



Conservation Approaches to Protecting Critical Habitats and Species on Private Property

Authors: Dr. Debby, F. Mir, and Dick, Kevin

Source: Natural Areas Journal, 32(2) : 190-198

Published By: Natural Areas Association

URL: <https://doi.org/10.3375/043.032.0208>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

●

Conservation Approaches to Protecting Critical Habitats and Species on Private Property

●

Dr. Debby F. Mir^{1,3,4}

¹Tel Hai Academic College
Upper Galilee, Israel 12210

Kevin Dick²

²Department of Geography and
Environmental Studies
Northeastern Illinois University
5500 North St. Louis Avenue
Chicago, Illinois 60625

³ Corresponding author:
debbymir@gmail.com; 972-4-9533581

⁴ Current address:
Dekel 14A, Kiryat Tivon, Israel, 36056

ABSTRACT: This paper highlights the importance of private lands for habitat and species protection and the challenges of engaging private owners of critical natural habitat in conservation programs. The literature points to similar attitudes among owners of agricultural and recreational properties. In the case study, a landowner's conservation attitude and behavior was assessed prior and subsequent to conducting a botanical survey on a critical habitat where a Michigan State threatened species and rare plant were identified. Learning of the at-risk species strengthened interest in conservation but not for protecting the rare habitat in a conservation program, despite positive experience with an agricultural property.

Agricultural property owners view conservation as normative social behavior and face quantifiable financial challenges and opportunities when weighing conservation options. In contrast, owners who purchase property for wildlife enjoyment may be more confident of their ability to independently engage in conservation and fearful of government interference and loss of privacy should critical species or habitat be discovered.

Behavioral theory informs strategies to promote private land conservation and should consider type of land use, expected conservation costs, and level of intergenerational nature engagement, among other factors. For example, in families where only the older generation is engaged, the emphasis would be on purchasing land or conservation easements. For conservation-minded families, the strategy might be to encourage biological surveys and offer conservation assistance while safeguarding privacy.

Index terms: conservation, critical habitat and species, plants, private landowner, wetland

INTRODUCTION

Development, when productive agricultural or natural land is converted to urban and related land use, is a major cause of species extinction as habitat loss and degradation reduce the range of many plant and animal species. Government agencies have responded by sponsoring research to inform species and habitat protection, enacting conservation laws and guidelines, establishing public nature reserves, and—with non-governmental organizations (NGO's)—providing informational programs and incentives to assist private landowners who control access to and manage their properties (NRCS, n.d.; Land Trust Alliance 2005; Cattaneo et al. 2006). Private landowners offer special challenges in promoting environmentally responsible behaviors and developing strategies and programs to identify and protect critical habitat and species (Geller 1995; Stern 2000).

The importance of private lands for habitat and species protection is increasingly valued, even as their area is diminishing. Parcellation of private agricultural and natural habitat to transfer to new owners with different values and expectations are changing the natural landscape and management practices—such as conflicting per-

ceptions over property rights and hunting as a threat to biodiversity or benefit for species protection. These differences are leading to a fragmented and often ill-informed mosaic of management practices.Restricted access to natural private habitat helps explain the relatively few studies of the biodiversity or vulnerability of private lands. Regardless of conservation attitude, landowners are protective of their privacy and avoid actions that could trigger regulatory or other types of interference (Brook et al. 2003; Yung and Belsky 2007). This helps explain the relatively few studies of the biodiversity or vulnerability of private lands, and the fragmented and ill-informed mosaic of management practices.

This paper discusses the importance of private lands in preserving biodiversity and the challenges of working with landowners to assess the biological value of their properties and develop affective strategies to protect critical natural areas. The potential for private land conservation is assessed based on government and private conservation policies and practices, land-use and hunting trends, and expectations of private landowners to enjoy economic and other benefits from their property. A case study illustrates differences in motivations and conservation actions of an owner of agricultural land and land purchased for

recreation and intrinsic value, leading to recommendations for diversified conservation policies and practices based on land use and ownership motivation.

