Improved Methods to Evaluate the Impact of Subdivisions on Wildlife in Oak-Dominated Woodlands in California[1]

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Abstract: *This study includes a review of scientific and planning literature, interviews with practicing wildlife biologists, and an analysis of case studies (development projects) located in Northern California and concentrated in oak woodlands at the urban/wildland interface. The goal was to discover and test improved methods for the assessment of wildlife populations and biological diversity where subdivisions have been built.*

Our analysis indicates that a major problem is a lack of communication between professionals in the disciplines of planning and wildlife biology leading to poor understanding of ecological concepts in the preparation of reports and planning documents.

We found that there are few, if any, standardized methods or consistent qualifications for those engaged in the preparation and interpretation of biological surveys and environmental documents. The information presented in environmental assessment documents often lies somewhere between guesswork and science, generally, within the realm of anecdote. Oftentimes, what passes as evidence of absence is, in reality, absence of evidence.

Promising methods and techniques which could improve the wildlife analysis and the decision-making process are: standardized survey methods, improved documentation, use of the compact camcorder, analysis based upon the principles of landscape ecology (ecosystem ecology), the use of adaptive management strategies, and development of community-based coordinated resource management and planning processes (CRMPs).

There are significant impacts on wildlife (defined by the U.S. Fish and Wildlife Service as all living things) because of the land-use policies and regulations governing subdivisions in California. To understand these complex interactions, one must delve into the local, state, and federal statutes, programs, and administrative activities. There are some fundamental and significant uncertainties regarding the impacts development in urbanizing areas of California, particularly in the oak woodland/urban interface.

Over the past two decades, subdivision development and ranching in and adjacent to oak woodlands in California have caused significant losses of oak woodlands (Barbour and others 1993, Pavlik and others 1991). The loss of oak woodland habitats and the decline of wildlife species associated with those habitats appear to be interrelated. However, quantifying this apparent relationship has only recently come under scientific investigation (Block and Morrison 1990 and Block and others 1990). The conversion of forest, farm, and grassland into urban/suburban subdivisions is contributing to the decline of certain habitats and wildlife and may be leading to the ascension of others (Jensen and others 1993). Buildings, concrete, blacktop, and manicured landscapes support populations of exotic wildlife such as starlings, house mice, and argentine ants which may compete with or disrupt native species (Jahn 1991). Subdivisions may also create isolated islands or fragmented remnant habitats (Morrison and others 1992, Soulé 1991).

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Literature Review

Our survey of the scientific literature included peer-reviewed articles, refereed journals, and proceedings and transactions from technical conferences of professional organizations.

Describing the type of oak woodland or other habitat type is part of analyzing a subdivision's impact on wildlife (Allen 1987). The use of mathematical models for predicting occurrences of wildlife within given habitats shows some promise with bird species (James and Shugart 1970, Morrison and others 1987, Raphael and others 1988).

Studies to detect presence and numbers of animals are many and include studies on birds (Morrison and Meslow 1983, Soulé 1991, Verner 1987), mammals (Barrett 1987, Hayne 1978) and herpetofauna (Grant and others 1992, Welsh 1987).

There has been a significant increase in what might be called anecdotal literature, focusing on the human and biological consequences of activities in the urban/wildland interface. There is a growing recognition that there is a lack of quantifiable data demonstrating the effects of the human desire to convert natural landscapes to "higher and better uses" at the potential expense of natural resources (Beatley 1994, Giusti 1993, Keeley 1993, Platt and others 1994). Some planning agencies are developing strategies which directly apply to regulation and management of the environment. For example, the County of Tuolumne developed a Wildlife Project which included mapping and inventory work, specific mitigation measures, a process for evaluating wildlife impacts, and, most importantly, specifications for a monitoring program (Grandholm 1987). The process is still functioning and is being updated and expanded (Augustine 1996). Santa Barbara County has a mitigation and critical habitat program through the use of a Master Environmental Assessment, which focuses on developable areas in specific plans (Santa Barbara County Department of Resource Management, 1992).

