly contribute to the ozone layer depletion simply due to the size of our country and its growing population. National strategies to keep energy prices low have led to overuse of polluting energy resources such as coal and oil in electricity production and automobile use. These strategies offset the gains made for clean air by the Clean Air Act. The world is also facing mass extinctions of species. This last occurred 65 million years ago and took 5 to 10 million years to regenerate the diversity level to its previous level. Whereas past extinctions had natural causes, the present mass extinction is the result of human beings changing the world (Myers 1993). U.S. policies to curb extinction rates have not succeeded in doing so as stated above.

The fifth reason for the increased interest in ecosystem management is that “environmental groups have increasingly used administrative appeals and litigation to challenge successfully current resource management policies and practices” (Grumbine 1994). Primarily the result of legislation that makes lawsuits on environmental grounds legal, the high number of lawsuits in recent years even lead to a new branch of law,

environmental law (Noss and Cooperrider 1994, 82). Environmental organizations have formed with the purpose of taking actions to court, not on legal but scientific grounds.

The sixth reason on Table 2.1 is that federal management has “failed legal tests, ignored conservation biology concerns, and left the public’s expectations for meaningful participation in decision–making unfulfilled” (Grumbine 1994). Federal land management agencies have been challenged in court by many of the environmental groups about land management strategies implemented by federal agencies. Often cases that are raised in the courts require the land management agency to rethink their approach to management on the grounds that it fails to protect the environment sufficiently. Further, the cases often result from a failure to adequately involve the public in the decision–making or plan writing process. When the public is ignored or left out of the process, their opinions and ideas cannot be included in the process and are not reflected in the resulting management decision or plan. Upset because of this, the public can take the agency to court.

All of these reasons culminate into, or conversely, result from the seventh reason for increased demand for ecosystem management: the changing views about the “relationships between people and nature” (Dunlap and Mertig 1992 in Grumbine 1994). People are changing from a frontier economics view to a more ecologically oriented view. Also, there has recently been a shift in how people perceive their place in reference to the environment. To many, humans are no longer considered rulers over the environment, but are viewed as being a part of it.

The needs for management to meet these seven unresolved problems do not fit into the current paradigm of multiple use and sustained yield. A new paradigm is needed. Scott Slocombe (1993a) said “Making specific choices about land use, wildlife protection, and resource development that are acceptable to entire communities and regions, and that are sustainable, may be the hardest tasks we face in the coming decades.” Ecosystem management developed as a concept that would accommodate the issues being raised and tackle the need to find solutions.

Ecosystem management aims to accomplish the paradigm shift: restructuring the thought process behind management by making it more interdisciplinary (Slocombe 1993b); rethinking the ways that management is undertaken by integrating research, planning, and public comment into the process (Slocombe 1993b, Cortner and Moote 1994, Grumbine 1994); and redefining the boundaries, scales, and values of the management area (Loomis 1993). Under this approach, management moves away from a focus on commodity flow and single resources to emphasize preserving the entire ecosystem's integrity and how it will react to change and what change is appropriate to achieve values held by the community (Irland 1994, Gordon 1993, Cortner and Moote 1994). Furthermore, without the shift to ecosystem management, the country may face increased management costs and increased instability in social and economic areas (Risser 1985) as well as impending ecosystem-wide failure of the environment to support the human population (Noss and Cooperrider 1994).

Defining Ecosystem Management

Ecosystem approaches appear to offer the widest range of desirable characteristics, the most diverse experience, and the best prospects for devising such a framework. Ecosystem approaches can facilitate studies that integrate knowledge from a range of disciplines about an area or society or person; they encourage recognition of complexity, change, and the need to adapt to and anticipate it. They promote an appreciation of people's place within rather than separate from nature, and they promote involvement of people in surveys, analysis, and plans.

Scott D. Slocombe
Environmental Management 1993

Ecosystem management is an ecologically based approach to land management. The many definitions listed in Table 2.2 demonstrate the importance placed on the ecosystem and the human–ecosystem interaction. Ecological principles are integrated throughout (with the exception of Gordon 1993). The links to the concepts of biodiversity conservation, multiple use and sustained yield, ecosystem health, and sustainable development, all of which contributed to ecosystem management, are strong (Salwasser 1994). Yet, ecosystem management is different from each of them.

Table 2.2: Definitions of ecosystem management**Ecosystem management:**

- Is the integration of ecological, economic, and social principles to manage biological and physical systems in the manner that safeguards the ecological sustainability, natural diversity, and productivity of the landscape (Wood 1994).
- Implies a process by which project-level decisions are influenced by larger-scale ecological planning. It assumes that humans cannot avoid decisions about natural resources, and that they should support those decisions which knowledge of the physical, biological, and social relationships that define ecosystems (Lucier 1994).
- Is not mere words: ecosystem management represent shifts in the way we do business, indeed in the way we view and interpret society. As such they elicit both excitement and fear as we anticipate the possibilities of growth and the inevitability of change (Staebler 1994).
- Integrates environment and development planning within a coherent management unit, defined in terms of biophysical and socioeconomic similarities (a bioregion) (Slocombe 1993b).
- Emphasizes resource conditions and long-term sustainability...requires the maintenance of biological diversity and stresses ecological function and balance. In this view, objectives are related to sustaining desired future conditions of the land and water resources rather than maximizing the production goals of any one resource or use, such as timber harvesting, forage production, aesthetic experiences, or the development of new water supplies...choices are based on public concerns about ecosystem health, cumulative effects, and the long-term sustainability of ecological relationships, rather than units of output...focuses on state (conditions) (Cortner and Moote 1994).
- Is a planning process to arrange an environment allowing human beings and other living things to live continuously and perform production'. The purpose is the total organization of environmental management. Control of the environment as an entity through the control of various processes and the creation and maintenance of a sound and more comfortable environment are the main motives (Ayala 1987) (Takeuchi and Lee 1989).
- Focuses on the maintenance of an ecosystem's natural flows, structure, and cycles, displacing the traditional emphasis on the protection of such individual elements as popular species or natural features (Goldstein 1992).
- Is an ecosystem perspective on forest policy is more holistic in adding a focus on relationships between various forest conditions, natural events and processes, various human uses of forests, and the different and changing values of forests to people at multiple geographic scales over time. It is further concerned with how natural events and processes together with human uses of forests in one place can effect environmental and economic changes over time and in different places (Salwasser et al. 1991).
- Sustains desired ecosystem conditions requiring that management goals and actions fall within the intersection of three spheres: That they be simultaneously ecologically viable (environmentally sound), economically feasible (affordable), and socially desirable (politically acceptable). If the balance among these three criteria is not reasonable, there is a high likelihood that desired conditions will not be sustainable because of failures in one or more of the spheres (After Zonneveld 1990) (Salwasser 1991).
- Means using an ecological approach to achieve the multiple-use management of national forests and grasslands by blending the needs of people and environmental values in such a way that national forests and grasslands represent diverse, healthy, productive, and sustainable ecosystems (Robertson, 1992) (Salwasser 1991).
- Is, at a minimum, people trying to accomplish something in a bounded space (Gordon 1993).
- Integrates scientific knowledge of ecological relationships within a complex sociopolitical and values framework toward the general goal of protecting native ecosystem integrity over the long term (Grumbine 1994).
- Is protecting or restoring the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated (FWS 1994).

Ecosystem management responds to the issues in Table 2.1, attempting to accomplish better management. The primary goals of ecosystem management described in the literature are the maintenance of ecosystem integrity and sustaining ecosystems for future generations (Grumbine 1994, Wood 1994, Slocombe 1993a). Thus, ecosystem management must be holistic, not concentrated on one function, resource, or use. Biodiversity, habitat conservation, commodity production, and human use are components of the ecosystem and must all be considered as part of the management system.

Ecosystem management, then, goes beyond the natural environment to also include the human component of the ecosystem. Factors that contribute to the ecosystem and need to be taken into account include social and economic factors as well as ecological ones (Salwasser et al. 1991). The human side of the ecosystem is as complex as the ecological side and presents as many, if not more, difficulties for addressing issues and management. Human social systems include culture, values, and economic interests. Ecosystem management must include the social and economic system in its management of the land because humans are key components of the ecosystems, but these systems are included as a subset of the ecosystem to which humans belong.

Two different representations of ecosystem management being a component of social, economic, and ecological factors are shown in Figure 2.1. According to Christopher Wood (1994, 7) diagrams such as Figure 2.1-A show ecological, social, and economic factors sharing “power” in the management paradigm. In Wood’s definition of ecosystem management,

[t]o embrace the ecosystem management concept is to accept that ecological factors such as maintaining biological diversity, factors such as maintaining biological diversity, ecological integrity, and resource productivity dictate strict limits on social and economic uses of the land (1994, 7).

Social and economic factors in ecosystem management are not given as much weight when making decisions concerning use of an ecosystem. The shared power concept is

Figure 2.1: Diagrams of ecosystem management as a component of social, economic, and ecological factors

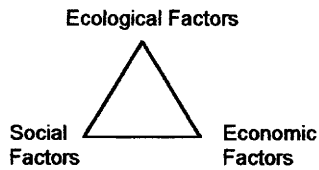


Figure 1-A: Diagram of the links between different factors in ecosystem management

Source: Wood 1994, 7

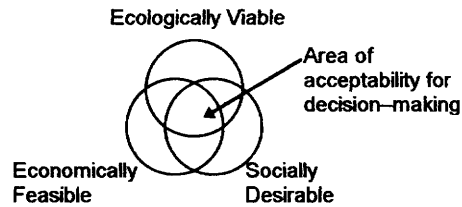


Figure 1-B: Diagram of where appropriate decisions will come from based on aspects involved in ecosystem management

Source: Salwasser 1991, 67

also shown in Figure 2.1-B. Hal Salwasser, et al. (1994, 67) argue that without an agreement based on the influence of all three factors "... there is a likelihood that desired conditions will not be sustainable because of failures in one or more spheres." The argument says that ecological factors cannot retain the majority of power in decision-making; the power must be shared. Public value systems figure more prominently in the Salwasser, et al. model than in Wood's model on the surface. These arguments strike a distinct division in the literature.

Yet, the arguments may be moot. All definitions of ecosystem management call for a fundamental shift in the way people perceive their place in the ecosystem. If the shift occurs from the traditional human as controller of the environment to one where humans are a component of the environment, then the social and economic spheres (to use the Salwasser, et. al. model) will have different values in them than traditionally thought. Ecological values will be infused throughout these value systems and will have the effect of Wood's model. Since the shift has not occurred, it is difficult to say what the values in the spheres of social and economic factors are or will be. Thus, at this time, maybe Wood's model needs to be the model for ecosystem management to follow. But, in reality, once the paradigm shift has occurred, the Salwasser, et. al. model will be the model of how ecosystem management will work. All three factors will affect ecosystem management decisions, but they will differ from current value systems and be influenced by the new way humans perceive their place in the environment.

In managing ecosystems, objectives have been outlined by many different individuals and agencies. The objectives tend to reflect values held by the writers in their individual attempts at defining ecosystem management. Overall though, with ecosystem integrity and sustainability as the goal, the primary objectives include:

- Preservation of biodiversity through maintenance of viable populations of plants and animals native to the ecosystem (Salwasser et al. 1991, Crawley and Feemuth 1993, Noss and Cooperrider 1994, Grumbine 1994, Wood 1994).
- Including the human species as a part of the ecosystem. This means including their needs (physical, economic, social, and cultural) in to the management decision-making (Salwasser et al. 1991, Slocombe 1993a, Noss and Cooperrider 1994, Grumbine 1994, Wood 1994, Cortner and Moote 1994)
- Managing ecosystems to reflect the values of people while remaining within the boundaries of ecological rules and meeting preferred future conditions for the ecosystem (Grumbine 1994, Wood 1994)

Using these goals and objectives as the basis for definition, ecosystem management could be defined as:

Management of land such that the ecosystem, social system, and economic system in which the land exists determines appropriate and acceptable uses of the land and environment such that the ecosystem will retain its integrity, biodiversity, and function and that the humans within the system will be supported and their needs provided for in the present and the future.

Ecosystem Management Criteria

Many individuals in the environmental fields view ecosystem management as the natural evolution of the environmental movement and of the land management system in the United States and the world. Gerlach and Bengston stated:

Some consider it a self-evident truth that ecological interdependence must be institutionalized, woven into the fabric of human life. It is further considered self-evident that ecological interdependence must be integrated with economic interdependence to produce a “sustainable future”. (1994, 20)

As a ‘natural’ path to land management, V. Alaric Sample’s quote at the beginning of the chapter shows how government and many in the public are changing their thinking about

the land and people's place in it. Ecosystem management may accomplish a paradigm shift in the thinking of many across the United States. But is it being implemented? And, more simply, how can it be determined that something is ecosystem management?

Even though defining ecosystem management is important, a definition by itself is not sufficient to evaluate management programs. Criteria need to be established not only for determining a course of action to accomplish ecosystem management but also for determining if the actions are successful. They are necessary to determine if management practices being undertaken by the government or private landowners are indeed ecosystem management.

Integration of all factors (ecological, social, and economic) affecting ecosystem management will require a shift not only in how federal agencies manage public lands but also in how the "public defines their own property rights for land, trees, and water" (Loomis 1993). Traditional public definitions of property rights have held the land owner or human as the controller of the land with rights to do what they wanted with the "land, trees, and water". Control decisions concerning land use were influenced primarily by economic and sometimes social factors affecting the controller. For the paradigm shift to ecosystem management, the public must also shift their view of property rights. People must change the view of themselves as controller over their land and replace it with a view of themselves as a component of their land. Such a shift will change the economic and social factors influencing ecosystem management and therefore shift the property rights definition the public holds. It will also entail changes in time scales, how technology is used, how people view the environment, and how government will operate when managing the land.

Table 2.3 shows how different authors have characterized ecosystem management. The parameters (based on Noss and Cooperrider 1994, 85) are broad types of characteristics. Characteristics of traditional management are presented

Table 2.3: Different Characteristics of Ecosystem Management

Parameters	Characteristics of Traditional Management (Noss and Cooperider 1994 p. 85)	Characteristics of Conservation Biology (Noss and Cooperider 1994 p. 85)	Characteristics of Ecosystem Management (Giumbine 1994)	Characteristics of Ecosystem Management (Gordon 1994 p. 240)	Characteristics of Ecosystem Management (Stocombe Env ngingint p. 297)	Forest Characteristics of Ecosystem Management (Hiland 1994 p. 16)	FWS Characteristics of Ecosystem Management (FWS 1994 p. 5)	FS Characteristics of Ecosystem Management (Salwasser et al 1991 p. 74-75)	BLM Characteristics of Ecosystem Management (Wood 1994 p. 6-7)
Time and Spatial Scale	Short-term perspective	Long-term perspective	Hierarchical Context	Manage where you are, be site specific	Holistic, comprehensive, transdisciplinary dynamics Look at different levels and scales of system	Manage for appropriate spatial and time scales	Manage on discrete units of landscape for manageability	Long term, through generations of people	Base planning and management on long-term horizons and goals
Orientation	Oriented toward use of resources	Ecologically oriented	Ecological Boundaries	Manage across boundaries to ecosystem	Define the ecosystem naturally		Decisions on ecosystem-wide basis		
Role of ecosystem	Emphasis on "improving" ecosystems	Emphasis on maintaining natural ecosystems	Ecological Integrity	Manage without externalities		Emphasize landscape traits		Sustain ecological integrity	
Species emphasized	Emphasis on "improved" or introduced species	Emphasis on native species				Maintain and enhance biodiversity Emphasize species composition of primeval forest	Conserve biodiversity		
Responsiveness	Management responsive to bureaucracy/commodity users	Management responsive to long-term needs of earth and local people			Recognizing systemic limits to action - defining and seeking sustainability		Maintain environmentally sustainable level of development	Promote sustainable development	Sustain the productivity and diversity of ecological systems
Role of humans	Human domination/control of ecosystems/landscape	Humans living within ecosystem limits	Humans Embedded in Nature	Manage with people in mind	Include people and their activities			Within sustainable ability of land, meet needs of people who depend on natural resources	