Importance of Private Land Conservation

America loses approximately eight-hundred thousand hectares of farms, forests, and open spaces annually. This includes forty thousand hectares of wetlands, which is vital for wildlife survival, flood control, and maintaining water quality (Land Trust Alliance 2005). Seventy-five percent of the remaining approximately forty-four million hectares of wetlands are situated on private lands. Aggressive conservation and restoration policies, especially since the 1990s, have achieved the policy goal of no net wetland losses, especially from agricultural lands. Despite this success, private landowners remain reluctant to report critical habitat or species in fear of potential land-use restrictions and loss of property value (Brook et al. 2003; Wiebe and Gollehon 2006; Zinn and Copeland 2007).

Early conservation studies focus on protecting game species (wildlife and fish) and their habitats for recreation and on managing agricultural land sustainably, while current conservation efforts have since expanded to protecting critical habitat and at-risk plant and animal species (Brook et al. 2003; Lueck and Michael 2003; Fischer 2005; Troy et al. 2005; Winter et al. 2005). Private agricultural lands (working landscapes) are considered especially significant for conservation encompassing three-quarters of United States land divided among rangeland, farmland/crops, and forestland (Land Trust Alliance 2005; Lubowski 2006). However, rapid population growth and increases in personal income are resulting in a sharp decline of croplands and forested lands. Substantial expansion of residential, urban, transportation, and related land uses are expected to continue over the next 50 years, especially in the West, South, and coastal areas (Lubowski et al. 2006; Alig et al. 2010). Working landscapes often contain critical or important habitat including riparian frontage and wetlands vital for wildlife

survival, flood control, and water quality maintenance; while isolated wetlands are likely to harbor uncommon, threatened, or endangered species (Mitsch and Gosselink 1993; Land Trust Alliance 2005; Wiebe and Gollehon 2006).

Most research on the impact of development on wildlife is limited to studies of endangered or threatened species under the Endangered Species Act (ESA), which provides for incidental impacts on protected habitats with an approved Habitat Conservation Plan (HCP). Taylor et al. (2005) studied 1095 species listed under the ESA during the 1990s and found that “species with critical habitat for two or more years were more than twice as likely to have an improving population trend in the late 1990s, and less than half as likely to be declining in the early 1990s, as species without” (p.1). Protecting habitat, therefore, is the most effective measure to preserve populations of threatened and endangered species. The extent of local habitat and natural services (clean water, parks, etc.) protected through private land conservation is less studied despite its importance (Randolph 2004; Land Trust Alliance 2005). The State of Michigan, for example, has approximately eleven and one-half million hectares of critical species habitat on private land, with 97% in the Lower Peninsula (Eagle et al. 2005).

Government and Private Conservation Programs for Private Lands

United States wildlife protection laws and practices reflect land ownership and conservation priorities. Criteria include maximizing protection while minimizing costs; thus, many nature reserves were established on less productive land (DeFries et al. 2007). This helps explain why 50% of endangered species are found primarily on, and 90% of their range is on, private lands (USGAO 1994). However, the majority of studies investigating endangered species incidence occurred on federal lands because of accessibility (Morrison and Humphrey 2001; Brook et al. 2003; Hilty and Merenlender 2003). The paucity of research on private lands is problematic as governments require scientific data to designate species-

at-risk, identify critical habitat, and inform conservation strategies. Most research on the impact of development on wildlife affecting private land is centered on the ESA (USGAO 1994; Gerber et al. 1999; Morrison and Humphrey 2001; Brook et al. 2003; Randolph 2004; Taylor et al. 2005; Leigh and Olive 2008).

While government programs and funding play a leading role in conservation, the focus is on public parks, nature reserves, and working landscapes. Habitat is protected through land conservation or preservation, the permanent withdrawal of land from development, or by regulating land use. Government conservation efforts include protecting federal, state, regional, and local public lands as well as the administration of regulatory and incentive programs, education, and technical or other assistance to government agencies, private organizations, and private landowners to promote conservation and preservation on public and private lands. Programs and incentives for privately-owned lands are administered primarily by the Department of Natural Resources (DNR), often in partnership with other governmental or private entities (NRCS, n.d.; Randolph 2004; Cattaneo et al. 2006).

Federal programs affecting private land conservation include the ESA and a provision of the Clean Water Act (CWA) that requires permits for dredging or filling in wetlands (Randolph 2004). Under the ESA, federal protection of animals extends to all federal, state, and privately-owned lands; but plant protection is limited to federally owned or managed land despite comprising approximately 50% of protected species (USGAO 1994). However, there is no evidence this has detrimentally affected endangered species recovery as plants may benefit more from habitat than individual species protection. Conservation measures on privately-owned land are especially critical if native wildlife biodiversity is to be maintained (USGAO 1994; Taylor et al. 2005).