The University of California Integrated Hardwood Range Management Program (IHRMP) has published the *Planners Guide for Oak Woodlands* (Giusti and Timmins 1993), *Quercus, Wildlife Among the Oaks: A Management Guide for Landowners* (Johnson 1994) and *Landscape Conservation Planning: Preserving Ecosystems in Open Space Networks* (Peck 1993).

There are aids to help planners and biologists communicate. The *Wildland Planning Glossary* is a classic, but it is out-of-date (Schwartz and others 1976). Perhaps the single most important recent publication to address California's natural resources is *Life on the Edge: A Guide to California's Endangered Natural Resources, Wildlife* (Thelander and Crabtree 1994). This thorough reference is insightful and honest about the future of the state's landscape. It should be a text for anyone interested in the diversity and complexity of California.

There has been an increased interest in joint ventures aimed at expanding general awareness and education regarding wildlife. The Wild Earth Project is in its third year and is a combination of efforts by environmental/conservation groups and well-known conservation biologists such as Reed Noss and Michael Soulé under the auspices of the Cenozoic Society. Their publication *Wild Earth* is very informative, is written in an understandable manner, without jargon and gets to the heart of the difficulties of addressing and affecting significant changes in how we humans act as stewards of the natural landscape (Wild Earth 1995/96).

Supplemental Interviews with Practicing Professional Wildlife Biologists

Five wildlife biologists were interviewed for the purpose of surveying the apparent gap between scientific and other published literature and the actual practice of applied wildlife biology. All of the professionals interviewed are involved in the planning process and its relationship to wildlife and habitat evaluation. The purpose of the interviews was *not* to provide statistical values—only to shed light on a complicated issue.

These professional wildlife biologists differed on some details but were mostly concerned with the amount of time spent in the field, adequacy of training and uniformity and consistency of observations and reporting. They expressed a lack of confidence in mitigation measures but were highly supportive of good mapping and documentation of resources.

Case Study Analysis[4]

For inclusion in this study, projects had to meet certain criteria: (1) location in oak-dominated woodlands of unspecified species composition, (2) sites located in the urban/wildland interface, (3) some record of wildlife investigation and analysis, (4) project approved and at least partially built, and (5) accessible for field investigation.

Selection began with queries to the California State Clearinghouse database, various counties, and cities and regional governments. Five central and northern California counties were contacted. Ten environmental impact reports (EIRs) were reviewed, and eventually four projects were selected, two in Solano and two in Contra Costa Counties.

A critique of information provided and existing methods used for evaluating wildlife populations in proximity to subdivisions in EIRs was carried out in this portion of the study. We identified and evaluated existing procedures and potential techniques which may be useful to planners and field biologists involved in the process of recommending and making decisions about wildlife and subdivisions. Project EIRs were reviewed and analyzed; the treatment of wildlife impacts, discussion of habitats, and mitigation measures were reviewed.

The goal of conducting field surveys for each potential case study was to become familiar with the general urban and wildland context of subdivisions in oak woodlands, to assess the usefulness and accuracy of the planning and environmental literature for the specific case study as well as the applicability of available scientific information.

The goals for the field surveys for each project were: (1) to become familiar with the general context of each subdivision, (2) to determine the level of development completion, (3) to compare the extent and quality of information presented in the environmental documents, and, (4) to develop parameters and conduct field testing of new methodologies.

[4]Detailed analysis of the professional interviews and case studies are available in the complete report under separate cover from the IHRMP office at 160 Mulford Hall, University of California, Berkeley, CA 94720 and at the Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture, P.O. Box 245, Berkeley, CA 94701-0245

Discussion and Conclusions

Some difficult questions must be addressed if significant progress is to be made in the arena of resource protection and prevention of wildlife losses in oak woodlands and other habitats. Clearly the majority of land-use and resource management decisions operate between guesswork and science along the lines of informed anecdote.