Table 2.3: Different Characteristics of Ecosystem Management

Parameters	Characteristics of Traditional Management (Noss and Cooperider 1994 p. 85)	Characteristics of Conservation Biology (Noss and Cooperider 1994 p. 85)	Characteristics of Ecosystem Management (Grumbine 1994)	Characteristics of Ecosystem Management (Gordon 1994 p. 240)	Characteristics of Ecosystem Management (Slocombe Env mgmt p. 297)	Forest Characteristics of Ecosystem Management (Hiland 1994 p. 16)	FWS Characteristics of Ecosystem Management (FWS 1994 p. 5)	FS Characteristics of Ecosystem Management (Selwasser et al 1991 p. 74-75)	BLM Characteristics of Ecosystem Management (Wood 1994 p. 6-7)
Use of technology	High-tech management	Management with emphasis on minimal or appropriate technology							
Risk	Management with high risk to ecosystem/biodiversity (linear management)	Management to minimize risk to ecosystem/biodiversity (adaptive management)	Adaptive Management	Manage based on mechanisms rather than algorithms	Use anticipatory, flexible research and planning process		Encourage flexibility and innovation		Practice adaptive management
Attitude	Confidence in human knowledge about resources and human effects on nature	Uncertainty about human knowledge and human effects on nature	Data Collection		Describe parts, systems, environments, and their interactions	Data collection			Gather and use the best available scientific information
Intraagency programs	Fragmented/ disciplinary	Integrated	Organizational Change			More intensive planning and coordination	Delegate decisions to lowest level & give Service employees max. authority		
Interdisciplinary Interaction	Competition	Cooperation			Including actor-system dynamics and institutional factors in analysis		Integrate FWS resources and tools with partners		Adopt an interdisciplinary approach to land management
Interagency Interaction	Competition	Cooperation	Interagency Cooperation				Full participation of all partner (Fed, State, Local and Tribal)		Coordinate with other federal, state, and private landowners

Table 2.3: Different Characteristics of Ecosystem Management

Parameters	Characteristics of Traditional Management (Noss and Cooperider 1994 p. 85)	Characteristics of Conservation Biology (Noss and Cooperider 1994 p. 85)	Characteristics of Ecosystem Management (Gumbine 1994)	Characteristics of Ecosystem Management (Gordon 1994 p. 240)	Characteristics of Ecosystem Management (Siocombe Env management p. 297)	Forest Characteristics of Ecosystem Management (Irland 1994 p. 16)	FWS Characteristics of Ecosystem Management (FWS 1994 p. 5)	FS Characteristics of Ecosystem Management (Salwasser et al. 1991 p. 74-75)	BLM Characteristics of Ecosystem Management (Wood 1994 p. 6-7)
Human values			Values		Emphasizing an implicit or explicit ethics of quality, well-being, and integrity		Socioeconomic and human interests included	Contribute to the social and economic well-being of communities, regions, and the nation through cost-effective and environmentally sensitive production and conservation of natural resources	Involve public in the planning process Determine desired future ecosystem conditions based on historic, ecologic, economic, and social considerations
Monitoring			Monitoring						
Repairing past damage								Restore ecological integrity	Minimize and repair impacts to land and reconnect isolated parts

for comparison to illustrate the differences between it and ecosystem management. Also for comparison is a list of the characteristics of conservation biology, not to show differences, but similarities. Ecosystem management is very different from traditional land management as shown whereas conservation biology, which is developing parallel to and calling for ecosystem management, unsurprisingly, is basically the same as ecosystem management. Noticeably, though, the lack of agreement in what ecosystem management is shows in the subtle differences in word choice and meaning. Ecosystem management defined by these characteristics demonstrates a dynamic land management system despite the lack of unity. It adapts to individual and new situations as well as changing as human values grow and change.

Using the parameters and information provided on Table 2.3 as well as the goals and objectives, a set of criteria can be established (see Table 2.4). Five distinct criteria areas can be derived: ecological orientation, time and spatial scale, role of humans, management actions, and data collection. Ecological orientation encompasses the parameters of the role of ecosystems, species emphasis, and responsiveness. Time and spatial scale parameters include the time and spatial scale and orientation. The parameters of role of humans, attitude, and values define the role of humans criteria. Management actions include the characteristics in the risk, intra-agency programs, interdisciplinary interaction, interagency interaction, monitoring, and repairing past damage parameters. Finally, data collection criteria are described by the characteristics in the attitude parameter and are closely linked with monitoring. Following this are more detailed descriptions of each of the criteria areas.

Ecological orientation

To be ecosystem management, ecosystems dictate use and management strategies as set by the natural systems and biotic communities they contain. Ecologically based management approaches derive decisions on information provided by the ecosystem because its integrity is the goal of ecosystem management. Thus, development and

Table 2.4: Ecosystem management criteria**1. Ecological orientation**

- a. Ecosystem dictates use and management strategies
- b. The integrity of the ecosystem is to be preserved in a way to seek sustainability
- c. Natural biological diversity is important and to be maintained, focusing on how biologic community functions as a whole within the ecosystem

2. Time and Spatial Scale

- a. Long-term, looking at future generation of people
- b. Boundaries are set by the ecosystem not set arbitrarily as jurisdictional boundaries are

3. Role of Human Beings

- a. Social, cultural, and economic values of humans must be considered in management of land: Thus people must participate in the decision-making and management process
- b. Humans have changed the environment: Past damages should be repaired
- c. Humans will change the environment: These impacts need to be minimized
- d. To always try to acquire as complete knowledge base available and within technological and scientific limits

4. Management actions

- a. Integrate management and practices within agencies
- b. Integrate management and practices between separate agencies
- c. Integrate interdisciplinary practices into the management strategy
- d. Practice adaptive management
- e. Monitor management practices to be sure they are successful and document failures

5. Data collection: Current data are incomplete, more data is needed with management changing as new information comes available through monitoring and research

human interaction with the environment must be integrated with ecological integrity and ecological factors to be ecosystem management (Wood 1994). Therefore, the functions, process, and components of an ecosystem must be given priority over changes to the ecosystem. The ecosystem management paradigm assumes that ecosystem integrity must be preserved for life on Earth as currently known to persist. Assumptions can be drawn that say that current life on the planet is desirable and should be maintained, and current evolutionary processes are also desirable and should be maintained.

Arguments for preservation of ecosystem integrity can parallel the utilitarian and intrinsic value arguments raised for preserving biodiversity. Human beings receive many utilitarian benefits from ecosystem integrity such as flood control, pest control, and

groundwater recharge. Many of these functions have been imitated by humans through the artificial creation of wetlands, recharge ponds, and maintained landscapes for habitat with varying success. At this point in the discussion of ecosystem importance, intrinsic values must be considered. Like biodiversity, to many people, just knowing that a functioning, self-maintaining ecosystem exists is justification in and of itself for preserving ecosystem integrity. Others simply want to preserve ecosystems and their integrity because it is the good and moral thing to do. Whatever the reason that ecosystem integrity is chosen as the goal of ecosystem management, the literature states that the paradigm shift requires that it be the goal (See Table 2.2: Definitions of ecosystem management). Based on the assumption that ecosystem integrity is required to maintain life on the planet as currently known, the ecosystem itself must dictate what changes it can assimilate and still maintain its own integrity.

Through appropriate decision-making based on information about the ecosystem, the integrity of the ecosystem can be preserved. An ecosystem's functions need to be maintained throughout even if there is to be human use within the ecosystem. Conservation biology and the study of the "landscape matrix" can provide the information on the ecosystem as well as choices that are acceptable for the land within the constraints of maintaining ecosystem integrity (Noss and Cooperrider 1994). Holistic approaches to understanding the landscape, such as these, will provide the basis for considering the ecosystem and choices available for management of the system (Slocombe 1993a). Emphasis should be on the natural systems and native species.

Time and spatial scale

Ecosystem management must consider different time and spatial scales from those practiced in the past. These scales are "critical" for defining the management choices within a management area (Salwasser et al. 1991). The first, time scales, must be long-term. Management choices should be made to ensure sustainability into the future. Without management considering the long-term impacts of the decision choices, future generations may be impacted for the worse. Because ecosystems provide resources that

we use now, such as timber and water supplies, these resources should be available for people in the future. Those generations must be planned for because it has been shown that resources do not always renew themselves and they are exhaustible (Myers 1993).

Secondly, the ecosystem as a whole must define the spatial scale for the management area. Spatial scale is one of the most important factors in defining ecosystem management (Loomis 1993). The spatial boundaries are defined by the management objective, since ecosystems vary depending on the resource being managed (Salwasser 1991). For example, a watershed may be the management area for a strategy to improve or maintain water quality or the habitat range for a group of animals for maintaining the biodiversity of a region. Ecosystem boundaries are thus defined by the resource or reason the management is occurring. It should also be noted that cumulative effects should be minimized or, if possible, eliminated, with the use of a proper time and spatial scale.

Role of Human Beings

Human beings affect the environment and the functioning of an ecosystem in such dramatic ways that their influence is one of the most important factors in ecosystem management. Human use of the land is unavoidable. Part of the shift to the ecosystem management paradigm will be the restructuring of human value systems where social and economic values shift to become a subset of the ecosystem. Human needs for food and shelter cannot be ignored because humans are a component of the ecosystem and need to depend on ecosystems to provide for these needs. The meeting of these needs must respond to the ecosystem from which they are being derived. Humans have the responsibility of making decisions based on the ecosystem and for changing their value systems.

A problem when managing large ecosystems is going to be the large number of landowners and decision-makers. The large number of individuals make for large numbers of values and opinions. Public involvement needs to address these differing

values and somehow reach a consensus of how to manage land. Ecosystem management, currently taking place primarily in federal agencies, will face the task of fashioning a decision-making process that will be responsive to the public and include the public in decision-making (Salwasser et al 1991, FWS 1994, Wood 1994). Social and cultural values, as well as economic values, have all been discussed as requirements in the ecosystem management process (Salwasser et al. 1991, Slocombe 1993a, Salwasser 1994, Cortner and Mootte 1994).

Furthermore, human beings have been the leading cause of change in the environment (Myers 1993, Noss and Cooperrider 1994). We have caused most of the environmental problems faced today. The BLM has made repair of past damage and restoration of natural ecosystem one of the components of their ecosystem management definition (Wood 1994). Because many of the problems ecosystems face today are the direct result of past human action, these problems should be corrected if at all possible so that ecosystem integrity is restored.

While repairing past damage, humans will also have the responsibility of minimizing impact when the inevitable changes to the ecosystem occur. While human needs must be met, humans must also minimize changes therefore preserving ecosystem integrity. The balance between human need and ecosystem integrity is fine and no definitive answer has been given in the literature. It will depend on the ecosystem being managed.

Finally, ecosystem management is limited by human understanding of the ecosystem. Technology and science further limit the levels of understanding possible at any given time. Humans must play the role of information gatherer to better understand the ecosystem and always recognize that their information is incomplete.

Management Actions

There is no established process for ecosystem management because the approach is still being developed. It requires a restructuring not only in the way the environment is

viewed and valued but in how decisions are made, and how people respond to information and changes in the environment. The reliance on the ecosystem to dictate the choices and guide behavior will require a restructuring in the decision-making process and incentive system (Salwasser 1994). The U.S. federal government has many different agencies with different objectives, practices, and reasons for existing. Within these agencies are many different levels of management and divisions working toward different management objectives. Each of the agencies is in charge of set areas of land whose boundaries were established without concern for ecosystems and their function. The result of all the fragmentation is a management process that is often ineffective and sometimes counterproductive. Integration of all management practices between and within these agencies needs to be completed for ecosystem management to function. Furthermore, to avoid the 'railroading' effect in decision-making when the decision makers have similar backgrounds, interdisciplinary practices need to be incorporated within the management process.

The effect of random decision-making by individual public agency landholders is further complicated when private land ownership is taken into account within ecosystem management. Economics and property rights issues come to be leading issues when implementing ecosystem-wide management (e.g., see Goldstein 1993). Individual property owners each have an individual agenda for the use of their land and often do not consider the ecosystem when planning the agenda. But, the land is still within the ecosystem and thus a part of the management area. With ecosystem management occurring primarily on federal land or under federal programs, the interdependence of federal and private-landowner resources is being recognized (Loomis 1993, 446). Areas with high numbers of private landowners will have to include all the landowners or some agreed upon representation of landowners in the decision-making process.

After a decision to implement ecosystem management has been made, a monitoring process should be implemented (Grumbine 1994, Noss and Cooperrider 1994). Monitoring will provide information on successful strategies, actions, or

decision-making processes, as well as failures or marginal successes. The database of information derived from the monitoring process needs to be available to all land managers.

Finally, adaptive management should be used. Knowledge of the environment and ecosystem functions is limited. It is constantly changing as studies are completed, technology advances, and values change. Adaptive management recognizes that as information changes, management will adapt, responding to the changes. Results of monitoring will contribute to the changing management as well. Thus, ecosystem managers will incorporate the results of previous actions and therefore remain flexible and adaptable to uncertainty (Grumbine 1994).

Data Collection

Ecosystem management must have as a key component data collection. As stated previously, human knowledge of the environment is limited. Constant data collection is necessary to improve our decision-making. With improved data, better decisions can be made because we can better judge what the results of a decision will be and therefore, hopefully, fewer 'bad' decisions will be made. Adaptive management can respond to the increased amount of data as well as data that changes as research is completed. Monitoring programs, essential to ecosystem management, will rely on data collection and dissemination systems for it to be effective in evaluating ecosystem management efforts.

Challenges Facing Ecosystem Management

To meet the criteria for achieving ecosystem management, the approach will have to overcome many challenges accompanying the paradigm shift. The well established paradigm of multiple use and sustained yield is engrained in the practices of land management and land managers are being asked to implement new practices that are not even defined. Also, the current resurgence of property rights issues is inspiring the public

Table 2.5: Challenges Facing Ecosystem Management

- Overcoming the multiple use and sustained yield paradigm and implementing a new paradigm.
- The resurgence of property rights issues as a movement across the United States and redefining these rights in accordance with ecosystem management.
- The actual definition and development of practices for ecosystem management and how the public will be involved in the process.
- The paradigm shift of the way human beings perceive their place in the ecosystem.
- Understanding of the environment is limited to the technology and science available and this understanding is always incomplete.

to challenge the proposed paradigm shift on the basis that it remove rights property owners now hold. “Ecosystem management entails setting limits on land use in order to maintain ecological sustainability. In the U.S. no one likes to talk about limits; it is almost unethical, if not un-American (Wood 1994, 7).” These issues must be resolved during the process of implementing ecosystem management. (See Table 2.5 for a summary of the challenges facing ecosystem management)

Ecosystem management will require a shift in the way that property owners view their land and in the way that land is managed by both public and private agencies. Private lands must become key components of management areas, and their inclusion in the process will be necessary for success (Staebler 1994). Public agencies will have to restructure the processes by which they do land planning and development. When managing an area with private land, land use planning, land acquisition, land exchange, private landowner assistance, and mitigation banks may be the most effective management strategy (Loomis 1993, Goldstein 1992). Many of these processes are established and will only need to be oriented to the new goal of ecosystem management. Others, such as mitigation banks, are new practices still being tested in the field. While the goals of the area need to be reevaluated, the process by which people are included and how decision-making is done will also need to be restructured. Public agencies will have to include environmentalists, ecologists, and resource managers of various kinds (Slocombe 1993a) into the planning process. The change will still include the traditional

economists and mainstream urban and regional planners, but will become more interdisciplinary thus accomplishing a more holistic perspective of the areas.

Because of the lack of an agreed upon definition, ecosystem management faces the challenge of simple acceptance as the management strategy of choice. Despite its long historical background, ecosystem management has never, until recently, been implemented. Slocombe (1993b, 612) sites this difficulty as a result of “political difficulties of changing arbitrary existing management units, such as regions and municipalities, and the conceptual and practical difficulties of bridging traditional disciplinary and professional boundaries.” For many people, change is difficult. Changing to a new way of thinking about the environment that contradicts the traditional management process in many ways is one of the major challenges to be overcome. The new thinking will be a shift from a belief in humans as rulers to humans as parts of the ecosystem.

For the public, ecosystem management is a very confusing subject. The government, which is promoting the process, has not fully established management practices that make the process successful. Ecosystem management is untried. And, in general, the public is skeptical of untested, undefined, new processes. Education of the public will need to be undertaken for them to be informed of the management to be undertaken. Public involvement needs to be established early in the process so their input is available for establishment of goals and acceptable management strategies. As more information on ecosystem management becomes available from the monitoring process, a validation process on the importance of ecosystem management should be undertaken. This will assist not only the public but the land managers as well.