The ESA does not have a mechanism for protecting endangered or threatened species when private landowners are unaware of or would rather not ascertain or report

harboring critical species. The ESA uses an inflexible command and control approach that forbids many types of land management, even when potentially beneficial to endangered or threatened species. Landowners fear forfeiting control over the use and resale value of their property and may actively avoid the creation of, or destroy, critical habitat (Hadlock and Beckwith 2002; Brook et al. 2003; Lueck and Michael 2003; Leigh and Olive 2008). Most information on protected species is anecdotal due to difficulties obtaining permission to study private lands. Unfettered access is especially important as private lands may contain critical habitat or protected species may have small isolated populations (Gerber et al. 1999; Brook et al. 2003; Hilty and Merenlender 2003; Lawler et al. 2003).

Private conservation organizations, and especially land trusts, have taken a leading role in identifying critical habitat and encouraging private land conservation. Most programs combine fee-simple purchase and private land conservation, where land remains under private ownership with development restrictions (Parker 2002; Rissman et al. 2007; Ernst and Wallace 2008). Land trusts promote private, voluntary land conservation through land acquisition, conservation easements, and stewardship (Land Trust Alliance 2005).

State entities provide funding and play a data collection, technical assistance, organizational, and enforcement role for implementing conservation programs (Wilcove and Lee 2004; Land Trust Alliance 2005; Wallace et al. 2008). States with adequate capacity can partner with other government or private entities to implement the ESA or develop broader or more stringent programs (NRCS, n.d.; Randolph 2004). For example, Michigan is a leading state in total acres protected by state or local land trusts and provides financial and legal protection to species and habitat that may become threatened, endangered, or extinct in the state. Michigan regulates private land habitats significantly more than required by the Federal ESA (Michigan Legislature 1994; Austin 2003; Land Trust Alliance 2005). In order to qualify for federal conservation funding, Michigan

developed the Wildlife Action Plan to identify and protect high quality habitat and at-risk species and to provide landowners with conservation education and technical assistance (Eagle, et.al 2005). Landowners may enter into conservation easements, place development restrictions on deeds, trade conservation credits to developers, or enter into “safe harbor agreements” (Michigan Legislature 1994; Wilcove and Lee 2004; Ruhl et al. 2005). Most plant protection falls to the states.

Incentives and Disincentives for Private Land Conservation

The literature presents multiple motivators for conserving private property, including financial, environmental, altruistic, and recreational (Table 1). Most of the findings are based on surveys of landowners already participating in conservation programs. Mistrust of or conflicts with conservation agencies, as well as lack of, confusing, misleading, or inaccessible conservation information are a common problem in approaching private landowners (Leigh and Olive 2008). Studying private land also presents challenges to researchers. First, a facultative knowledge of community types and species identification is a prerequisite to a good study. Often individuals with this skill are associated with government or academic institutions and perceived as authoritative figures by perspective landowners, or have limited resources. The view that researchers are authority figures to be wary of is a common view held by landowners with critical habitat (Brook et al. 2003).

Disincentives for conservation were primarily attributed to anticipated costs or income loss. For example, dairy farmers rejected longer cutting intervals to provide bird nesting habitat as this would significantly reduce hay nutritional value, and landowners reacted negatively to protecting Preble’s meadow jumping mouse (*Zapus hudsonius preblei*) in the absence of monetary incentives (Brook et al. 2003; Troy et al. 2005). Forty-one percent of mostly non-agricultural landowners living in a newly designated conservation area for the Indiana bat (*Myotis sodalis*) agreed that some limits on private land use were

appropriate, but this had little to no influence on their land management practices (Leigh and Olive 2008). Paradoxically, when conservation groups seek to acquire critical habitat, some landowners resist, enjoying their privileged position on valued natural landscapes and confident in their land management practices (Parkhurst et al. 2002; Brook et al. 2003; Leigh and Olive 2008).