We have identified several problems with the current methods used to evaluate potential impacts on wildlife in oak woodlands. These include regulatory and California Environmental Quality Act (CEQA) issues, adequacy

of studies and surveys conducted for CEQA documents, professional communication and training, and the lack of bioregional land-use planning.

Regulatory and California Environmental Quality Act Issues

There is an expectation that the resource protection agencies are looking out for the public's interest in public resources. With the exception of water rights and the Endangered Species Act, there is little legal protection for wildlife on private land. Clearly, private property rights prevail over the responsibility of public agencies to enter lands for the purpose of protecting organisms and/or habitat. Given today's deregulation environment at the state and federal levels, it is unlikely that the public interest in these issues could be elevated to "protection at any cost" (i.e., regardless of private property rights).

In the process of developing land, regulatory forces can influence habitat and wildlife populations. California oak woodland habitat is affected by regulatory actions initiated at city and county levels (Barbour and others 1993, Whittington and Tietje 1992). The discretionary decisions by local governments in approving development projects are primarily nested in general plan and zoning statutes, the Subdivision Map Act, CEQA (1986, California Code of Regulations, CCR Section 15000 *et seq.*) and its Guidelines (Public Resources Code Section 21000 *et seq.*, PRC), and the local implementation through county and city ordinances. And even though California has some of the most detailed and restrictive land-use and planning controls in the nation, there is a "lack of effective wildland land-use planning" (Irwin 1987, 1995).

Replicated experiments and statistical analyses are not required for the preparation of planning documents. CEQA (1986) states, in Section 15147, that an EIR in its analysis "need not be exhaustive.... does not need to be perfection.... good faith effort at full disclosure" 1986). All but a few studies conducted for CEQA documents are "descriptive" studies. They provide estimates and descriptions of the status of a habitat and its inhabitants and do not normally involve "treatments," "test plots," "randomization," or "replication," which are expected in experimental studies. It is apparent that field studies for environmental and planning documents seldom ask the ecological questions, let alone predict outcomes with any testable certainty (Schamberger and O'Neil 1986).

Application and practice of planning and environmental laws and other regulations are often irregular and vary at the local level because of policy, tradition, personal attitudes of decision-makers, and interests of professionals staffing the land-use agencies. The end result is that CEQA is the primary vehicle for citizens and agencies to have input into the planning process. Despite this public process, significant and unmitigated impacts on wildlife may remain. The lead agency decision-makers still have the discretion to approve a project with a "statement of overriding consideration of public good and benefit," (CEQA Section 15093(b)). Too often, disagreements end up in court, resolved to the letter of the law, rather than the legislative intent or spirit (i.e., to improve California's environment).

Adequacy of Studies and Surveys

The basic problem with CEQA is that it does not differentiate between data and analysis prepared by a first-year graduating biology student and a published researcher who may be the leader in her/his field.

Our examination of the EIRs for our case studies pointed out many potential problems. The EIRs and maps are often incomplete or inaccurate: surveys did not encompass the entire project site, no season or time of day was indicated for some surveys, important habitats and conditions were not reported or analyzed, the project description and maps used in the EIRs did not necessarily correlate

with the as-built project, and some mitigation measures were completed while others were not incorporated into the conditions of approval or final improvement plans for the project.

In one case, the EIR for Baywood indicated that riparian and wetland values were sacrificed to accommodate utilities, roads, yards, and homes, while the apparent benefits of preserving large areas of grassland and oak woodland by providing common open space may be outweighed by fragmentation and destruction of other habitats not preserved as open space. Was it worth the loss? A herpetologist might give you a different opinion than an oak woodland specialist. The comparison between the subdivisions providing common open space with smaller concentrated housing lots and the large lot subdivisions with no tracts of common oak woodland and grassland is commonly understood to reduce fragmentation and provide corridors in the former and not the latter. But, scientific criteria have seldom been applied to analysis of these situations to bring any facts to bear on decisions to approve or deny subdivisions.