Finally, there will always be the problem of lack of data. Data collection, while one of the primary components of ecosystem management, will be incomplete at any given time. New information needs to be integrated into the management process at any time. Unfortunately, it may result in a major change in the base of information on which a decision was based. Economically, major new costs may develop or a project revised

to take the new information into account.

Conclusion

Gordon (1993, 244) asked “When can we afford to apply [ecosystem management] and then by what criteria will we judge its effectiveness?” Using the literature on the ecosystem management paradigm, five basic criteria themes have been defined: first, that management must take an ecologically oriented approach; second, time and spatial scales must be adjusted to accommodate the ecosystem now and in the future; third, human beings as components of the ecosystem bring social and economic values into the decision-making process and these values need to be ecologically oriented so damage to the ecosystem integrity is minimized; fourth, management actions are only now being developed and therefore should follow an adaptive management strategy using monitoring results to guide management decisions; and fifth, that data collection is going to be key in the ecosystem management process because our understanding of the environment and ecosystem function is limited by science and technology that are available at any given time. All of these criteria can be used to determine if management is accomplishing the goal of ecosystem management, to maintain ecosystem integrity. While implementation is at hand, challenges to ecosystem management are growing. To accomplish the paradigm shift to ecosystem management, these challenges must be overcome.

Chapter 3



Habitat Conservation Planning

Unlike ecosystem management which is a developing concept, habitat conservation planning is a practice that has been implemented since 1982. Habitat conservation planning is the development and implementation of a habitat conservation plan (HCP) for the purpose of accomplishing the conservation of endangered species' habitat while still allowing for land development in the habitat area. Further, the FWS believes that the process "is an opportunity to provide species protection and habitat conservation within the context of non-Federal development and land use" (FWS 1994, 24). Habitat conservation plans have and are being written across the country for the purpose of acquiring an 'incidental take permit' under Section 10 (a) of the Endangered Species Act of 1973 (ESA). Interior Secretary Bruce Babbitt compared the HCP efforts to that of the implementation of ecosystem management in April, 1993. But similar to ecosystem management, until recently, habitat conservation planning lacked a defined preparation and implementation process. Each HCP that has been written is very different, and the process has evolved over time as methods are tried and developed. This chapter will provide an overview of how habitat conservation planning came into being through a brief discussion of its history and legislation, the planning process, and future trends.

Habitat Conservation Planning's Beginnings

In the late 1970's, the ESA was argued to be a very restrictive law that precluded chances of economic development in areas where endangered species were present.

Because of this, in 1982, when the ESA was scheduled for reauthorization, a developer and the FWS joined together to propose the Section 10 (a) legislation along with an example of the type of product the legislation would produce in the form of the San Bruno Mountain Habitat Conservation Plan. With the San Bruno Mountain HCP, the U.S. Congress was convinced to add the Section 10 (a) legislation onto the ESA. The legislation allowed the FWS to issue an incidental take permit for the development on land occupied by an endangered species if the applicant “submits an acceptable conservation plan...which specifies (McKenzie-Smith 1994, 130):

1. The impacts on the endangered species likely to result from the taking
2. The measures an applicant proposes to undertake to minimize and mitigate the impacts of the taking, including identification of the funding available to implement such measures
3. Alternatives to the taking considered by an applicant, together with justification for the rejection of the alternatives, and
4. Other measures ‘necessary for purposes of the plan (16 USCA § 1539(a)(2)(A))’.”

Within the HCP, the applicant also has to show that the following are true for the development alternative proposed for the land area:

1. That the taking will be incidental
2. To the maximum extent practicable, that the applicant will minimize and mitigate the effects of the taking
3. That the applicant will insure that adequate funding for the implementation of the HCP will be provided
4. That the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild
5. That the applicant will accomplish other measures, if any, necessary or appropriate for purposes of the plan (16 USCA § 1539 (a)(2)(B)).

After the ESA was amended in 1982, the FWS issued its first permit for the San Bruno Mountain HCP in early 1983. The HCP was to serve as a model for future habitat conservation planning practices and guide future development of HCPs. As an example, however, the San Bruno Mountain HCP only provided a brief overview of what could be

accomplished through the HCP process. While the main characteristic of the HCP is that there is some conflict between development and at least one endangered species, the 'model' provided by San Bruno Mountain HCP to identify characteristics of HCPs was specific to its situation and not necessarily applicable to other HCPs. The participants in the HCP process were primarily proponents of the amendment (Bean et al. 1991), which makes it significantly different from subsequent HCPs where participants were not trying to pass new legislation. Secondly, the San Bruno Mountain HCP had only one major landowner that affected the species in question, with only one land use proposition. Many HCPs that developed after 1983 had multiple stakeholder groups with diverse land use interests involved in the project area. Finally, the San Bruno Mountain HCP was primarily concerned with butterflies and not all species within the HCP area. Again, many HCPs have not followed this standard, though some have kept with a single-species approach. Instead of following the 'model' San Bruno Mountain HCP, each HCP effort has individually developed a plan following processes felt to be most appropriate for their circumstances.

Proponents of the HCP process as it has developed over the past 12 years have identified it as a positive process that alleviates tension between economic development and environmental protection. The FWS and others, after examining the HCP efforts as they have developed over time, outlined trends that HCPs created as they were developed (See Table 3.1). HCP efforts evolved into a different process than the one provided by the San Bruno Mountain HCP. Trends include taking a regional approach to the planning process to include all habitat area of the species to be protected by the HCP. In conjunction with taking a region-wide approach, the opportunity for multi-species protection and study becomes more feasible and is advocated as the approach of choice (Bean et al. 1991, Beatley 1993, National Homebuilders Association 1993, and FWS 1994). A multi-species approach not only takes into account federally listed endangered species but also other sensitive species that may be on the federal candidate list for potential listing as endangered or threatened, state listed species, or species of local

Table 3.1: Characteristics Encouraged for Future HCP Efforts

- Involve all stakeholders (or representatives of all stakeholder groups) throughout the HCP process (Beatley 1994, FWS 1994, Bean et al. 1991)
- HCPs should be based on biological information that is as complete as possible (Beatley 1994, FWS 1994, Bean et al. 1991) and should include rangewide natural resource inventories and plan appropriately (National Homebuilders Association 1993).
- The HCP area should be regional, using the habitat range of the species as the delineating factor (Beatley 1994, FWS 1994, Bean et al. 1991, National Homebuilders Association 1993) with a regional body to administer implementation and incorporate the HCP efforts within community goals and long-range planning efforts of local and regional governments (Beatley 1994).
- The HCP should include protection for multiple species present in the area focusing on preserving ecosystems that support all the species of an area (Beatley 1994, FWS 1994, Bean et al. 1991, National Homebuilders Association 1993)
- Funding of the HCP should be equitable (Beatley 1994) and provide incentives for development interests in the area to encourage their participation in the process (FWS 1994, National Homebuilders Association 1993).
- Specific criteria should be developed for measuring the success of the HCP and each of the mitigation measures implemented (FWS 1994, Bean et al. 1991).

concern. Third, as HCPs cover wider regions, local and regional governments are becoming involved as well as the federal government. Funding sources for regional HCP development and implementation become more widespread as government agencies become involved. The agencies contribute funding as well as making it more likely that environmental groups will view the HCP as an opportunity to protect larger areas of habitat and also contribute funding. Financial considerations are critical in the HCP process due to the expense of developing an HCP and implementing the mitigation required by the plan. It is one of the most controversial aspects of the HCP process and is used by advocates of HCPs as well as their critics. Regional HCPs also allow for more opportunities for creative mitigation simply because there is more land area to work with as well as more diverse funding (FWS 1994). Community goals could also be “dovetailed” with habitat conservation goals, particularly long-range planning goals for both local governments and regional governments (Beatley 1994). Finally, a characteristic present in the ‘model’ HCP was that decisions on appropriate levels of development and mitigation measures be based on biological information. All HCPs

incorporate biological study into their plan development. These studies "... should incorporate as complete and as thorough a biological and scientific information base as possible" (Beatley 1994) and possibly incorporate rangewide natural resources inventories and planning (National Homebuilders Association 1993). The information is important not only for the success of protecting the species specified in the plan but also for minimizing the chances of future conflicts with species not protected by the HCP. Use of rangewide studies would identify potential conflicts, and these issues could be addressed by the HCP.

The HCP process, when undertaken, involves the applicant in additional federal regulation. Because the incidental take permit is a federal permit, the applicant is required to comply with Section 7 of the ESA and NEPA requirements as well. The HCP process should coordinate the completion of these requirements within its own implementation and plan development.

Developing a Habitat Conservation Plan

Until the publication of the FWS' Preliminary Draft Handbook for Habitat Conservation Planning and Incidental Take Permit Processing in September, 1994, landowners desiring the permit did not have guidelines explaining what the process entailed. Confusion and distrust of the FWS generated by their approach has led to frustration among landowners. The 1994 guidelines provide a framework that shows what the HCP process entails, provides its legislative background, describes what the FWS is expecting in the plan, and identifies processes that could be followed to develop an acceptable HCP (FWS 1994). These guidelines should make the process of developing the HCP less of a challenge for applicants (See Table 3.2 for an outline of the process).

The FWS divides the HCP process into three phases: the pre-application coordination phase, permit application processing phase, and the post-issuance phase (FWS 1994, 3-4). The primary purpose of the guidelines is to offer a process that could be followed and, most importantly, how the process should be integrated with the FWS

Table 3.2: The Habitat Conservation Planning Process as Outlined by the FWS**I. Pre-planning Process**

- A. Determine the applicant
- B. Gather steering committee members - representative of all stakeholders involved
- C. Designate a neutral facilitator
- D. Consult with the FWS

II. Plan Development

- A. Define the land area to be included in the HCP
- B. Gather biological data
 - 1. Determine the species to be included in the HCP
 - 2. Gather and review existing data
 - 3. Develop new data through new biological studies as needed
- C. Identify activities to be included in the HCP land area
- D. Determine the anticipated take levels resulting from proposed activities
- E. Develop mitigation measures (the following in descending priority as given by FWS)
 - 1. Avoid the impact
 - 2. Minimize the impact
 - 3. Rectify the impact
 - 4. Reducing or eliminating the impact over time
 - 5. Compensating for impact
- F. Develop monitoring measures for determining success and/or problems with the HCP
- G. Plan for unforeseen circumstances and plan amendments
- H. Develop a funding scheme to pay for HCP and any mitigation measures
- I. Describe alternatives considered and reasons why alternative not chosen

III. Submit Plan for Permitting to FWS**IV. If Permitted Implement**

- A. Implement mitigation measures
- B. Monitor
- C. Amend plan as necessary

Source: After FWS, Preliminary Draft Handbook for Habitat Conservation Planning and Incidental Take Permit Processing, September 15, 1994. U.S. Department of the Interior, FWS.

permitting and planning efforts. The development of the HCP will occur in the initial stage of the process, or the pre-application stage. Implementation of the plan occurs in the final stage or post-issuance stage.

The HCP is also subject to public comment and before it is permitted, the applicant must publish their intents in the Federal Register. In the FWS guidelines, the first step in the pre-application stage is the selection of who the applicant will be. Once a developer or landowner discovers an endangered species residing on their land and they want to develop the land in some way, they must decide whether they will be the applicant or whether the role will be passed to a local or county government or agency.

The distinction is important. First, it will probably determine the scale of the HCP to be developed and what land area will be encompassed by the HCP. If the landowner/developer takes the role of applicant, the HCP will probably only apply to the single piece of property. Conversely, if the local or county government or agency takes the role of applicant, the HCP area will probably expand over the entire range or habitat of the species. All landowners in an area encompassed in this fashion will be subject to the HCP.

Secondly, the applicant decision is important in terms of the species to be protected. A landowner/developer applicant tends to focus primarily on only the endangered species and its habitat on their land. If this occurs, support species or other significant species also present in the habitat may be ignored. Also, contiguous habitat that extends beyond the property boundaries is left out of the plan (unless they are brought into play in the mitigation measures). Many HCP advocates are promoting a more multi-species approach focusing over the entire habitat range of the endangered species primarily to avoid cumulative damage to habitat and the species (Bean et al. 1991, FWS 1994, Beatley 1994). This type of approach is better suited to a regional applicant who can develop a plan for multiple landowners that have habitat present on their land.

Many of the current and ongoing HCP processes have taken the regional approach to applying for the permit. While expectedly more complicated due to the higher number of participants and people involved, many local and county governments feel it is the best approach to avoid ongoing and future species–development conflicts (Beatley 1994). In growing urban areas, the problem of species–development conflicts is acute due to the high amount of habitat destruction. It is not surprising that the majority of HCPs are most common in urban areas. By taking a regional approach, habitat protection is able to consider all of the habitat area and hopefully provide better species protection.

Once the decision has been made as to who the applicant will be, the second step is to determine a steering committee. The steering committee approach has proven to be

very successful in guiding the HCP process. Its purpose is to serve as the decision maker for the process and content of the HCP and guide the activities and timing of actions in completing the HCP. Timothy Beatley (1994) identified the common stakeholder groups usually involved in the HCP process as:

- Developers
- Landowners/property owners
- Environmentalists
- Local government
- Federal and State resource agencies, and
- Recreational land uses

Often, each of these groups has many individuals and interests that vary. Values held by one groups can be completely opposite in another group creating conflict within the steering committee. The HCP process for development of an acceptable plan will be a negotiation process between all the stakeholders with all making compromises (Beatley 1994). Either from the groups or preferably from a neutral outside group, a facilitator should be chosen to guide the committee throughout the process and act as a negotiator for the resulting conflict situations. Neutral facilitators provide guidance to the stakeholders whose conflicting perspectives on many of the major issues in the HCP process could cause a failure in the process.

If the applicant is a regional agency, and the HCP encompasses a large area including many landowners, representatives for the landowners should be chosen to serve on the steering committee. It is important that the entire community of landowners choose their own representatives to ensure that the landowners feel their concerns are addressed in the HCP process (FWS 1994). Future conflict is reduced when all landowners are present or represented. The North Key Largo HCP failed primarily because of lack of representation of all interests in their process (Beatley 1994). The steering committee was appointed by the governor of Florida and many residents of Key Largo felt they were not being fairly represented in the HCP process. Factions formed

that could not reach a consensus and the HCP was never produced in a form that was permitted by the FWS (see Beatley 1994 for more information).

After the HCP steering committee is formed, the process for developing the HCP can begin. It involves identifying impacts that will result from the project and developing mitigation and monitoring programs. Coordination with Section 7 of the ESA and NEPA requirement is necessary throughout the process. Determining the area and scale of the HCP are the first steps. The determination specifies the land area the HCP will encompass as its planning area. This part of the process must be exact so that the permitting authority is explicit, and landowners in the HCP are covered by the permit. The FWS established guidelines for undertaking this part of the process. Area delineation “should be considered within the context of the species’ geographic range” (FWS 1994, 24). It should also be as comprehensive and contiguous is possible.

Once the area of the HCP is delineated, the biological data can be gathered. If current data on the area are not available, the FWS “should recommend the type, scope, and design of biological studies that can reasonably be developed” (FWS 1994, 25). This part of the process includes determining and listing the species that will be included in the HCP. While the FWS recommends that the HCP include not only federally listed species, but also candidate and state listed species, the applicant is not required to oblige. Inclusion of plant species is also encouraged and sometimes required under Section 7 of the ESA.

Next, the process should identify the types of development and activities that will occur in the HCP area. This information is used for permitting the type of development and activities that will be allowed in the HCP area as well as for providing the information for determining the anticipated take levels. Take of species is required to be minimal. “Harm” and “harassment” of the species is required to be included in the take analysis (FWS 1994).

The development of mitigation measures is one of the main components of the plan. The FWS (1994, 30) outline, in order of preference, mitigation measures that occur in HCPs:

- Avoiding the impact
- Minimizing the impact
- Rectifying the impact
- Reducing or eliminating the impact over time
- Compensating for the impact

Different HCP processes have chosen different approaches. A mixture of approaches may be used for different or even the same impacts. Also, the FWS points out that the HCP is not required in any way to benefit the species. It simply exists as a tool for minimizing impact to a species while allowing development. The only restriction is that the development that results cannot "... jeopardize the continued existence of the species involved" (FWS 1994, 30).