Financial incentives for private land conservation in the form of grants and tax incentives increased starting in the mid 1990s as government and nonprofit organizations realized their importance for protecting critical habitat. A wide range of financial incentives were developed to protect habitat or species, including: direct payments and tax relief, market institutions, regulations and enforcement, legal mechanisms, property rights tools, education, recognition programs, and administrative streamlining (Parker 2002; Ruhl et al. 2005). For example, the U.S. Fish and Wildlife Service initiated State Wildlife Grants (SWG) in 2001 to fund qualified state wildlife conservation programs. Many states offer four to six types of incentives, sometimes through a single program. Local governments mostly use zoning regulations and the transfer of development rights to meet conservation objectives (NRCS, n.d.; Randolph 2004). Often programs serve a dual purpose of conservation and recreational improvements.

Agricultural conservation programs receive the largest budgets for private land conservation measures, including: erosion control, water quality improvement, and disincentives for modifying environmentally sensitive areas. Some programs mitigate the environmental effects of marginal agricultural land, such as the Wetlands Reserve Program, while others help individual landowners provide stewardship (Randolph 2004; NRCS 2005; Cattaneo 2006). Ironically, an analysis of endangered species density in U.S. counties cited agricultural activity as the most important variable endangering native plants (Dobson et al. 1997).

Privately funded conservation efforts, and especially land trusts, have taken a leading

Table 1: Factors Promoting Conservation on Private Property.

Landowner Characteristics, Beliefs and Attitudes

- Personal beliefs and attitudes can encourage or discourage conservation. For example, importance of ecological, environmental, and agrarian stewardship.
- Experiences intrinsic satisfaction from conservation (in Brook et al. 2003)
- Aesthetic appreciation of nature, wildlife, and forest by owner and legacy (Fischer 2005)
- Resident/frequent visitor and familiar/actively enjoys property, protects property for self and future generations (in Brook et al. 2003; Ernst and Wallace 2008)
- Landowners perceived responsibility to neighbors (community mindedness) and environment (in Brook et al. 2003; Ernst and Wallace 2008)
- Confident in personal land management and conservation abilities (in Brook et al. 2003)

Land Characteristics

- Larger farms if owners believe can afford to take a risk
- Contains views of nature, wildlife, or forest (in Brook et al. 2003)
- Commercially viable farms if low cost of habitat protection or little economic pressure
- Farms with smaller dairy herds are more likely to protect habitat than with larger herds
- Large lot private property (not farms) on former hayfields (Troy et al. 2005)
- Smaller non-agricultural plots in community efforts to protect open spaces (Ernst and Wallace 2008)
- Land is subject to development or fragmentation threats (Rissman et al. 2007)

Species Characteristics

- Perception a species is beneficial (Troy et al. 2005)
- Recognition that species is at risk (Leigh and Olive 2008)

Conservation Incentives

- Conservation policies, institutional and family influences (in Winter et al. 2005)
- Financial incentives such as tax incentives and subsidies for conservation, tax deductions for conservation easements, and grants or assistance to offset conservation costs or loss of income as a result of conservation (Brook et al. 2003; Fischer 2005).
- Access to formal pro-conservation information/education from wildlife agencies
- One-on-one diffusion approach by the U.S. Extension Service was successful in adoption of agricultural innovations and a similar approach might work for wildlife conservation
- Access to information and support through social networks (support social norms)
- Conservation agencies and organizations that listen to and work cooperatively with landowners, giving them respect and sense of control and fairness (sources)
- In some, but not all cases, non-consumptive recreational land use such as wildlife viewing and hiking, or consumptive activities such as hunting and fishing (sources)
- USFWS programs for private landowners such as Landowner Incentive Program (LIP) and the Habitat Conservation (Leigh and Olive 2008)

role in private-land purchase following government budget cuts (especially federal LWCF funds) and growing public concern over the fast pace of urban sprawl and unplanned development. A survey of natural land trusts during 2000-2005 indicate a 54% increase (nine and one-half million to fifteen million hectares) in total acreage

conserved, a tripling in the pace of local and state conservation through land trusts, 32% increase in the number of land trusts (1667), and an increase in the level of professionalism and accountability (Land Trust Alliance 2005). Other reasons for conserving critical habitat exist, such as altruistic or aesthetic motiva-