Few documents we reviewed discussed important ecological concepts such as ecotones, edge effects, niches, or recognized that what you may record about a subject could change significantly minutes or hours later. While numerous techniques for monitoring populations of wildlife are suggested in the scientific literature, few are used by biologists involved in the preparation of relevant sections of EIRs or other environmental documents used in the land use decision-making process (Hayne 1978, Morrison and others 1992, Raphael and others 1988).

According to recent testimony to Congress regarding the requirements and regulations within the Endangered Species Act (ESA) and the National Biological Survey (NBS), landowners and developers are fighting data collection. They fear that new information (e.g., a new location for a listed endangered species) will have a negative impact on their actions or plans (Lewis 1995). Some of the NBS scientists have said, "somewhere along the line, some people figured out that information, true information, is not their friend," and "good science does not always mean good business, at least in the short term."

Professional Communication and Training

The need for better communication is apparent from several recent articles drawing attention to a gap in information and understanding (Giusti 1993, Grumbine 1994, Soulé 1991, Turner and Gardner 1990). We need to speak a common language if we are to fill these gaps with better data, objective documentation, ecological understanding, and, hopefully, sustainable management action.

Professional biologists, as well as non-scientists with experience in various disciplines, are employed to prepare sections of planning documents related to habitat and wildlife; few reports have glossaries or definitions of terms and concepts. These professionals use a variety of standards, languages, and methodologies to assess the environment. The existing gap between traditional scientific methodologies for assessing habitat and wildlife and the practices currently used in the planning process should be closed (Leopold 1992). The information in documents comes from a variety of methodologies which are then used by planning officials, and elected decision-makers make decisions about subdivisions (Johnston and Madison 1991).

A significant concern raised by our study is the qualifications of persons conducting survey work. This is an issue which should be of concern to everyone (Leopold 1992). The wildlife biologists we interviewed consistently identified this as a concern to them.

The question of who is qualified to conduct site investigations, prepare reports, evaluate results and draw conclusions is a difficult one. Criticizing old

EIRs while interpreting existing conditions makes one aware of the biases and prejudices we all bring to projects. We reviewed several certification and licensing programs to detect requirements for level of education, training, and experience. Because there is a lack of legal requirements for "a minimum level of knowledge in biology, environmental laws, or government processes, for biologists who develop or review environmental documentation," legislation for licensing of natural resource biologists has been proposed (Steele 1991). The California Board of Forestry (1991) has a licensing program under Public Resources Code (PRC), Section 750 *et seq.,* titled *Wildland Biologist*, which has limited application to planning and general environmental documents. Voluntary certification programs have been developed by several professional organizations such as the Ecological Society of America, the Association of Environmental Professionals, and the Society for Restoration Ecology. These programs rely on relatively strong ethics statements and experience parameters; the effectiveness of these programs is questionable because they are largely self-policed, voluntary, and often without peer review.

Bioregional Planning and Landscape Ecology

Our study supports others in recognizing the need for a bioregional land-use planning and landscape ecology approach to addressing social and biological issues (Giusti 1993, Naveh and Lieberman 1994). Increased fragmentation of habitat and disruption of wildlife corridors continue to be a result of the disjointed and piecemeal local land-use planning process. This can be expected to continue without a broad commitment to look at land use changes ecologically across jurisdictional boundaries. Local land-use decision-makers seldom work together on these issues. The problem is exacerbated because professional planners and field biologists do not communicate on an ongoing basis. It seems that such approaches are possible at the bioregional level where enough land could be available to meet the many goals of various landowners and resource interests.

Recommendations

These recommendations are intended to stimulate discussion over a wide range of issues and subjects; basically we want to suggest how to reduce the risk to wildlife and habitats and prevent further losses of biodiversity. Our suggestions include regulatory and administrative changes to codes and procedures, public and professional education for improving knowledge of wildlife and the use of standardized field survey methods and techniques for facilitating community involvement.