The final steps in the process include the development of monitoring measures that include criteria for judging success of the HCP in protecting a species, a discussion of how the HCP will adopt to "unforeseen circumstances" and deal with plan amendments, development of a funding process that will pay for the mitigation and HCP implementation, and describe the alternatives analyzed and reasons why they were not chosen (FWS 1994). Each of these sections needs to be as specific as possible. For example, in the monitoring measures, the FWS recommends that objectives be clearly defined, variables to be used as criteria be explicit, a time schedule and frequency of sampling be delineated, and an explanation of how the data collected will be analyzed and who will perform the analysis (1994, 33-34). Exclusion of any of these sections or inadequacy in any section will result in the FWS not issuing a permit.

Conclusion

The HCP process has been developing for over a decade. HCP efforts that followed the model San Bruno HCP have deviated greatly from its established process,

accommodating and responding to the unique characteristics of each situation. Despite the different processes that have been used, the FWS has developed a set of guidelines that will hopefully provide a framework for new HCP efforts. While fewer than ten HCPs had been permitted by 1990, there has been a dramatic increase in the number of efforts being undertaken, with California taking the lead with over 50 individual efforts.

The HCP process as outlined by the FWS recommends incorporating the trends in habitat conservation planning within all new planning processes. Many of these trends change the process from the original process outlined by the San Bruno Mountain HCP effort. Much of the process remains 'open' and allows for creativity throughout the process, in the mitigation requirements, and the development of funding schemes. Other than the minimum requirements of what the HCP must contain and the few restrictions, the ESA leaves the process and planning open for the HCP developers and each individual situation. Mitigation methods are not designated (only classified) and thus are open to innovative ways to protect species. Funding and other management activities are also not mandated. As will be shown in the case studies, many different approaches have been adopted by HCP developers. While it has been found that regional approaches open to the public are the most accommodating approaches for avoiding future conflict and in conflict negotiation, they are not the requirement.

Chapter 4



Case Studies of Five HCP Efforts

The five case studies presented on the following pages include the three HCPs that Interior Secretary Bruce Babbitt used as examples of representing ecosystem management: the Balcones Canyonlands Conservation Plan, the Clark County Desert Tortoise HCP, and the Metro-Bakersfield HCP. A fourth plan, the Riverside County Stephen's Kangaroo Rat HCP is also included as the first case study because of its high level of interagency cooperation and comprehensive. The final habitat conservation effort to be described is the San Diego County Natural Communities Conservation Program (NCCP) being developed under the California's NCCP legislation that will include application for incidental take under the ESA. Each of the efforts has been underway for several years, though only the Metropolitan Bakersfield HCP has received its permit from the FWS. All but the San Diego effort are near to receiving their permits from the FWS and thus have completed draft documents submitted to the FWS.

Stephen's Kangaroo Rat HCP – Riverside County, California

Riverside County, California contains some of the last inexpensive land in the Los Angeles metropolitan area. During the 1980's the county and cities in the area experienced explosive growth, with a 100% increase in population from 1980 to 1993 in the county and some cities having more than 200% population increases for the same time period (California Department of Finance and Demographic Research in SKR HCP,

1994). Land use decisions in these communities are made by the local governments. When the Stephen's Kangaroo Rat (*Dipodomys stephensi* or SKR) was federally listed as endangered in 1988, the county and seven cities joined together to develop an HCP for the SKR that would allow them to retain their land use decision power (Bean et al. 1991). In the few months before the federal listing by the FWS, the seven cities of Corona, Hemet, Lake Elsinore, Moreno Valley, Perris, Riverside, and Temecula joined with Riverside County to form the Riverside County Habitat Conservation Agency (RCHCA) to develop the HCP, administer funding, and act as 'record keeper' providing a central location for the public to access information concerning the HCP.

The significant feature of the SKR HCP process was the development and use of an interim HCP. The use of such a mechanism had never been done before. By using the interim HCP, the cities and the county were able to permit development in select areas while the biological and land use studies to be used in the development of the final HCP were completed. These studies had presented time problems in past HCP efforts, and the RCHCA members wanted to avoid these conflicts. Further, the interim HCP also allowed the RCHCA to impose a \$1950 per acre development fee on land within the range of the SKR within Riverside County. These funds were used to pay for the studies that had to be completed for the development of the HCP. Finally, ten study areas were set aside comprising 80% of the remaining HCP habitat. Development in the areas was not permitted, and they served as locations for the biological studies. The interim HCP was initially permitted by the FWS for a two year period which was later extended to over four years to accommodate the lengthy studies of the SKR and its habitat being undertaken and for writing of the final HCP. At the end of those four years (as of June 30, 1994) the status of the interim plan was positive (see Table 4.1). Over 50% of the buildable land remained and many acres of the habitat had been acquired for reserves or were in the process of being purchased. Also, RCHCA members had incorporated goals of SKR preservation into their general plans that guide land use decisions.

Table 4.1: Status of SKR habitat conservation efforts as of June, 1994

- 1,935 acres (44%) of the 4,400 acres developable land had been incidentally taken under the rules of the interim HCP
- RCHCA had acquired over 5,000 acres of which 3,172 acres was approved SKR replacement habitat
- Approximately 700 acres had been dedicated to the RCHCA via Section 7 consultation
- Approximately \$29.7 million in SKR mitigation fee revenue from development fees within the HCP area had been collected by RCHCA agencies, and \$7.2 million had been secured by the RCHCA from other sources
- Approximately \$14.2 million had been expended by the RCHCA to acquire habitat under the HCP, with an additional \$2.5 million spent by other parties
- Two 9,000 acre multi-species preserves have been established, one with 1,200 acres of SKR habitat and another with 3,341 acres

Source: Riverside County Habitat Conservation Agency, Draft Habitat Conservation Plan for the Stephen's' Kangaroo Rat. July 1994. p. 20-21.

Throughout 1993, the final draft of the SKR HCP was developed and underwent review by public and numerous RCHCA board and advisory committee meetings. Only four of these meetings involved the public, though their concerns were represented on the board and advisory committees of the RCHCA. The final HCP will be up for approval by the FWS in December, 1995 with a 30 year permit for the incidental take of SKRs. It was prepared concurrently with many other conservation efforts:

- the Draft Lake Matthew's Multi-Species HCP,
- the Southwestern Riverside County Multi-Species HCP,
- the Multi-Species Habitat Conservation Strategy,
- the BLM South Coast Resource Management Plan, and
- the Natural Communities Conservation Planning Program of California.

Many of the reserve areas established during the interim HCP and to be established under the final SKR HCP will be established concurrently with these other planning efforts. The reserves will be public property and be preserved as open space in perpetuity as public lands. In addition to working with other habitat conservation efforts, biological analysis revealed another 122 species of concern present in the SKR habitat and encompassed by the plan. These species are listed federally, by the state, or are of local

concern and their preservation efforts will benefit from the establishment of SKR reserves.

Results of the biological studies were combined with “current biological conservation theory and practice” (Riverside County Habitat Conservation Agency 1994) of Thomas, et. al. (1991), Noss (1991), and Brussard, et. al. (1993) to develop and guide reserve design. Permanent reserves, established under these guidelines, were also subject to land use planning policies, cost–benefit considerations, and boundary modification requests that both added habitat area in some cases but, overall, decreased reserve land by almost 1800 acres (Riverside County Habitat Conservation Agency 1994). The final preserve selection criteria for suitability included the following:

- SKR population density,
- Landscape unit acreage,
- Connectivity between habitat patches,
- Buffer characteristics,
- Vegetation,
- Soil characteristics,
- Slope,
- The contribution to reserve assembly,
- Effect on edge ratio,
- The projected contribution to SKR population persistence, and
- The contribution to ecological diversity on reserve system (Riverside County Habitat Conservation Agency 1994, 96)

(Table 4.2 outlines the consideration that went into the preserve selection criteria.) In addition, five of the original study areas established under the interim HCP were removed from core reserve status for various reasons including the SKR not being present in the area (one study area), other biological concerns, land use patterns, and economic factors (Riverside County Habitat Conservation Agency 1994). Economic factors were one of the major issues in three of the study areas with land purchase costs exceeding \$20 million, and possibly reaching \$100 million on one site alone.

The five remaining core reserves contain a total of 11,225 acres of SKR habitat and encompass a total of 38,185 acres. Only about 5,000 acres of these reserves remain in private ownership and half of this will be acquired by the RCHCA using a 1:1

Table 4.2: Considerations guiding SKR habitat reserve design

- Biological Considerations (General) (Riverside County Habitat Conservation Agency 1994, 92)
 - Reserves that are well distributed across a species' native range will be more successful in preventing extinction
 - Large blocks of habitat, containing large populations of the target species, are superior to small blocks
 - Blocks of habitat located in close proximity to each other are superior to blocks far apart
 - Habitat occurring in contiguous blocks is preferable to habitat which is fragmented
 - Habitat patches that minimize edge-to-area ratios are superior to those that do not
 - Interconnected blocks of habitat are superior to isolated blocks, and corridors or linkages function better when the habitat within them includes protected, preferred habitat for the target species
 - Blocks of habitat without roads or other means of human access are superior to those traversed by roads or otherwise accessible
- Biological Considerations (Specific to SKR) (Riverside County Habitat Conservation Agency 1994, 96)
 - Inclusion of the best remaining examples of SKR habitat
 - Protection of the ecosystem on which SKR and other species depend
 - Inclusion of heterogeneous terrain and vegetation
 - Inclusion of some geographically isolated populations to reduce the potential for catastrophic losses of SKR due to localized diseases, natural disasters, or other effects
- Land Use Planning Policies (Riverside County Habitat Conservation Agency 1994, 96-97)
 - Conservation of SKR occupied habitat is properly considered an "open space" land use which, pursuant to General Plan requirements, must be planned in the context of all other uses of land
 - To the degree that conservation of SKR occupied habitat provides a public service to the region as a whole and to individual jurisdictions, it is comparable to other public works important to the environmental and economic quality of life in the HCP area
 - Agriculture is an essential component of the regional open space system, contributes to the economic and environmental quality of life in the region, and is capable of creating and maintaining conditions which sustain SKR. Where compatible with SKR habitat conservation goals, the continuation of agricultural land uses in the plan area should be encouraged by this HCP
 - Changes to land use categories, zoning, or existing land uses in areas within or adjacent to SKR reserves can have regional consequences. Within the context of the CEQA (California Environmental Quality Act) process these changes should be planned to avoid, minimize, and mitigate adverse impacts to SKR to the greatest extent practicable
- Cost/Benefit Considerations (Riverside County Habitat Conservation Agency 1994, 97)
 - The amount and quality of SKR occupied habitat on public lands
 - The amount and quality of SKR occupied habitat on private lands required for inclusion in the reserves
 - The projected acquisition cost for private lands based upon land prices actually paid by the RCHCA during the implementation of the Short-Term HCP, and analysis of real estate market conditions

Source: Riverside County Habitat Conservation Agency, *Habitat Conservation Plan for the Stephen's' Kangaroo Rat*. July 1994. pp. 92-97.

replacement mitigation requirement for the issuance of an incidental take permit for the development of SKR habitat. Approximately 7,000 acres of habitat will also be preserved in other locations within the HCP area, raising the total habitat area conserved to 18,425 acres. Thus, of the original 31,550 acres of existing habitat, 13,125 acres or

about 42% of habitat will be subject to incidental take (Riverside County Habitat Conservation Agency 1994).

Also, the mitigation fee of \$1,950 per acre will be maintained until the 2,500 acres are acquired and conservation of the reserves is ensured. Once that is accomplished, the mitigation fee will be modified but remain at a lower cost so that revenues for management and monitoring are maintained. Management of the reserve includes biological monitoring, habitat enhancement and restoration, access controls, fire management, grazing, and recreation. The biological monitoring “carried out in each reserve [will] evaluate the status and trends of resident SKR populations” for determining the success of the HCP (Riverside County Habitat Conservation Agency 1994, 162). A management committee has been established to include:

- the California Department of Fish and Game,
- the State of California Department of Parks and Recreation,
- the Metropolitan Water District,
- The Nature Conservancy,
- the City of Riverside Park and Recreation Department,
- the University of California at Riverside, and
- the BLM (Riverside County Habitat Conservation Agency 1994).

Each of the members will act as managers for specific core reserve areas. Reports to the FWS will be required throughout the implementation of the plan to define the levels of incidental take, the status of the SKR, and the management activities occurring in the reserve areas.

Summary

The SKRHCP exhibits many of the positive aspects of the HCP process. The ability of the process to accommodate new types of management practices is shown through the approval of the Interim HCP which was a new idea for dealing with the time issues the HCP process raises. Secondly, the use of a development fee demonstrates the benefits of a regional government agency as lead. This option is not available to private

individuals trying to fund HCPs. Also, great efforts were made to coordinate planning for the SKR with other conservation and land use planning actions in cities and the county, and with utilities and federal agencies.

But, the SKR HCP also has some shortcomings. The single species focus of the HCP limits the number of species actively protected. Also, the permission to develop on habitat of an endangered species is always controversial. Over 40% of the remaining habitat is available for development. Is the remaining 60% for the SKR really enough to preserve the species? This will not be known until it is probably too late because the 40% will be developed. Finally, the plan does not address natural communities that support the habitat of the SKR. While the SKR may live on an area of land, its survival may be dependent on water movement, air flow, or plant communities not on the site but which affect the habitat.

The Metropolitan-Bakersfield HCP - Kern County, California

The Great Central Valley of California comprises a large quantity of prime agriculture land. In the southern-most part of the Central Valley is the smaller San Joaquin Valley which has oil and urban uses in addition to agriculture. While the Central Valley has provided food products to most of the country, agriculture and the other land uses have extirpated the wildlife that existed in the area. Many of these species were endemic to the unique environment that created the prime agricultural opportunities. In the San Joaquin Valley, Bakersfield, a city located in Kern County, California, is home to numerous species that have become endangered due to the intense human use of the land throughout the Central Valley. The level of endangerment of these species is often high due to Bakersfield, Kern County and a few surrounding areas that provide the only remaining habitat for the species.

Bakersfield city officials decided that the development of an HCP would reduce the increasing number of endangered species-development conflicts by providing a plan that would define where development would occur and providing habitat preserves for

Table 4.3: Species of Concern in the MBHCP

- **Federal and State Endangered or Threatened**

Bakersfield cactus (all 5 remaining populations threatened by development)
 California jewelflower (of 47 historical location, 1 introduced pop. in Kern Co. and 8 pops. exist elsewhere)
 Bakersfield saltbush (only 1 population is known and is in decline, not in study area)
 Blunt-nosed leopard lizard (95% of historic range now lost)
 Tipton kangaroo rat (estimated 1% of historic population now remains, and 3.7% of historic habitat remains)
 Giant kangaroo rat (97-98% of historic habitat lost)
 San Joaquin kit fox (Historically 8,667 mi², presently confined to foothills and interior coast range valleys)

- **Federal Candidate and State Listed (any category)**

Slough thistle (insufficient information for status)
 Recurved larkspur (insufficient information for status but directly threatened by a proposed reservoir)
 Tulare pseudobohia
 Striped adobe lily
 Short-nosed kangaroo rat (no evidence of species in study area)
 San Joaquin antelope squirrel (insufficient information for status)
 Buenavista lake shrew

- **Federal Candidate Listing Only**

San Joaquin wooly-threads (63% of historical populations lost)
 Hoover's wooly-star (100 of 118 populations threatened by development)
 Kern mallow
 San Joaquin pocket mouse (insufficient information for status)

Source: MBHCP Steering Committee, Metropolitan-Bakersfield Habitat Conservation Plan, April 1994, pp. 20-43.

species of concern primarily within Kern County. Fortunately for the HCP developers, the most publicized federally listed species, the San Joaquin kit fox, has a high “cuddleability quotient (Beatley 1994, 167)” that resulted in a positive public interest and subsequent support for the HCP and its purpose. Additionally, the development community supported the HCP because it was “...an efficient and cost-effective approach to dealing with endangered species...[and was] preferable to negotiating individual mitigation plans” (Beatley 1994, 168). But unlike the SKR HCP which took a single species approach and happened to benefit additional species, the MBHCP sets out with the goal of preserving habitat for 18 species of concern. (See Table 4.3 for species and level of endangerment) The plan covers both state and federal candidate, threatened, and endangered species (plant and animal).