tions. Fischer and Bliss (2008) found, when interviewing Oregon family foresters, that utilitarian values, a desire to steward legacies, and self-determination were motivators toward managing productive forests in such a way as to maximize ecosystem benefits. Kaplan and Kaplan (2008) further address the importance of understanding

human psychology, a prime motivator for conservation efforts that involves recreation such as hunting or camping, and other seemingly selfish reasons for practicing conservation. However, the Fischer and Bliss study underscores an important issue in conservation: the need to bridge the gap between research and implementation, as the study did not indicate next steps in identifying best uses or conservation techniques for the land beyond what was already determined by the landowner to be acceptable. Knight et al. (2007) address this by suggesting that actions “expand the social dimension of conservation assessments” among other ways to improve the implementation of actions suggested by research and conservation assessments.

The role of hunting in maintaining both natural and working landscapes has been extensively studied in the academic and practitioner literature. Hunting is controversial, culpable for extinction of select species and impacting food web integrity and habitat, but also increasingly realized as beneficial in the absence of natural predators. Paradoxically, hunting is the most effective tool for managing overabundant species such as deer (*Odocoileus virginianus*) that cause extensive economic damage to farmers, vehicle collisions, and reduction of the biodiversity of flora and fauna, and regeneration efficiency in natural areas. Hunting and fishing also generate income for U.S. conservation that provided more than \$10 billion for state and territorial wildlife conservation over seventy-five years through license fees, duck stamps, and special excise taxes (USFWS 2006; Jagnow et al. 2008).

Because of the wide range of deer and other grazers, effective management depends upon access to contiguous public and privately-owned lands (Yung and Belsky 2007; Jagnow et al. 2008). However, according to the 1995-96 National Private Owners Study, access to private property declined significantly with approximately 40% of U.S. landowners posting against trespassing and hunting (Teasley et al. 1997). Restricting private land to public hunting is problematic for wildlife management, especially when posted parcels provide refuges for deer that subsequently

migrate and impact other properties.

Research indicates that hunting perceptions differ between rural and urban owners and can change with experience, such as when people in new subdivisions are initially attracted by deer but subsequently favor lethal controls after suffering collisions and property damage (Jagnow et al. 2008). Non-farmers, urban retirees, or absentee landlords purchasing farms and natural areas for their natural value are more often pro-conservation and concerned with privacy, limiting public access for hunting in ways that clash with traditional rural values and practices (Jagnow et al. 2006; Yung and Belsky 2007). Farmers and ranchers are more likely to allow hunting access to neighbors and family upon request—especially when over-abundant deer populations are destroying feedstock (Teasley et al. 1997; Morrison and Humphrey 2001). Some landowners improve habitat for economic gain, leasing access for hunting and recreation. In contrast, no-trespass postings are common among absentee urban landlords and persons that experienced property damage from hunters or recreationalists or fear illegal hunting, liability, or safety. The literature indicates socio-economic factors are generally not significant predictors of access to private lands but investment in hunting habitat is more likely for owners with higher incomes and larger holdings (Luek 1991; Jagnow et al. 2006; Zhang et al. 2006; Yung and Belsky 2007; Jagnow et al. 2008).

Case Study – Intergenerational Attitudes towards Private Property Conservation

A landowner and his family’s conservation attitude and behavior were assessed prior and subsequent to conducting a botanical survey in a rare and diverse conifer swamp habitat in Chippewa County, Michigan. The case study differed from previous research in that it focuses on a non-agricultural habitat purchased for its wildlife, was conducted by a previously unknown neighbor/researcher, and the landowner participates in the USDA’s cost sharing Wetland Reserve Program (WRP) on farmland owned elsewhere in Michigan. The swamp habitat was purchased for con-

sumptive and non-consumptive private use of “beneficial” wildlife (viewing, hunting, and fishing) with no financial pressure to manage the land to the detriment of habitat or at-risk species. The research consisted of a botanical survey and interviews with the landowner prior to and following the botanical survey, where responses reflected early attitudes and any new interest in the property’s ecological value after learning about the survey results and conservation options.