Regulatory and CEQA Actions

The Resources Agency and the Governor's Office of Planning and Research could conduct a fact-finding session or public hearing on the potential for implementing and codifying methods to improve the sustainability of wildlife and biodiversity. For example:

(1) Development and fostering of legislation to require "no net loss" of species, significant habitat, and biological diversity;
(2) Require performance standards for inclusion in Land Use and Open Space/Conservation Elements of General Plans that would influence zoning regulations and incentives and rewards for jurisdictions which use the standards;
(3) Bolster and fine-tune the California planning and environmental laws (e.g., General Plan, Subdivision Map Act, zoning statutes,

CEQA), and their uniform interpretation and application by professional planners, agencies, and decision-makers;

(4) CEQA statute and guidelines could be amended to require minimum standards for those conducting environmental assessments, how the assessment should be conducted and documented, and methods of analysis and the level of confidence associated with proposed mitigation recommendations. The biological sections of CEQA documents prepared by lead agencies should be standardized and the guidelines revised to include identification of the surveyor, a statement of field conditions and limitations for surveys (e.g., date, time, frequency of sampling, routes, a qualitative assessment of biological diversity). Furthermore, the level of confidence expressed in the analysis and conclusions of CEQA documents should have no less than 80 percent probability of accuracy. We must move towards a more scientific basis for confidence in land-use decisions;

(5) A sample section demonstrating what adequate coverage looks like should be added to the CEQA Guidelines Appendix (e.g., similar to archaeology and energy);

(6) Lead agency decision-makers could be required to make specific findings on impacts to wildlife in any "statement of overriding considerations" they may adopt. Some of these issues have recently been addressed in depth by Landis and others (1995) in their landmark study "Fixing CEQA."

Improving Adequacy of Studies and Surveys

The use of field survey techniques for assessing populations of vertebrates developed by the Museum of Vertebrate Zoology (MVZ) at the University of California at Berkeley is being tested for its applicability to assess the impacts of subdivisions on wildlife (Stebbins and others 1996a). These methods involve intensive mapping and note-taking. The use of field survey techniques in the preparation of EIRs was evaluated in our study, and this method should be considered as a minimum standard for CEQA field surveys by the State Resources Agency and the Governor's Office of Planning and Research. In addition, the California Native Plant Society (CNPS) has published guidelines for assessing effects of proposed development on rare plants and plant communities (Skinner and Pavlik 1994).

We suggest that the data collection process for environmental and planning documents can be significantly improved if resource analyses were standardized through the use of documentable techniques, be they MVZ, CNPS, or other methods.

Wildlife Habitat Relationships (WHR) program is a database that identifies habitat types and the general distribution of amphibians, reptiles, birds, and mammals within California habitats. Shortcomings of the WHR model include the lack of specific soil investigations, the use of broad descriptive units, and the omission of invertebrates. Because it is commonly used in EIRs, an analysis of the four case study sites was performed with the WHR and California endangered species listings in the and California Natural Diversity Data Base (CNDDB) program, *Rarefind*. No recorded locations for rare, endangered or threatened species or critical habitat were identified for any of the case study sites.

These general resource databases such as *Rarefind* and *WHR* are available through the California Department of Fish and Game, Natural Heritage Division. These are useful tools but they are not substitutes for carefully documented field investigation and analysis, and we recommend that they be used in conjunction

with the MVZ Survey Methods, particularly if there is an opportunity to target or search for specific indicator organisms (Stebbins and others 1996b).

Video recording with the relatively inexpensive and readily available compact video recorder is an obvious candidate for increasing the quantity and quality of data gathered and retained during field surveys. The most recent version of the MVZ methods outlines how the medium can be of use in that regard. We have prepared a demonstration video on how the camcorder can be used for field surveys which is available through the IHRMP office at 160 Mulford Hall, University of California, Berkeley, CA 94720.