The development of an HCP for Bakersfield was completed jointly with Kern County for the purpose of “...resolving conflicts between species of concern and development within the boundary of the Metropolitan Bakersfield 2010 General Plan

area” (MBHCP 1994, 1). The HCP effort began in July of 1987 and ended with the approval of the HCP by the FWS in April of 1994. The plan area extends beyond the city limits and includes land under county jurisdiction that “bears relation to planning” in the city. The focus of the plan is on urbanization of land within the MBHCP area which has destroyed significant portions of natural habitat (MBHCP 1994, 46). Oil and agricultural interests, which are also major contributors to the loss of habitat, are exempt from the plan since they do not have to acquire a city or county permit. Because these interests are not included in the HCP, their actions may place them in violation of the ESA, and each must address these situations independently with the FWS.

Mitigation for destruction of habitat resulting from urbanization relies on “...a method of collecting funds for the acquisition and/or enhancement of natural lands and restorable lands for the purposes of creating preserves” (MBHCP 1994, 44) with some relocation of the San Joaquin kit fox and plants covered by the HCP. Preserve areas are to be established primarily outside of the plan area with money from a \$1,250 per acre development fee (fee to change to accommodate inflation) though two preserves will be established within the HCP area. It was felt that much of the habitat remaining within Bakersfield was prime development land and thus the necessity for the incidental take permit. Land within the plan area was selling for around \$800-\$1000 per acre (some prices currently range up to \$10,000 per acre) and would require a much higher development fee than land out of the area which sold for about \$75 to \$1000 per acre. Plan developers argued that by preserving land outside of the plan area they could preserve much larger areas of habitat while allowing development close to already developed areas reducing fragmentation.

Preserve areas may include areas of remaining natural environment or land that will be restored to its natural state through the conversion of agricultural land back to natural environment. Though some of the species will have reserves established specifically for them (such as for the Bakersfield cactus), it is the plan’s hope that by establishing large preserve areas that represent the habitat inhabited by the many species

covered by the MBHCP, the majority of species will benefit. Outside of the plan area, several suitable preserve areas are present that would add to existing preserves established for other reasons in the past (such as a preserve managed by The Nature Conservancy). Mitigation for development within the plan area that occurs on natural habitat area requires a 1:1 acre preserve acquisition if the preserve land is also natural environment. If the preserve land is restored land, then the ratio rises such that for every one acre of development, three acres need to be restored. Development occurring on non-natural land, such as land that was previously agriculture, only requires the 1:1 acre preservation.

Selection of a preserve area will be undertaken by the Implementation Trust established by the Steering Committee and comprising representatives of the following agencies/groups:

- FWS
- City of Bakersfield
- Kern County
- California Department of Fish and Game
- The Nature Conservancy

This committee will have to follow the guidelines established by the Steering Committee for acceptable preserve areas. Criteria for preserves area as follows:

1. “The preserve should represent the ecological communities and habitats of the species of concern for the MBHCP.
2. The preserves should be close to Bakersfield if possible so that populations on outside preserves could naturally or artificially exchange with populations in the MBHCP area.
3. Participation of the MBHCP in the preserve must clearly make a contribution to the area or management of the preserve such that there is a significant incremental benefit to the species of concern in the Bakersfield region.
4. The preserve should be in Kern County if possible to confer local open space benefit to fees collected from Kern County. (MBHCP 1994, 68-69)”

Further, the Implementation Trust, for each preserve effort they undertake, must also consider an established set of preserve selection and design guidelines that reflect the land conditions, property ownership patterns, land costs, and species requirements. Only goals for preserve acquisition were defined within the MBHCP. Specific parcels and land prices within the HCP area were not outlined to prevent land speculation by landowners that could artificially raise the purchase price of the land (MBHCP 1994, 79).

Once preserves are established, management and/or restoration programs will begin on the sites. Stewardship of the preserve will be handled by a management entity to be designated prior to preserve acquisition. A management plan for the preserve will then be prepared and submitted to the Implementation Trust, the FWS, and the California Department of Fish and Game. "Management plans shall address the following:

1. Which species of concern are currently supported by the preserve land and which species could the land potentially support,
2. Which other plants, animals, or ecological communities are currently or could potentially be supported,
3. Appropriateness of visitor use,
4. Activities to be permitted and activities to be strictly controlled or prohibited on the land including the restriction of the use of the land, assuring its permanent use for protection and conservation of the species of concern,
5. Requirements for fencing and signing land boundaries,
6. Requirements for patrolling of land, and
7. The value and suitability of each management area to serve as a recipient of relocated San Joaquin kit fox or plan species of concern and the estimated cost of such relocation (MBHCP 1994, 86-87)."

Management of the preserve will require fencing and signing preserve boundaries, patrolling to control prohibited activities, maintaining policies and goals of visitor use on the preserve, and resource management. Activities that will be undertaken for resource management include controlled burn programs, grazing programs, exotic species control, erosion control, natural drainage restoration, native community enhancement, sensitive species enhancement, coyote control, control of pesticides, herbicides and rodenticides on preserve and adjacent lands, and coordination of any research conducted within the

preserves by outside groups. Since many of the preserves to be established will also restore or enhance habitat, these areas must be managed accordingly and will comprise the majority of the resource management activities.

Throughout the management of preserve areas, monitoring will study the habitat quality, species of concern, and the effectiveness of the restoration and enhancement programs. Each of the preserve managers will submit information that will be compiled into a comprehensive annual report that goes to the FWS. The annual report must contain the information on the amount of land urbanized, the amount of land placed in preserves, an estimate of taking for each of the state and federally listed species, management activities, enhancement activities, qualitative analysis on the population status of each of the species, and a description of any scientific research authorized or conducted by the City or county and preserve land and any proposed for the next year.

Summary

The MBHCP demonstrates a common approach to the HCP development: the plan area encompasses an area delimited by a jurisdictional boundary. It is more ambitious than the SKR HCP in the 18 species that it covers. While this is primarily to protect landowners from future limitations due to endangered species, it does allow for more comprehensive planning.

A new approach used by this HCP is the preservation of land not within the HCP designated area. Almost all preserves are to be established outside of the HCP boundaries. The MBHCP seeks an incidental take permit that will permit development throughout the plan area and place the preserves away from development pressure. While areas outside the HCP may be existing habitat, a significant amount is proposed to be reclaimed at a replacement ratio of three acres of preserve reclamation to one acre of natural habitat development. This may actually result in a net gain of habitat.

Finally, this HCP demonstrates the difficulties that can be experienced with different opinions of land use rights. Oil and agricultural interests did not participate in

the planning process despite the fact that they are two of the major causes of habitat destruction. While they must comply with the ESA, their omission from the process may limit cooperative preservation efforts.

The Desert Conservation Plan - Clark County, Nevada

The Clark County habitat conservation efforts have focused on the desert tortoise, a federally threatened species formally listed on April 2, 1990. Preceding the threatened status, the desert tortoise had been emergency listed as endangered in April, 1989 by the FWS following a lawsuit initiated by the Environmental Defense Fund, Natural Resources Defense Council, and Defenders of Wildlife (Beatley 1994). The initial efforts at habitat conservation planning resulted in the Short-Term HCP for the Desert Tortoise in Las Vegas Valley, Clark County, Nevada. It was approved by the FWS for implementation soon after the threatened status of the desert tortoise was given. The permit for incidental take was given to Clark County for a three-year period in which the final HCP was to be developed. Problems arose early in the final HCP process concerning much of the land in the county (92%) which is federally owned. Many of the preserve sites established were to be on federal lands allowing development on non-federal lands following mitigation practices. Uncertainty in what could be required by the HCP and what would be enforceable on federal lands which fell under different legislative requirements lead to problems, particularly with the BLM. Federal law requires the BLM to prepare resource management plans (RMPs). These plans could undermine the mitigation efforts of the HCP and result in money having been spent on preservation efforts under the HCP to have been wasted.

Due to these and other issues, Clark County decided to write a different conservation plan that would not rely on the federal agency plans for mitigation effort success and that would replace the Short-Term HCP for the desert tortoise with the Desert Conservation Plan which would receive the 30 year incidental take permit. The steering committee established for the process included representative from all the

Table 4.4: Steering committee members for the DCP

Mr. Paul Selzer of RECON and staff	Nevada Division of Wildlife
Clark County (Lead Agency)	Nevada Division of Agriculture
Clark County Department of Comprehensive Planning	The Nature Conservancy
City of Las Vegas Department of Building and Safety	Tortoise Group
City of Mesquite	Desert Tortoise Council
City of North Las Vegas	Board of Realtors
City of Henderson	Blue Ribbon Coalition
City of Boulder	Vegas Valley 4 Wheelers
Moapa Town Board	Multiple Users Group
Las Vegas Water District	Nevada Miners Association
FWS	Summa Corporation
NPS	Budd-Falen Law Offices
BLM	Interested citizens

Source: Regional Environmental Consultants 1994, 118

communities in the planning area, Clark County, environmental organizations, special interest groups, several federal agencies, several state agencies, and several interested citizens (see Table 4.4 for a list of steering committee members).

The area covered by the plan includes all of Clark County and Nevada Department of Transportation (NDOT) rights-of-way and material sites below 5,000 feet in elevation, south of the 38th parallel in Clark, Nye, Lincoln, Mineral, and Esmeralda counties. The main focus of the plan was urban development in communities in the area, focusing on development in the Las Vegas Valley. Within Clark County, 92% of the land area is owned by a federal agency (BLM is the primary agency, owning 59%). Only 355,000 acres of land of which 111,000 acres contain tortoise habitat are available for development compared to over 5 million acres of federally owned land of which 3 million acres are potential tortoise habitat. The County estimates that even if the entire 111,000 acres of tortoise habitat were developed, it would result in a loss of less than 4% of the tortoise's habitat. Within the plan area, 91 other sensitive plants and animals also occur. Thirteen of these are federally listed as endangered and one is proposed for listing as endangered. The remaining species fall in various categories of federal and state listing as well as a few of local concern. Of the 91 species of concern, 26 occupy habitat

associated with the desert tortoise and will benefit by the protection of habitat for the tortoise.

But, federally owned land possesses threats to the tortoise as well that will probably not result from urbanization. Overall, threats to the desert tortoise are diverse and include loss of habitat to urban development and agriculture, potential degradation of habitat by grazing and off-highway vehicle (OHV) use, illegal collection, spread of an upper respiratory tract disease (URTD), excessive predation of juvenile tortoises by common ravens, and other contributing factors (Regional Environmental Consultants 1994). Grazing and OHV are activities that occur on federal lands as well as mining uses that threaten the tortoise populations. But, in addition to this, is the threat of URTD which is spreading among the wild populations of the desert tortoise.

To mitigate these threats on non-federal lands, the DCP establishes a set of mitigation efforts that focus on the collection of tortoises present on land being developed or for tortoises in some type of danger. Transfer and holding facilities are to be built and maintained by the County for tortoises acquired through the pick-up program. A set of guidelines is established in the DCP which outline actions for the removal of tortoises from immediate danger (such as being in the middle of a street or turned upside down) as well as for tortoises that may face a potential for danger. Unlike the process in the Short-Term HCP in which developers had to pay for the survey and removal of tortoises on their land, the pick-up service established in the DCP allows the developer to locate the tortoises and either deliver them to a holding facility or to call for pick-up of the tortoises.

Desert tortoises placed in a holding facility will hopefully be placed so that they do not have to live out their lives in the facility. Under the Short-Term HCP, tortoises placed in a holding facility could possibly be euthanized after five days. Public opposition to this type of action was immense, particularly from developers who had to pay for surveys and removal of the tortoises. The DCP only permits euthanasia of tortoises if they are damaged or have signs of URTD infection. It is hoped that the

tortoises will be able to be placed in some other location. Translocation and research programs have to be approved by the FWS with one location already approved as a research site for translocation to occur. The threat of spreading the URTD and spreading of populations away from their genetic pool has resulted in translocation not being allowed for all the tortoises. In addition to translocation, placement could be accomplished through adoption programs (allowing adoption in the public sector - pets) or placement at research or zoo facilities.

Desert wildlife maintenance areas (DWMAs) were established on federal lands containing tortoise habitat to act as preserve areas (these areas were initially established in the Short-Term HCP as tortoise management areas [TMAs]). These areas were established following the critical habitat designation by the FWS. Because critical habitat is designated such that preservation of these areas would result in the success of the species' survival, it was felt that mitigation efforts could focus on the preservation of these land areas while allowing development in the remainder of the county. Under the Short-Term HCP, many responsibilities for the management of these areas were given to the BLM, NPS, Nevada Department of Wildlife (NCOW), and the FWS. These responsibilities are to be maintained under the DCP.

Within these DWMAs, the DCP provides funding for conservation measures (law enforcement, closing of roads, provision of tortoise barriers, tortoise inventories, and multi-species inventory and protection), purchasing grazing rights if they can be placed in non-use for perpetuity, acquiring conservation easements, and purchasing of water rights if they can be placed in non-use for perpetuity. While not the specific focus of the DCP, multi-species protection is one of the programs provided funding. The plan states:

In order to reduce the likelihood of future listings of other plant and wildlife resources as threatened or endangered, the Steering Committee has decided to take a proactive approach to conservation planning...by funding programs which will inventory the biological resources of Clark County and provide protection for species which appear in danger of extinction (Regional Environmental Consultants 1994, 93).

Following this proclamation, the plan outlines provisions for mapping and inventory of species, prioritization of species of concern, permission for restrictions to be placed on lands, and programs for species preservation. These studies and programs will occur on non-federal lands as well as the DWMA's.

Problems arising from the purchase of grazing and water rights result from federal and state legislation. Concerning grazing rights, they can only be purchased if the purchaser utilizes grazing and secondly, the rights revert back to the BLM if they are not utilized within 5 years of the purchase date. The BLM must designate areas where grazing rights would be eliminated in their RMP for the area and then this must be approved by the Interior Board of Land Appeals where it could be challenged and possibly go to court. With respect to water rights, Nevada law requires that water be put to a beneficial use. If this is not done for five consecutive years, "... the water is forfeit and may be appropriated by others" (Regional Environmental Consultants 1994, 98). The problems these issues presented in the Short-Term HCP were immense and therefore the DCP does not rely on the purchase of grazing or rights as their primary form of mitigation. What the DCP does provide for concerning these issues is funding to protect grazing and water rights that are purchased if problems concerning them arise.

Additionally, mitigation efforts include a public education program. Information about the desert tortoise is provided to the public, civic groups, professional organizations, special interest groups, and children (in and out of school) (Regional Environmental Consultants 1994). Telephone hotlines, experts, speakers, media announcements, and a pending school education program are all given funding under the DCP.

Finally, revenue to provide all the funding will be generated by a \$550 per acre mitigation fee on land to be developed. All non-federal land is subject to the fee as well as land maintained by NDOT. The fee will be required at the issuance of a permit by the county or cities involved in the plan.

Once implementation of the DCP commences, an Implementation and Monitoring Committee will be formed to review management plans and budgets. Primarily to review and comment on expenditure of funds, it will also perform reviews of the public information program, and recommend studies and projects for the protection of the desert tortoise and the desert ecosystem. Management plans will be completed principally by state and federal resource agencies that have management responsibilities in the DWMAs. Other reports will be completed by the County and NDOT concerning any road or barrier construction. Review and evaluation of management actions taken, budgets, and all policies and actions proposed for each of the DWMAs must be provided in the management plan. These plans not only go to the Implementation and Monitoring Committee but to the FWS as well. Further, annual reports on the tortoise pick-up program, placement programs, and development fee programs will also be submitted to the FWS and Committee.

Summary

The DCP is a very comprehensive, yet single species approach to habitat conservation planning. While preserves are primarily located on federal lands, habitat occurs primarily on those lands and not around urban areas. Interestingly, the DCP also promotes tortoise adoption by the public and an extensive public involvement and education program. Because of the free pick-up services provided as part of mitigation, the fear of finding the tortoises and being accused of ‘taking’ the species is highly reduced both in the general public and the development community.