One Michigan State-threatened species and one rare plant were identified. Learning of the uncommon habitat and at-risk species strengthened the landowner’s conservation resolve. The family was familiar with and had discussed various conservation options prior to the study. The landowner expressed interest in learning about other programs and added that “[his] son is like-minded,” sharing the same attitude toward conservation, using the property only for deer hunting and the “*only [other] reason to own the land is to not disturb the area...[that] nothing is better than natural*” (landowner, pers. comm., 2 May 2006). He was critical of land use that could disturb the aesthetic quality of the bay, noting that it is a “*privilege and an honor to be near the lakeshore, not a right*” (landowner, pers. comm., 2 May 2006). The land was posted as private property—no hunting allowed. The landowner was interested in supporting further wildlife research and appreciated the ecological value of the habitat, but hesitant to report survey results that could attract regulatory attention pending information as to any ramifications. He saw no need to place the land in a permanent conservation easement as he “*protects the land.*”

Knowledge of at-risk habitat and species did not change the landowner’s attitude towards conservation, but supported pre-existing convictions. Participation in the study led to self and family reflection on the responsibility of owning unique habitat and to proactive conservation actions (investigating development threats in the vicinity, reporting survey results). The importance of residency and peer support are further supported as the landowner’s attitude towards protecting endangered spe-

cies agree with the majority of Michigan residents, and his primary residence is protected in a conservation program in the lower peninsula where this is commonplace (Eagle et al. 2005).

The landlord was leery of potentially burdensome conservation requirements, and external incentives or disincentives for conservation had little influence on attitudes or practices. The landowner and his son made contradictory statements regarding economic incentives, saying this was a good reason *other* people might consider placing their land in a conservation program and saying later that economic incentives may eventually sway them. In practice, financial benefits are important incentives in other case studies for entering conservation programs, such as the Wetland Reserve Program (Fischer 2005, p. 9-11). A recent analysis of conservation program participants helps explain the paradox where agricultural property owners were motivated by financial benefits compatible with their operations, while non-agricultural owners “*tended to see financial incentives as the means for realizing important motives*” (Ernst and Wallace 2008, p. 10). In the case study, the overriding motivation for conserving land was to own property for intergenerational hunting, fishing, and wildlife enjoyment (Main et al. 1999; Hadlock and Beckwith 2002; Wilcove and Lee 2004; Fischer 2005). With attractive financial initiatives and reassurance, they could continue to enjoy their land as before; private landowners could, in principle, be approached for data collection on their properties.

The landowner purchased and is conserving the land for hunting, a sport in decline. In Michigan, the number of hunters decreased by 9% from 1991-2001, especially new recruits. That said, the similarity of the landowner and his son’s attitudes is supported by earlier conservation studies (Glass and Bengtson 1986; Miller and Glass 1989; Frawley 2006). However, shared intergenerational participation in hunting is becoming less typical, and younger generations distant from nature may be more receptive to development and other economic incentives (Michigan Legislature 1994; Austin 2003).

Discussion and Recommendations

The study points to similarities in conservation stewardship attitudes among owners of different categories of private land not necessarily linked to common expectations or actions. The relationships between environmental attitudes and actions can be analyzed within the framework of altruism and attitude theories. Altruistic values may induce a moral obligation to act given the opportunity (Geller 1995; Kaplan and Kaplan 2008), while attitude theories assume a causal chain of personal and normative beliefs and attitudes that predict intention and subsequent behavior, subject to perceived and actual barriers. Thus, individual landowners formulate intentions depending on their beliefs (personal, societal norms/peer pressure, perceived barriers) that are more likely to transfer into action given opportunities or in the absence of barriers (Stern 2000; Raudsepp 2001). Personal beliefs may be similar but social norms or perceived or actual barriers/opportunities different; thus, different strategies may be needed to promote environmentally responsible actions, depending on the situation. In the case study, the landlord participated in a conservation program for agricultural land (normative behavior, financial incentives) but is reluctant to protect the conifer swamp habitat in a similar manner (non-normative behavior, belief in personal ability, fear of reduced property value, protect privacy and avoid government interference).

Many of the landowner’s values and characteristics in the case study paralleled those of landowners participating in agricultural conservation programs, including: an appreciation of nature and wildlife along with a limited knowledge of vulnerable species, familiarity with property, intrinsic satisfaction from conservation (for sustainable agricultural or natural habitat), belief in stewardship, fear of government interference, and confidence in personal land management abilities (Brook et al. 2003; Eagle et al. 2005; Fischer 2005; Ernst and Wallace 2008). However, those beliefs led to the alternate conclusion that conservation would be well served by acting independently, a finding supported by

recent studies (Brook et al. 2003; Fischer 2005; Leigh and Olive 2008).