Professional Communication and Training

There is a need for clear working definitions of *wildlife* and *biodiversity* The terms "wildlife" and "biodiversity" have no commonly agreed upon definition, by scientists or the public. We recommend that the State of California formally adopt the U.S. Fish and Wildlife Service definition of wildlife as "all living things" and that Edward O. Wilson's (1992) definition of biodiversity be adopted: "The variety of organisms considered at all levels, from genetic varieties belonging to the same species to arrays of species, to arrays of genera, families and still higher taxonomic levels; includes the variety of ecosystems which comprise both the communities of organisms and the particular habitat and physical conditions under which they live" This definition implies that biodiversity is not just an extensive list of organisms, but also includes the systems and functions it takes to maintain and sustain the organisms.

Please see recommendations above on training and outreach under ***Regulatory and CEQA Actions***.

Bioregional and Landscape Planning

Landscape ecology is a unifying concept that ensures that all factors are considered. Its principles and practice allow us to deal with issues from the perspective of property owners who are more likely to become involved if it is understood that they and their concerns are accommodated from the beginning while still addressing the need for objective scientific criteria. So, landscape ecology provides a mechanism to converse and understand the forces at work at the urban/wildland interface. The concepts of ecology and economics can be dealt with simultaneously and from a regional perspective.

The State Resources Agency and the Governor's Office of Planning and Research should develop a policy for implementing a statewide program to establish landscape ecology as the guiding philosophy for environmental considerations in California (Naveh and Lieberman 1994).

An adjunct to landscape ecology is adaptive management which is an emerging approach to quantification of management decisions and testing success of actions. The principles and practices of adaptive management have direct application to natural or renewable resources. One of the most important features is the requirement that management actions *must* have a monitoring or feedback element to determine whether the actions were successful. The principles have been applied to USDA Forest Service programs (e.g., Sequoia National Forest) and some Canadian fisheries programs. Adaptive management would be an appropriate approach to improve the level of confidence in approved mitigation measures. A confidence level of 80 percent has been proposed for use in the planning process (Sanders and Baefsky 1994), in contrast to 95 to 99 percent levels commonly used in science-based experimental research; this seems more realistic and defensible with the reliance on a scientific monitoring program that strives for higher confidence levels through a feedback and review process.

Coordinated resource management and planning (CRMP) a current method for developing bioregional biodiversity planning by federal, state, and local

agencies in conjunction with non-governmental organizations and individuals, through a memorandum of understanding, appears to be working in California (Hoshofsky 1992). Perhaps this process provides the greatest opportunity to address the major problems of habitat fragmentation and destruction of physical corridors through bioregional planning by increasing opportunities for serious discussions about the importance of resource issues in California (CRMP 1993, Giusti 1993, Tietje and Berlund 1995). The beauty of the CRMP process is that *all* stakeholders have a place at the negotiating table and when the process is completed, they will all leave with the feeling that they were heard and made written commitments to each other. No one will get all they want, but history has shown that this process often leaves permanent bonds between people and places and the work will be accomplished in the field where it matters and not at the podium where rhetoric rules over reason.

This report is presented against the backdrop of two considerations which run through our analysis and understanding of the problems presented. First, there seems to be an unwritten assumption on the part of the general public—a belief, rather—that our public wildlife resources are being looked after and protected by someone, and second, there seems to also be a notion that absence of evidence is synonymous with evidence of absence. Neither of these assumptions is borne out by our study. There needs to be a public trust doctrine with regard to wildlife protection and a greater demand for scientific proof that there will be no net loss of wildlife values resulting from the development process. Our finding is that these two issues must become important in the minds of the public and elected officials if significant progress is to be made in lowering risk to wildlife and prevention of loss of biodiversity and extinctions in oak woodlands and other habitats in the urban/wildland interface in California.

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