Unfortunately, the DCP graphically demonstrates the problems with coordinating preservation efforts with federal agencies. The lack of coordinated or even accommodating legislation at the federal level (with the BLM) was the major issue with the development of the final HCP. Because of these problems, the process was drawn out longer than necessary.

The Balcones Canyonlands Conservation Plan- Austin, Texas

In Travis County, Texas, exists the unique ecology associated with the Balcones Canyonlands, a section of the Edward's Plateau. In 1987, Earth First!, recognizing the uniqueness of the natural ecosystem as well as the forces disrupting it, initiated a campaign to educate the government as well as the public to the endangered status of the black-capped vireo. These actions spawned a number of investigations that listed additional species as endangered including the golden-cheeked warbler (1990), several cave invertebrates (1989), and few plant species. By 1992, sixty-one species of concern were identified as occupying the area.

When the first species was listed as endangered in 1987, community groups, developers, landowners, and local governments joined together to confront the issues surrounding an endangered species. Having the vireo on a parcel of land meant there could be no development, and this was unacceptable to many in the group. It was decided that the development of a conservation plan for the purpose of acquiring an incidental take permit from the FWS under the ESA was the preferred alternative to no development or development following individual development of the plans.

As of March, 1993, the Balcones Canyonlands Conservation Plan (BCCP) had developed a preserve system and mitigation efforts to be utilized in what the Executive Committee hopes to be the final plan for submittal for the incidental take permit. To develop the plan, the initial steering committee that formed soon after the initial listing of the vireo selected representative members to form an Executive Committee in 1988. While the Executive Committee could not directly represent all affected parties "...a concerted effort ha[d] been made to bring those interests to the table" (BCCP 1993, 2-2). To accommodate the representation effort, newsletters, public meetings, workshops, and public review periods for documents were available for interested parties. To develop the plan, subcommittees of the Executive Committee were formed to address specific areas of the conservation planning process. A Biological Advisory Team (BAT) was

assembled to include experts on the species of concern to perform “essential research” needed to develop the plan as well as serve as an advisory body to the Executive Committee.

The plan area includes all of Travis County except those jurisdictions that chose not to participate in the BCCP process. To begin the process, BAT initiated an intensive study of the species of concern and habitat requirements. The species specifically addressed by the BCCP are the:

- Black-capped vireo (*Vireo atricapillus*),
- Golden-cheeked warbler (*Dendroica chrysoparia*),
- Tooth Cave pseudoscorpion (*Microcreagis texana*),
- Tooth Cave spider (*Neoleptoneta myopica*),
- Tooth Cave ground beetle (*Rhadine persephone*),
- Kretschmarr Cave mold beetle (*Texamaurops reddelli*),
- Bee Creek Cave harvestman (*Texalla reddelli*),
- Texas salamander (*Eurycea*), and
- Texabama Croton (*Croton alabamensis* var. *texensis*).

It was determined that the main threat to all species was the destruction of habitat though other factors have contributed to each species’ population decline. Habitat destruction is the result of urbanization, overgrazing and overpopulation of domestic and native herbivores, and growth of species of plants that change the habitat. The vireo and warbler are further impacted by the increased populations of the brown-headed cowbird which lay their eggs in the bird’s nests displacing the vireo and warbler chicks when they hatch. Karst ecosystems are impacted by changes in the ecosystem as a whole which maintains natural water and energy flows as well as buffers for moisture and temperature. Also, imported fire ants are affecting the above ground biodiversity but it is unknown what effects they have on the cave invertebrates.

The study of each of the species further yielded information about the species’ physical description, its distribution and abundance, the reproductive biology, its habitat requirements, and its status. Much of the habitat information for the two bird species was acquired using remote sensing technology. This information and the information

gathered on the other species was developed into a geographic information system (GIS) that could produce map overlays of the spatial relationships of the habitat of all the species. Using the information gathered from these studies, preserve areas were designated that defined areas providing the most contiguous habitat protection of species. Criteria were also developed that outlined the habitat requirements of each of the endangered species including habitat requirements recommended by BAT, the ability of a tract of land to support multiple species, and the adjacent land cover and activity.

The preserve information provided by BAT was also compared with socioeconomic criteria for the determination of acceptable habitat preserve areas. Economic concerns are important since land in some of the preserve areas could range in value from a dollar value per acre to a dollar value per square foot. These cost issues limit preserve design because funding for land acquisition is limited by the funding provided through the BCCP. Roads, tax values, land values, and parcel data were also input into the GIS to determine the costs associated with all of the preserve land that was designated. Combining the information with aerial photographs and all the ecological studies available, preserve areas were established. Land ownership became one of the determining criteria for preserve designation. Lands owned by public agencies such as local governments, the Federal government, or utilities was given priority over tracts of land with numerous private landowners. Additionally, lands controlled by the Resolution Trust Corporation and the Federal Deposit Insurance Corporation (both federal agencies) provided tracts of land that could be directly conveyed to the BCCP or sold at a discounted rate.

To determine preserve areas, the County was divided into distinct macro-areas which could be individually analyzed. Ten areas were established and each reviewed and compared to the criteria. Of these, five contain large areas for preserve units, and two others contain smaller preserve units. The BCCP estimates that 29,159 of the 35,338 acres identified as potential preserve area will be acquired to form the preserve system.

Table 4.5: Amount remaining habitat to be protected in the BCCP preserve system

Type of habitat	Total protected	% protected	Total unprotected	% unprotected
Potential Karst invertebrate ¹	9,298 acres	20.5	36,070 acres	79.5
Occupied Black-capped vireo ²	1,164	56.3	904	43.7
Potential Black-capped vireo ³	10,503	38.9	16,475	61.1
Golden-cheeked warbler ⁴	13,969	36.9	23,870	63.1

¹ Source: Table 9-8: Acreage of Potential Karst Invertebrate Habitat in the BCCP Conservation Area in BCCP 1994.

² Source: Table 9-1: Acreage of Occupied Black-Capped Vireo Habitat in the BCCP Conservation Area in BCCP 1994.

³ Source: Table 9-2: Acreage of Potential Black-Capped Vireo Management Areas in the BCCP Conservation Area in BCCP 1994.

⁴ Source: Table 9-4: Acreage of Golden-Cheeked Warbler Habitat in the BCCP Conservation Area in BCCP 1994.

Table 4.5 identifies, based on information in the BCCP, the percentage of habitat for each of the endangered species that will be protected by the preserve system. Habitat preservation will only protect, at most, about 56% of the existing habitat for any one species. Many of the preserve areas to be established will be highly fragmented due to past development practices and will require intensive management for specific species (BCCP 1993, 7-3). Management for the Black-capped vireo habitat will significantly increase the amount of habitat that could potentially support the species. Potential habitat areas "...constitute requisite geologic substrate, slope, and vegetational characteristics in common with occupied vireo habitat in the plan area" (BCCP 1993). Mitigation for the vireo within the potential habitat areas relies on management to compensate for the loss of vireo habitat. The primary management strategy is to carry out brown-headed cowbird trapping to increase the fecundity of the vireo. Warbler habitat loss will be mitigated not only through the preservation of existing habitat but also with the regeneration of habitat throughout the managed areas. This type of management could restore habitat that had been destroyed in the past or, through ongoing management, create and maintain new tracts of habitat. The plan states that existing habitat that will remain in unprotected areas will become more sparse and fragmented than it currently is due to development but that the managed areas would compensate for this loss (BCCP 1993).

For the karst invertebrates, cave management will be required. Hydrologic factors greatly contribute to the success of the cave in supporting the species now present. Management of these factors, such as pesticides and urban runoff, and nutrient content, as well as the control of fire ant invasion, maintenance of native vegetation, and control of human disturbance will be implemented.

These management practices, preserve acquisition, and the monitoring programs to accompany preserve management will be funded through a yet undefined funding process. The BCCP is not yet completed but has received funding from sources in the federal government, support by local government, donations from environmental organizations, developers, and the public. The BCCP proposed to use a variety of funding mechanisms, some of which will be tailored to the specific preserve and locations of incidental take. Seven years after the habitat conservation process began, many of the implementation mechanisms have yet to be defined.

Summary

This very lengthy HCP process has extended to almost a decade, demonstrating the problems of time. The BCCP encompasses thousands of landowners and several different jurisdictions. Problems resulting from conflicts among these different interests have significantly contributed to decisions in the planning process and changes in the overall BCCP. Landowner influence is shown in the high fragmentation of the habitat areas to be designated for preserves.

Also, the plan utilized the new technology of computerized GIS which allowed for comprehensive analysis of both biological and economic factors. Further, technology is to be relied upon in the creation and maintenance of habitat areas for specific species where habitat does not currently exist. Issues surrounding this option for mitigation area are still being worked through along with the funding issues.

San Diego County's Habitat Conservation Planning Effort

As stated previously, Southern California has experienced explosive growth, particularly in the past 20 years. San Diego County, one of the two southernmost counties in California, bodes what people consider an idyllic climate (about 70 degrees Fahrenheit year-round) with coastal breezes and warm ocean water. Much of the area represents the unique coastal environment that once existed along all of Southern California's coastline. The remaining natural environment, though, is marred by the fact that urbanization resulting from millions of people flocking to the area have caused its alteration and destruction of this natural environment. In 1986, the FWS listed the least-Bell's vireo as endangered. This small migratory songbird's nesting environment has been reduced by 90 percent due to urbanization and agricultural development and the populations are further impacted by the brown-headed cowbird. The listing of the vireo triggered the initiation of a habitat conservation planning effort in an attempt for the area to acquire the incidental take permit offered under the ESA.

As the HCP process was being undertaken and five specific HCPs were being developed in the remaining waterways that contained habitat for the vireo, several other species of concern were discovered in the area. By early 1994, within the 4,200 square miles of San Diego County, "...24 plant and animal species that are listed or proposed for listing as endangered by the federal or state government..." had been discovered (Fairbanks 1994, 25). Endangered species, in addition to the least-Bell's vireo, included the California least tern, California orcutt grass, and San Diego button celery. Overall, the federal government had identified over 300 plant and animal species that could be considered sensitive and would possibly become candidates for listing under the ESA.

The habitat conservation planning efforts changed in 1991, when California Governor Pete Wilson, recognizing the problems associated with development and endangered species, initiated the Natural Communities Conservation Planning Program (NCCP). Governor Wilson's primary concern, in addition to conflicts emerging in

Northern California, was for Southern Californian regions that contained the native communities of coastal sage scrub that represented the home habitat of the California gnatcatcher which was being reviewed for listing as endangered. If the gnatcatcher was listed, the last remaining 300,000 acres of coastal sage scrub could not be developed without being in violation of ESA unless permits were acquired. Coastal sage scrub habitat areas had intense pressure from the development community for becoming home sites for wealthy Southern Californians. Governor Wilson was receiving pressure from the development community to do something to prevent the listing of the gnatcatcher. While he did implement the NCCP, it did not prevent the listing of the California gnatcatcher as threatened in early 1993. As a result of the NCCP, San Diego County decided to put aside its individual habitat conservation planning efforts and embrace the NCCP as a program to identify habitat areas that represent the natural communities present in the area and then to preserve those areas to prevent the future listing of additional species as well as provide HCPs for the species already listed under the ESA.

The NCCP process in San Diego County has divided the County into three major planning areas. Vireo conservation areas are present in the final plan due to their having been closely and independently studied for the County's previous HCP efforts. The vireo also resides in unique willow woodlands found only in limited areas within the County. The three concentration areas include the North County Multiple Habitat Conservation Program (MHCP), the Multiple Habitat Conservation and Open Space Program (MHCOS), and the Multiple Species Conservation Program (MSCP). Each of these programs was phased in development, with the MHCP development being undertaken first, the MHCOS second, and finally the MSCP. Each is being developed at the same time, but the initial study of the areas was phased. All will be tied together as they are developed to create a contiguous habitat preservation system and to avoid overlapping between jurisdictions.

It is hoped that by developing the NCCP process, San Diego County will model a regional cooperation program that "...emphasizes the role of local governments in the

process of protecting multiple habitats” (Fairbanks 1994, 25). The program will emphasize only about a third of the sensitive species identified by the federal government. But, these species were carefully selected. For example, the bobcat is not listed by either the federal or state government, but it is included in the studies because of its wide range, which when protected, will also protect habitat for a wide variety of species. Data for the area were gathered from existing environmental reports and through new research. Aerial photography, satellite imagery, and existing maps were used to identify the natural communities present in each of the planning areas. Communities were identified and rated on level of quality depending on the vegetation, presence of sensitive species, soil types, connectivity, and extent of micro-habitats. The information was put into a GIS along with information on the existing and planned land uses, ownership, and land costs within the area. Gap analysis was used to identify areas that were in risk of development and where preservation efforts should be focused (Fairbanks 1994).

The MHCP has already completed its mapping of biological resources and habitat quality ranking and has begun the process of defining planning areas and designing implementation, acquisition and funding strategies. (Habitat Conservation Planning in the San Diego Region 1994). The MSCP is still developing its biological and economic analysis using its GIS. Once these are completed, the draft of the plan will be written and released for public review. Vegetational mapping was recently completed for the MHCOS and will be used with the sensitive species data to begin the habitat quality mapping process (Status Report on the MCHP, MSCP, and MHCOS 1994).

Participants in the NCCP process are diverse. While much of the lead work was assumed by the San Diego Association of Governments (SANDAG) and two consulting firms hired to complete the biological and economic analysis, the process has been open to all who want to be involved. Voluntary involvement has been enacted by several environmental organizations, developers, farming organizations, and realty groups as well as many cities, county and regional entities, and federal organizations. Public

participation is encouraged through pamphlets listing names, phone numbers, and project specialty of several people in government who are involved in the NCCP.

Environmental organizations such as the Sierra Club and the Endangered Habitats League, a group representing 56 environmental groups, represent differing levels of support. Some organizations say that finally there is protection for the species in the program area. Dan Silver of the Endangered Habitats League stated “Local governments don’t protect habitat; that’s why we’re in this mess” and pointed to the estimated 3,700 acres of coastal sage scrub that had been developed since the NCCP began (in Slater 1994, 55). But, in an article in *Sierra*, Sierra Club’s publication, Dashka Slater writes, “The bad news is that preservation of the bird [the gnatcatcher] has been put in the hands of the same people who failed to protect it in the first place - the Wilson administration and local governments....If California blows it, it blows it for the whole country.” (Slater 1994, 55). These sentiments demonstrate the close scrutiny being given to the San Diego County NCCP efforts by many across the country. People are looking to this effort as being the model that could be applied elsewhere and as the one that goes beyond the HCP process to serve as a model for prevention of endangered species becoming a reality in many areas.

Summary

San Diego County’s NCCP program is being closely scrutinized by many across the country. Interior Secretary Bruce Babbitt hails it as the model for HCP processes to follow (1993). But, it is not an HCP process: it is an NCCP process that happens to accommodate the HCP process within it. National legislation, including the ESA, has no such requirements or even focuses on natural communities. The natural community focus of the NCCP is very different from the HCP process which focuses on habitat occupied by an endangered species and may ignore the functions of the natural community.

San Diego's efforts have been very comprehensive. While the biological studies are still underway, they utilize some the best technology available for information gathering (GIS and remote sensing). They also utilize new types of analysis (gap analysis). While mitigation efforts have not been designated, preserve areas are being developed in as coordinated manner for such a large area. But, the process does limit itself to the county boundaries. Little mention has been raised concerning coordination with preservation efforts beyond the county boundaries. It may simply be because the process has not gone that far and does warrant further analysis.

Conclusion

The five case studies presented demonstrate the many variations in approaches, organization, and mitigation possibilities available through the HCP process. The HCP process is truly unique and offers the opportunity for resolutions to species-development conflicts that are becoming more and more common. But, it must be asked whether it is enough to protect the species in question and if they will be successful to both the development community and endangered species? These questions cannot be answered until sometime in the future when plans such as the ones described are fully implemented and yield some way to measure their success. Despite the unknown success, the ideas behind habitat conservation planning are becoming more and more influential in governments as shown by the State of California's NCCP.