Conservation issues are becoming more acute with recognition that public lands are insufficient to maintain biodiversity, and private natural landscapes are rapidly being converted to other uses. Farmers and ranchers take an anthropocentric approach to conservation with a greater emphasis on economic gain that favors human needs over wildlife, while ‘recreational’ landowners tend to focus more on the intrinsic and enjoyment value associated with natural lands. Thus, financial incentives may be a more powerful motivator for conservation in working landscapes (ranches and farms) than for natural lands purchased for private enjoyment and recreation. However, the importance of integrating conservation with the legitimate rights of private landowners to enjoy their property depends on territorial compromise between the requirements of wild populations and land use for other purposes (Lueck 1991; Norton 2000).

The landlord was apprehensive about reporting the at-risk species despite his new knowledge and positive experience with the agricultural land Wetland Reserve Program. He reconsidered, after a period of reflection and discussions with family, the researcher/neighbor, and conservation agencies. In this case, “*peer knowledge and encouragement*” or normative behavior was a strong incentive that could be accessed through social, religious, or hunting organizations (Brook et al. 2003; Hilty and Merenlender 2003; Ernst and Wallace 2008).

Since the landowner and his son were inclined toward conservation, the survey results strengthened their resolve to protect the property from development, but also to resist transferring land or land-use rights in a long-term conservation program (Brook 2003; Leigh and Olive 2008). If true in general, private landowners are important potential partners in protecting critical habitat, especially where the emphasis is on preservation and not intensive costly maintenance. The cumulative impact of recruiting private landowners could be significant. As with any case study, results should not be considered representative of

all landowners but draw attention to and provide insight regarding a subpopulation of private landowners that directly benefit from conservation.

This raises the question if privately motivated conservation is likely to continue protecting critical habitat in the future. Studies in the U.S., Japan, and Spain indicate an annual decline in the public's participation in nature of 1.0% to -31% since 1981, for a total decrease of 18%-25%, correlating with a rise in sedentary activities involving electronic media (Pergams and Zaradic 2008). This trend has serious policy implications, as participation in environmental protection correlates with personal experiences in nature (Chawla 1999; Sobel 1999; Pilgrim et. al. 2007; Pergams and Zaradic 2008).

This paper proposes tailored policies to identify and protect natural lands purchased for wildlife enjoyment by using behavioral models. For example, inter-generational nature involvement can be assessed using activity surveys and a review of hunting and fishing licenses. In families where only the older generation is actively involved, the strategy would be to propose purchasing or protecting property in a conservation easement or related program. For conservation-minded families, the emphasis would be to solicit biological surveys and offer conservation assistance while safeguarding private use. Selectively recruiting private landowners on the basis of intergenerational nature involvement could prioritize conservation resources on critical or suspected critical habitat (Eagle et.al. 2005). This approach is especially pertinent given the importance of private lands for at-risk species and habitat and as opportunities for conservation elsewhere is limited.

ACKNOWLEDGMENTS

We are greatly indebted to the landlord for approving the botanical survey and to him and his family for their frank and committed participation in the study.

Dr. Debby F. Mir is an academic lecturer at Tel Hai Academic College, researcher, and consultant in environmental sciences

and studies who has worked in the U.S., Europe, Israel, and India. Debby holds a B.Sc. in Biology from McGill University in Montreal, Masters in Environmental Science from the Israel Institute of Technology, Ph.D. in Environmental Management and Policy from the Hebrew University of Jerusalem, and a certificate from UC Santa Cruz in Hazardous Waste Management. Her research focuses on environmental policy and promoting environmental and healthy behaviors in large sectors of small and micro-industries.

Kevin Dick, MA, is Director of Certifications Programs at the Delta Institute, with over 10 years experience managing and implementing sustainable building and planning projects, and has a wide experience in many aspects of environmental sciences. He presents, publishes, and provides trainings on a variety of topics, including energy efficiency and weatherization, green cleaning, native landscaping, stormwater best management practices, urban forest diversity, and endangered species management. Kevin has a B.S. in Environmental Science from the University of Cincinnati and a M.A. in Geography & Environmental Studies from Northeastern Illinois University.