Chapter 5



Ecosystem Management and Habitat Conservation Planning

The comparison of habitat conservation planning and ecosystem management made by Interior Secretary Bruce Babbitt in April of 1993 presents several questions, some of which can be answered, some of which cannot. All can be addressed. First of all, is habitat conservation planning ecosystem management? This chapter attempts to answer that question using the criteria established in Chapter 2 and comparing it to the information and case studies presented in Chapter 3. A second question is, if it is not ecosystem management, how can habitat conservation planning become ecosystem management? Through the discussion of whether habitat conservation planning is ecosystem management, hopefully some areas where habitat conservation planning falls short may lead to obvious solutions or at least a direction of where research and testing should proceed.

The criteria established in Chapter 2 fell into five major topics: ecological orientation, time and spatial scale, the role of human beings, management actions, and data collection. Each of these five topics will be addressed using the information from the case studies of Chapter 3 and are summarized in Table 5.1. Within each of the topics, characteristics of the HCP process and the case study HCP processes undertaken will be presented in the context of the criteria listed in each topic. The discussion will begin with the criteria on time and spatial scale since this is where the HCP process

Table 5.1: Comparison of ecosystem management criteria with case study HCPs

Ecosystem Management Criteria	Stephen's Kangaroo Rat HCP	Metro-Bakersfield HCP	Clark County Desert Tortoise HCP
1. Ecological Orientation	<ul style="list-style-type: none"> • Focus on single species • Preservation of entire habitat range • Limits preservation areas to those that can be economically purchased 	<ul style="list-style-type: none"> • Focus on multiple species, but not all species • Preservation predominantly outside of plan area • Large preservation areas designated away from development • Goal is to keep preserve self-sufficient 	<ul style="list-style-type: none"> • Focus on single species • Used critical habitat designation of FWS • Maintain natural systems through protection of hydrologic factors
2. Time and Spatial Scale	<ul style="list-style-type: none"> • 30 year permit, land in preserves protected in perpetuity • Extends over all existing habitat, excluding some of historic range outside of jurisdictional boundary 	<ul style="list-style-type: none"> • 20 year permit, land in preserves protected in perpetuity • Extends only to city boundaries • No range of creatures planned for 	<ul style="list-style-type: none"> • 30 year permit, preserve land is primarily public land • Used critical habitat designation by FWS, but did not plan for all habitat areas
3. Role of Human Beings	<ul style="list-style-type: none"> • Process open to all interested parties in public and private areas • Human values considered in the preserve system planning • Little repair of past damage • Minimize damage by designation of areas for no development • Completed comprehensive studies about the SKR by scientific community 	<ul style="list-style-type: none"> • Process open to all interested parties in public and private areas • Human values considered in the preserve system planning - most protection away from humans and economic values emphasized • Repairing past damage key in some of preserve management strategies • Little minimization of damage to species within the plan area • Many species comprehensively studied 	<ul style="list-style-type: none"> • Process open to all interested parties in public and private areas • Human values considered in the preserve system planning • Repairing past damage key in some of preserve management strategies (purchase of water and grazing rights) • Little minimization of damage to species within the urban areas other than species removal • Species comprehensively studied
4. Management Actions	<ul style="list-style-type: none"> • Created county agency to oversee planning efforts • New agency well coordinated with other agencies • Interaction with regional agencies (MWD and BLM) coordinated for combined preservation efforts • Monitoring key part of management of preserve areas and for mitigation • Interdisciplinary management undertaken 	<ul style="list-style-type: none"> • City coordination with county good but lack of cooperation with oil and agricultural interests • Some integration among differing agencies • Minimal integration of interdisciplinary practices • Monitoring programs established 	<ul style="list-style-type: none"> • Integration within state good • Integration with federal agency (BLM) not coordinated • Monitoring programs established
5. Data Collection	<ul style="list-style-type: none"> • Data will be continuously gathered throughout the permit period 	<ul style="list-style-type: none"> • Data will be continuously gathered throughout the permit period 	<ul style="list-style-type: none"> • Data will be continuously gathered throughout the permit period • A research station is being established to monitor and analyze the species

Table 5.1: Comparison of ecosystem management criteria and case study HCPs (Cont.)

Ecosystem Management Criteria	Balcones Canyonlands Conservation Plan	San Diego County NCCP
1. Ecological Orientation	<ul style="list-style-type: none"> • Focus on multiple species, but not all species • Natural communities used by species considered in preserve design • Ecological integrity not maintained in some areas requiring human intervention 	<ul style="list-style-type: none"> • Ecosystem and natural communities to design preserve and management areas • Maintain systems that keep areas in natural state to reduce ongoing conflicts
2. Time and Spatial Scale	<ul style="list-style-type: none"> • 30 year permit, land protected in perpetuity • Highly fragmented preserve system to accommodate human interests • Uses county boundaries to designate plan area 	<ul style="list-style-type: none"> • No time period specified • Plan area defined by county boundaries • Natural communities identified and used to define preserve areas and management efforts
3. Role of Human Beings	<ul style="list-style-type: none"> • Process open to all interested parties in public and private areas • Human values considered with development and economic interests emphasized • Some attempt to minimize damage through preserves • Some repair of past damage • Some creation of habitat • Used GIS to develop comprehensive biological and economic comparison 	<ul style="list-style-type: none"> • Process open to all interested parties in public and private areas • Human values considered • Management and preserve designation not yet completed • Used GIS to develop comprehensive biological and economic comparison • Very extensive research completed for all species and natural communities
4. Management Actions	<ul style="list-style-type: none"> • Integration of plan between agencies within county. Some integration of plan with federal (FWS) agencies. Some integration on state level (plan requires passage of new state legislation) • Utilized interdisciplinary practices • Preservation of fragmented areas of habitat and some contiguous areas • Some preserves to be continuously due to creation of artificial habitat • Monitoring programs established 	<ul style="list-style-type: none"> • Management within agencies is integrated • Integration between communities is currently successful • Many disciplines involved in the process • Management practices not yet defined
5. Data Collection	<ul style="list-style-type: none"> • Data will be continuously gathered throughout the permit period 	<ul style="list-style-type: none"> • Data will be continuously gathered throughout the permit period

begins. It will then move to data collection, role of human beings, management actions, and ecological orientation, respectively. Failure of any of the case study HCP processes to meet the ecosystem management criteria will mean that it did not accomplish ecosystem management. Thus, this chapter will answer whether habitat conservation planning meets the ecosystem management criteria?

Comparing Ecosystem Management Criteria to HCPS

Habitat conservation planning is a practice that was said by Interior Secretary Bruce Babbitt to demonstrate ecosystem management in action. On the surface this may seem to be true. Human considerations and endangered species concerns (representing a limit set by the natural environment) mesh together to form a plan of action to protect human interests in economic development and growth, and the preservation of part of the environment that is an integral piece in the ecosystem. But does habitat conservation planning actually implement the paradigm shift required under ecosystem management?

Time and Spatial Scale

Ecosystem management calls for increasing the time and spatial scale from the present scales that environmental management currently utilizes. Management should be long-term; addressing many years, possibly generations into the future. Secondly, the scale of management needs to encompass the entire ecosystem. While still limited by human understanding of what an ecosystem is, a concerted effort needs to be made to address what the ecosystem is and then set limits according to the information from the ecosystem.

The habitat conservation planning process, in general, designates a management strategy that will be implemented for the time period of the permit. The maximum permit period is 30 years. Funding, management, and protection are provided for that time period. In practice, through mitigation, lands are often established as preserve areas or at least areas that receive some protection that will remain so in perpetuity. The lands

are transferred into public ownership or are to be maintained by an organization (such as The Nature Conservancy). But it still remains that these lands are only provided management funding for the time period that the permit is issued. What happens when the thirty years are up?

The problem is best illustrated by the BCCP. Much of the mitigation for the black-capped vireo calls for intensive management of preserve areas to maintain habitat conditions favorable to the vireo. Areas that do not presently contain vireo natural habitat will require management practices that will not only create the habitat needed by the vireo through planting natural vegetation and simulation of natural occurrence, but will establish a management strategy to maintain these areas. In the future, since it cannot be guaranteed that they will naturally adapt and become self-maintaining; what happens if funding runs out or these areas fail? The natural habitat of the vireo has been destroyed, and the created habitat cannot be expected to remain in its natural state either because of loss of funding for management or because human intervention did not work. The vireo will be extirpated from of the area because it does not have a place to live. If management were addressed in perpetuity as well, the issue of habitat protection would be less important. Land may be preserved, but that does not mean that it is free from destruction by either humans or by natural occurrences such as major storms.

Secondly, spatial scale in the HCPs is primarily set by a jurisdiction. Granted, the case studies address plans that were all undertaken by a regional entity (usually a county government), but the spatial scale of the plan is set by the jurisdictional boundaries of the county. The Draft Desert Tortoise Habitat Conservation Plan extends beyond county boundaries but limits itself to state boundaries. Riverside County established a boundary that encompassed all of the exiting habitat of the SKR and all of the historical range of habitat within the county. Again, though, jurisdictional boundaries limited the extent of the management area to within the county to exclude historical ranges that extended beyond the county boundary. In the BCCP, the management strategy addresses the issues of habitat areas extending beyond the range of the plan saying that they have no control

over management decisions in these areas. Additionally, the black-capped vireo is a migratory bird. Its habitat extends outside of the country where the U.S. government has no control over the use of the land.

All of the plans address only the habitat of the target species as the method for establishing the management boundaries or areas. They do not address the ecosystems in which these areas exist as the feature for identifying preserve areas or preservation effort focus. As pointed out by Timothy Beatley in the BCCP area, species are the focus, not the communities in which they survive. Endangered communities, such as blackland prairie are not addressed in the plan and therefore, the biodiversity of the region is not protected (Beatley 1994, 191). Ecosystems are not setting the spatial scale for the HCP planning areas. They are being set by addressing only endangered species which limits the extent of protection provided the biodiversity of a region.

HCPs do go beyond the conventional five to ten year planning approach that has been implemented for many years. They do encompass more area than a single parcel of land or even a community and approach planning on a more regional scale than is often undertaken. Therefore, while habitat conservation planning is a more ambitious approach to planning for and within the limits of the environment, it does not meet the criterion of time and spatial scale as set by ecosystem management.

Data Collection

The data collection criterion that requires that data form the basis for management decisions realizes the limits to the presence of existing data. Data collection was one of the pervasive criteria expressed in all of the literature. There needed to be more data about ecosystems which must be maintained, analyzed, and researched in an ongoing fashion. All of the HCPs reviewed in the case studies completed extensive research on the species of concern, determining habitat needs and requirements of each. Management strategies were established based on biological information (as well as economic, but this will be discussed later). Each of the plans

established strategies for collecting and analyzing data throughout their permit's time frame. Types of data analysis and types of reported data were detailed for the entire management area. Data collection was definitely a major part of each of the HCP planning processes. The data's incompleteness were also acknowledged, and all contained statements that referred to changes in management strategies that would result if collected data showed a need to do so.

Role of Human Beings

Human beings play a critical role in the ecosystem management concept. They are responsible for making the paradigm shift happen; they are the cause of many (and some say all) of the environmental problems and damage that has occurred; they decide whether to repair, develop, or ignore the environmental issues that are facing the planet. Human concerns in economic development and maintaining culture and other social values are core in the ecosystem management concept. Success of the shift to this new paradigm relies on the changes in human thinking but also the weighing of human concerns in the balance of decision-making.

The habitat conservation planning process involves humans in the decision-making process. Voluntary participation in the process that is open to all stakeholders is one of the central themes that brings people to support the process. All of the processes examined in the case studies involved voluntary involvement and as complete and fair as possible representation for those who could not be directly involved. Steering committees composed of stakeholders guided the process, weighed the options for making decisions (socioeconomic concerns and biological concern primarily), and made decisions on the management approach. Some environmental groups feel that the biological and ecological factors were given too little weight. Some developers and landowners feel that the process is no-growth and ignores the economic factors that influence decisions. (For more information on these issues, see Beatley 1994.) Participants from these groups all compromised in the writing of the final HCPs.

Negotiation and compromise were methods used to determine the final mitigation measures that would be included in the implementation of the plans.

Many of the plans (MBHCP, BCCP, and the San Diego NCCP) included mitigation measures that would repair damage to habitats in their preserve management plans. Repair included restoration of natural water movement and planting natural vegetation in the designated preserve areas. Monitoring would be established to be sure that these processes were successful. Additionally, many of the plans implemented mitigation measures that would protect remaining habitat of the species of concern within the plan boundaries. The mitigation, to be approved by the FWS, is not to be detrimental to the survival of the species and therefore should minimize of impacts to the species.

Finally, human's knowledge is always incomplete, and there should be an ongoing effort to collect data to build as complete a knowledge base as possible. The two HCPs that most exemplify the efforts to include the most current technology in development of the knowledge base are the BCCP and the San Diego NCCP. Each of these HCP efforts developed, and are using and updating extensive GISs that include databases and spatial information on biological characteristics and economic and land use characteristics of the areas within the plan boundaries. Remote sensing information was utilized to define areas of habitat and potential habitat. Tax records and assessor data were used to develop economic information. These systems were identified as being critical in the decision-making process (Beatley 1994, Fairbanks 1994). The use of these systems seems to aid in the complexity and immense amount of information that the HCP process generates on a regional basis.

Management Actions

Management actions need to be integrated within agencies and across agencies as well as across disciplines to be considered ecosystem management. They need to include monitoring practices as well as following an adaptive management pattern that changes

management as more information becomes available. The HCP process, on its own, allows for all of this to occur by not limiting the way the plan is developed or the types of management decisions that can be made. Monitoring is required as are provisions for changing or amending the HCPs as information becomes available that make it necessary.

In practice, the HCP realizes the stumbling blocks that are in place in the integration of management. Best exemplified by the DCP, integration in land management across different agencies is difficult. Because the BLM had different priorities and fell under different legislation, their decision-making process did not coordinate well with the DCP writers who needed assurance that their actions would not be undermined by one participant's inability to ensure the outcome of their own decision-making. The BLM had a planning process that did not integrate well with outside planning actions. As a result of the conflicts, the DCP writers researched, developed, and submitted a different plan that did not rely on management decisions of the BLM.

Within their localities, more success for integration of management actions has been accomplished. Riverside, Clark, Travis, and San Diego County HCP efforts are all coordinated to some level with local communities and cities. Many of the cities within the planning areas are changing their own planning efforts to accommodate the provisions and strategies established in the HCPs. In California, many of the cities involved in the HCP processes modify their general plans (the city comprehensive plan) to make the goals of the HCP their own goals. Riverside and Travis Counties have also integrated their preservation efforts with local water utilities to preserve land areas in a coordinated way. Part of the goal in Riverside County is to integrate the HCP effort with other HCPs in the area as well as other natural resource planning efforts.

All of the plans establish some type of monitoring. Provisions for research beyond the defined monitoring programs are also established. All the information collected and developed will be maintained in databases to be used in guiding

management decisions. The wording for adaptive management is present in the amendment processes for the HCPs. But, while the ability to practice adaptive management is present in the plans, its implementation is only speculative. None of the plans have been implemented sufficiently to show that they will practice it. Changes (or adaptations) were made in the SKR HCP that developed from the short-term HCP implemented by Riverside County. The changes primarily involved removal of areas from protection due either to the lack of the SKR residing at a specific site or for economic reasons. Changes to the fundamental management strategies was not made however. Thus, it waits to be seen if adaptive management will be undertaken based on ecological reasons or even simply biological ones.

Ecological Orientation

Finally, the criterion of ecological orientation needs to be addressed. Key to the paradigm shift is the way people think about their planning efforts, letting the ecosystem dictate the use and management strategies. Has this been done? Further, is ecosystem integrity sought? Is biological diversity and natural community function given priority? The answer to all of these questions is no. The HCP process alone does not allow for it simply because it is governed by the rules and implementation of the ESA. Implementation of the ESA, while slating protection of ecosystems as a goal, fails to provide the mechanisms or tools that could be used for ecosystem management. Limitations within the ESA include a single species focus and after the fact timing. Under the ESA, the HCP process is not triggered until a species is endangered and development finds a conflict with the listing of the species. By the time this occurs, the species' ecosystem or natural community upon which it relies has lost most of its integrity and may not be sustainable (Dashka 1994). When a species is listed as endangered, it implies that somehow the ecosystem is out of balance. As Dashka (1994) pointed out, is it then appropriate to destroy more of something of which only an incredibly small proportion of the original is still remaining?

In particular, within the case studies these failures are demonstrated at differing levels among all the plans. The SKR HCP is concerned with a single species as is the DCP. This is not biological diversity. The BCCP preserve systems are going to be highly fragmented, relying on human management to maintain them. This violates the integrity of the ecosystem which is supposed to be self sufficient. The MBHCP does little to stop current habitat destruction practices and delegates mitigation for preserves off-site, ignoring the criteria of the ecosystem dictating use and management strategies.

The focus on the species in question does not address the natural processes that regulate the ecosystems. Many of the areas are so changed (water diverted for water projects; many extinct species primarily predators; and invasion of exotic species of both plants and animals) that it would be difficult to determine what the natural community functions once were. The BCCP and the San Diego NCCP each address these difficulties, realizing that humans will be around in the areas of the plan and that the existing settlement pattern cannot be changed. In the San Diego NCCP, many of the natural community functions are identified by taking a very broad species approach but this is being undertaken primarily under California's NCCP not the ESA or the HCP process.

Finally, ecosystem integrity is difficult to address. Do plan writers use functions of the current ecosystem (such as a series of flood control channels that are maintaining their own community functions) or those of the past ecosystem (the one present before humans changed it)? According to the HCP, some attention must be given to the past ecosystem because the process is to protect endangered species that rely on previously available habitat. All of the HCPs address maintaining at some degree the natural environment that existed before human settlement and change occurred.

Is It Ecosystem Management?

The answer to this question has to be no because not all the criteria are met. As shown in Table 5.2, not enough time is allotted to management strategies; the area of the

Table 5.2: Summary of comparison of ecosystem management criteria with the case study HCPs

Ecosystem Management Criteria	Stephen's kangaroo rat HCP	Metro-Bakersfield HCP	Clark County DCP	Balcones Canyonlands Cons. Plan	San Diego County NCCP
Time and Spatial Scale	✗	✗	✗	✗	○
Data Collection	●	●	●	●	●
Role of Human Beings	●	●	●	●	●
Management Actions	○	○	○	○	●
Ecological Orientation	✗	✗	✗	○	○
Meets ecosystem management criteria: ● Yes ○ Somewhat ✗ No					

plans is limited to jurisdictional boundaries; integration across different agencies is not coordinated; and ecological orientation of the plans is not accomplished. But, successes must also be documented. The HCP process does provide a framework for building decision-making processes on multi-disciplinary information and data; data collection is given priority with the realization that limits make all data incomplete; efforts are made to have the best data available for use as the basis for decision-making; and, finally, the environment, its functions, and its importance are integrated into a planning processes on a local level: that has not been done before. The NCCP in California provides an extension to current land planning that may be utilized in the HCP process and provide management practices or guidelines for practices that may more closely resemble ecosystem management. The HCP process has also moved towards ecosystem management. The process developed as the model by the San Bruno HCP was much more limited in area and scope than these subsequent plans.

How can It be More 'Like' Ecosystem Management?

The HCP process could be changed to accommodate more of the criteria established by the ecosystem management concept. Focus could be required to be placed more on the natural communities and their functions. This would require changes in the ESA that would allow it to be more pro-active. The triggering of the ESA could come

Table 5.3: How habitat conservation planning could be more 'like' ecosystem management

1. Focus on natural community preservation, not single-species habitat areas.
2. Begin planning early, before the conflicts arise.
3. Integrate ecosystem level planning into all planning actions from the local to the federal level.
4. Make interagency cooperation easier between different levels of government.
5. Reduce conflicts that result from legislation and agency requirements.
6. Involve everyone. Explain what is being done and why. Each person must accept the ecosystem management paradigm to some degree as a valid practice for it to be successful.

earlier in the planning process instead of waiting for conflict between endangered species and development to involve the HCP process. Planning for preservation of the ecosystem and its integrity needs to be undertaken before develop occurs, not after it has occurred unless it is to repair past changes that threaten the integrity. It should not be a triggered event; it should ongoing. The habitat focus that necessarily requires some species to be in peril could be expanded to include functions of the ecosystem and natural communities in the protection scheme. Consideration of habitat, ecosystem function, and biological diversity should be integrated in all planning processes, not just the HCP process.

Integration as specified by the ecosystem management criteria needs to occur more than is already being accomplished. Because the federal government has made ecosystem management a goal, it is being addressed on the federal level. Local communities may find the transition easier since being on a smaller scale to begin with has resulted in more cooperation on their parts for road connections, flood control, and land uses (not always successful, but the processes are present). As demonstrated by the DCP, restructuring of the legislation guiding planning needs to provide provisions for cooperative planning efforts so that conflicts such as those resulting from priority differences and legal requirements with HCP developers and the BLM can be addressed faster and with more coordinated outcomes.

Finally, the fundamental change that must occur is the shift from our current paradigm to a more ecological paradigm. The shift would influence all of the other criteria areas and must be personal. It is hard to legislate and force a process that people do not believe in. They will be the ones to implement the final planning efforts, and if they do not understand or believe in the process, it will not be implemented as designed. Legislation can help by requiring more information and inclusion of actual processes in methods for decision-making and bringing the ecosystem management paradigm at least to the awareness of people as an alternative to current practices. It cannot be expected that everyone will embrace the ecosystem management concept as the way to do things, but if it is established as a goal, some, if not many, people may adopt all or part of the paradigm and it will then be integrated into the HCP process and other planning processes.

Conclusion

The HCP process does much to meet the criteria of the ecosystem management concept. It broadens the decision-making process including all interested parties, integrates interdisciplinary practices, coordinates with other agencies, and lays a framework for planning processes that includes ecological considerations. However, it cannot be called ecosystem management though because of its narrow focus on jurisdictional areas and species of plants and animals, the constraints established by traditional planning practice that make interagency cooperation difficult, and the pervasiveness of past development practices that preclude advance planning for ecological integrity. Also, the ecological approach to thinking as a paradigm followed by land managers, planners, government, landowners, and even the general public has not taken hold. But these barriers can be overcome if ecosystem management is to be pursued as the paradigm of choice.

Chapter 6



Conclusion

The authors [of an article in Audobon magazine] slip into the false dichotomy of growth versus no growth. That of course, is never the issue. The real question is how we grow – how we balance economic development with resource protection. ... our protection of biodiversity should always be consistent with other locally driven development issues ... and follow local building codes.

*Interior Secretary Bruce Babbitt
Audobon 1994, p. 12*

This thesis addressed ecosystem management as a concept and the practice of habitat conservation planning under the ESA. Triggering the need to compare the two was a statement by Secretary of Interior Bruce Babbitt that asserted that habitat conservation planning is ecosystem management in practice at the local level. This raised the question of whether or not habitat conservation planning is indeed ecosystem management according to the definition or practice of ecosystem management. To compare the two and answer the question, the first step of the process was to develop a set of criteria from current literature defining ecosystem management and what characteristics an action would possess to be considered ecosystem management. The criteria established fell into five characteristic areas: ecological orientation, time and spatial scale, the role of human beings, management actions, and data collection. Each of these characteristic areas that comprise ecosystem management had specific criteria that could be used for comparing actions and processes already underway. It was then necessary to examine what habitat conservation planning is, its process, actions it undertakes, and how it is being implemented. To do this, guidelines for preparing HCPs

and then five case studies were investigated to supply a framework of habitat conservation planning that could be compared to the ecosystem management criteria.

Finally, the comparison was made. Habitat conservation planning falls short of the criteria for accomplishing ecosystem management. But, habitat conservation planning does take the first steps toward implementing ecosystem management on a local level by private citizens and local governments. The concept of ecosystem management is being redefined and its ideas tested every day. The U.S. federal government grasped the concept as the management strategy for federal land management agencies. Ecosystem management, like habitat conservation planning, is seen by many as a strategy that will reduce conflicts between environmental concerns or problems and development or use of land. If the environment becomes one of the components of the planning process it follows that the environment's needs should be met and conflict reduced. This very idea has inspired many in the development community to embrace the HCP process as a conflict resolution process that will meet the needs of the environment and allow development.

But the HCP process needs to be changed. It comes closest to accomplishing ecosystem management in its data collection. The process relies on immense amounts of data to be collected which form the basis for decision-making. Further, the HCP process almost accomplishes ecosystem management in its management strategies and in defining the role that humans will play in the ecosystem. There are attempts at interagency cooperation and the roots for adaptive management. Monitoring programs are being implemented and are supposed to provide information that will be used in making decisions in future implementation practices under an HCP. The biggest area of failure that the HCP process has concerning ecosystem management is in the allowance of the ecosystem to dictate how the land could be used. Economic issues and other social issues still tend to take precedence in the HCP process' attempts at accomplishing ecosystem management sometimes without giving equal weight to the biological

information. Even the ESA does not promote the types of planning that ecosystem management would require because it is reactive, not proactive.

Planning, as a field, attempts to create ideas and plans that avoid conflict from the start. It is used in conflict resolution but its real purpose is conflict avoidance. This is what ecosystem management strives for but what habitat conservation planning cannot achieve because of the limits of the ESA. Some of the HCPs being undertaken attempt some advance conflict avoidance by including other species of concern. But, this conflict avoidance strategy occurs only after another species has been listed as endangered and development of habitat of that species is being undertaken. It results in conflicts between the development community and the ESA. If habitat conservation planning is to ever become ecosystem management, federal legislation needs to be changed to accommodate advance planning to prevent conflicts from arising.

Yet, following the 1994 election of a conservative federal Congress, it is probably unlikely to occur. The current property rights movement is questioning many environmental regulations and protection actions. Environmental legislation will probably be weakened by the Congress. The move to weaken environmental legislation demonstrates the lack of the ecological paradigm's influence among lawmakers and the public in general. Actions by the federal government have prompted environmental groups across the nation to mount large lobbying campaigns to demonstrate public support for the environment. The habitat conservation planning legislation, indeed the entire ESA, is in danger of major cuts in its power to protect species.

States such as California have initiated even more aggressive legislation for protecting the environment. California's recently enacted NCCP goes beyond traditional species management. The HCP process was widely accepted in California, a state with immense numbers of species-development conflicts due in part to its often unique ecosystems and species mix and the large areas impacted by urban, agricultural, and other resource development. The NCCP goes beyond species-focused conservation to a

focus on the natural (and often endemic) communities that comprise California's environment.

Therefore, even if the federal government disempowers the ESA or completely removes the HCP section from the Act, some form of habitat conservation planning will exist. Habitat conservation planning under the ESA has laid the basic framework for other planning efforts such as the NCCP. Ecosystem management provides a possible goal. If the federal land management agencies continue to operate under some form of ecosystem management, the tools and practices that will form future ecosystem management into a practice will be developed. Eventually, if ecosystem management as a concept is held as the goal, a toolbox of practices and methods will be developed to accomplish its implementation. Habitat conservation planning provides the initial practices and methods that may fill that toolbox.

For habitat conservation planning to become ecosystem management, changes will need to be made not only to the ESA. All levels of government will have to accept ecosystem management. While the ESA may provide the federal level protection needed for wide ranging species and extensive ecosystems, the responsibility for implementing an ecosystem management type of habitat conservation planning will fall to the state and local governments and ultimately to the individual. The federal responsibility may only be in requiring that there be ecosystem management for determining development patterns. But, funding for data collection, such as mapping and vegetation studies, may best be provided for at the federal level as well. Data distribution and standards could also be set at the federal level so that all levels of government would have access to data. Finally, the federal government would need to act as mediator between states when an ecosystem extends beyond the boundaries of the one state into another. Hopefully, a consensus on the best management approach would result.

State governments would take this requirement for ecosystem management and habitat conservation planning and pass it onto local governments. At the state level there is the opportunity for statewide management of ecosystems performing the same function

of mediator between counties and cities. It may be necessary for the state to establish ecosystem boundaries since local governments may be too small spatially to encompass an entire ecosystem. Many state already require comprehensive planning at the local level, and it may only require an extension of the requirement to include ecosystem management.

Planning practice at the local level may be the most important factor in habitat conservation planning becoming ecosystem management. Because land use and urbanization represent the main factor in deterioration and destruction of habitat, the government entity that controls these factors must be a key player in the management of ecosystems and habitat. That entity is the local government. It would be the responsibility of local governments (cities and counties) to incorporate ecosystem management and habitat conservation planning into their everyday planning practices. Zoning, subdivision, and all advanced planning will need to incorporate ecosystem management into their development.

Finally, for habitat conservation planning to truly become ecosystem management, the individual must also change. Property owners, voters, and all other individuals need to accept and practice ecosystem management in habitat conservation planning for the change to occur. Not everyone must accept and practice, but there needs to be a faith in success of following such a paradigm. Without the support of individuals, habitat conservation planning cannot become ecosystem management because individuals have most of the power in deciding land use for their property, how they vote for preservation programs, and simply in what they will accept from government and what they will not.

If it is assumed that ecosystem management will be the goal for land management in the future, questions posed in literature as the challenges must be addressed. With having to make institutional changes, including everyone, and taking all information available into account, ecosystem management will be a very costly and time consuming process. This is demonstrated by the HCP processes already being undertaken that are

extending over several years and consuming millions of dollars in their development. For ecosystem management, everyone will have to pay or change in some way. Is society ready to take this fundamental step? V. Alaric Sample seemed to think that we would whether we wanted to or not because our survival would depend on it. But will we be successful in our attempt at avoiding destruction of the environment? Does the HCP process offer the opportunity to actually achieve success in ecosystem management? We will probably not know in our lifetimes. The success of ecosystem management will only be shown if we preserve biodiversity, quality of life, and the ability to live on the planet earth.

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- 16 USCA § 1539. Section 10, a. Endangered Species Act.

TRACY L. SMITH

HC61 Box 2052

Dewey, AZ 86327

Phone: (520) 632-8289

Objective	A CAREER POSITION AS AN ENVIRONMENTAL PLANNER	
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Education	MASTER OF URBAN AND REGIONAL PLANNING, SPECIALIZATION IN ENVIRONMENTAL PLANNING (1995) Virginia Polytechnic Institute and State University – Blacksburg, Virginia THESIS: Habitat Conservation Planning Under the Endangered Species Act: Is it Ecosystem Management, Advised by Dr. John Randolph	
	BACHELOR OF SCIENCE IN URBAN AND REGIONAL PLANNING (1993) California State Polytechnic University – Pomona, California	
	ASSOCIATE OF ARTS IN GENERAL EDUCATION (1990) Chaffey Community College – Rancho Cucamonga, California	

Representative Coursework	Endangered Species Management Public Participation Planning Demographic and Statistical Analysis Development Guidelines and Zoning	Comprehensive Planning Presentation Development and Preparation Graphic Design and Mapping Geographic Information Systems Applications and Programming
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Related Experience	VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY – Blacksburg, Virginia (August 1994 - Present) Thesis Research Completing detailed research in the areas of ecosystem management, habitat conservation planning, and the Endangered Species Act; Developing set of ecosystem management criteria to evaluate habitat conservation planning and the Endangered Species Act; Conducted interviews with persons involved in the habitat conservation planning process	
	CITY OF FONTANA PLANNING DIVISION – Fontana, California (June 1991 – September 1991) Planning Intern Researched and tailored Air Quality Element for City General Plan and cataloged historical preservation information	

Additional Experience	VIRGINIA CENTER FOR COAL AND ENERGY RESEARCH – Blacksburg, Virginia (August, 1993 – Present) Graduate Assistant and Computer Technician Entry and analysis of solar research data using spreadsheets and graphics applications; repair and maintain office computers; software installation and setup	
	BRANNIS ELECTRIC, INC. – Riverside, California (September, 1991 – August, 1992) Executive Assistant Completed company employee handbook; developed and wrote company safety manual; data entry; compiled submittal packages for all contracts; maintained records for each contracted job; developed integrated database of suppliers, purchase orders, and job files; repaired and maintained office computers; software installation and setup	

Computer	GEOGRAPHIC INFORMATION SYSTEMS/DESIGN/PRESENTATION: Atlas GIS, Idrisi, MicroCAM, AutoCAD, Visio, and Microsoft PowerPoint	
	WORDPROCESSORS/SPREADSHEETS/DATABASES: Microsoft Windows, Word, WordPerfect, Excel, QuattroPro, and Paradox	
	LANGUAGES: Turbo C/C++	

References	References and portfolio available upon request.	
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