LITERATURE CITED

- Alig, R.J., A.J. Plantinga, D. Haim, and M. Todd. 2010. Area changes in U.S. forests and other major land uses, 1982 to 2002, with projections to 2062. General Technical Report PNW-GTR-815, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, [Portland, Ore]. Available online <http://www.fs.fed.us/pnw/pubs/pnw_gtr815.pdf>. Accessed 5 July 2011.
- Austin, M.E. 2003. Resident perspectives of the open space conservation subdivision in Hamburg Township, Michigan. *Landscape and Urban Planning* 69:245-253.
- Brook, A., M. Zint, and R. DeYoung. 2003. Landowners' responses to an Endangered Species Act listing and implications for encouraging conservation. *Conservation Biology* 17:1638-1649.
- Cattaneo A., D. Hellerstein, C. Nickerson, and C. Myers. 2006. Balancing the multiple objectives of conservation programs. Economic Research Report No. 19, U.S. Department of Agriculture, Economic Research Service.

Available online <www.ers.usda.gov/publications/ERR19/ERR19.pdf>. Accessed 5 July 2011.

- Chawla, L. 1999. Life paths into effective environmental action. *The Journal of Environmental Education* 31:15-26.
- DeFries, R., A. Hansen, B.L. Turner., R. Reid, and J. Liu. 2007. Land use change around protected areas: management to balance human needs and ecological function. *Ecological Applications* 17:1031-1038.
- Dobson, A.P., J.P. Rodriguez, W.M. Roberts, and D.S. Wilcove. 1997. Geographic distribution of endangered species in the United States. *Science* 275:550-553.
- Eagle, A.C., E.M. Hay-Chmielewski, K.T. Cleveland, A.L. Derosier, M.E. Herbert, and R.A. Rustem, (eds.). 2005. Michigan's Wildlife Action Plan, Michigan DNR. Available online <http://www.michigan.gov/documents/dnr/A0_Executive_Summary_and_TOC_319782_7.pdf>. Accessed 5 July 2011.
- Ernst, T., and G.N. Wallace. 2008. Characteristics, motivations, and management actions of landowners engaged in private land conservation in Larimer County Colorado. *Natural Areas Journal* 28:109-120.
- Fischer, A.P., and J.C. Bliss. 2008. Behavioral assumptions of conservation policy: conserving oak habitat on family-forest land in the Willamette Valley, Oregon. *Conservation Biology* 22:275-283.
- Fischer, P. 2005. Listening to landowners: conservation case studies from Oregon's Willamette Valley. Available online <http://www.defenders.org/resources/publications/programs_and_policy/biodiversity_partners/listening_to_landowners.pdf>. Accessed 5 July 2011
- Frawley, B.J. 2006. Demographics, recruitment, and retention of Michigan hunters: 2005 update. Wildlife Division Report #3462, Michigan Department of Natural Resources. Available online <http://www.mich.gov/documents/dnr/2006_demographics_recruitment_retention_hunters_175136_7.pdf>. Accessed 5 July 2011.
- Geller, E.S. 1995. Actively caring for the environment: an integration of behaviorism and humanism. *Environment and Behavior* 27:184-195.
- Gerber, L.R., D.P. DeMaster, and P.M. Karreiva. 1999. Gray Whales and the value of monitoring data in implementing the U.S. Endangered Species Act. *Conservation Biology* 13:1215-1219.
- Glass, J., and V.L. Bengtson. 1986. Attitude similarity in three-generation families: socialization, status inheritance, or reciprocal

- influence? *American Sociological Review* 51:685-698.
- Hadlock, T.D., and J.A. Beckwith. 2002. Recommendations to improve recovery of endangered species in the United States. *Human Dimensions of Wildlife* 7:197-213.
- Hilty, J., and A.M. Merenlender. 2003. Studying biodiversity on private lands. *Conservation Biology* 17:132-137.
- Jagnow, C.P., A.E. Luloff, J.C. Finley, and G.J. San Julian. 2008. Private land access and deer management in three Pennsylvania counties: key informants' perspectives. *Human Dimensions of Wildlife* 13:102-114.
- Jagnow, C.P., R.C. Stedman, A.E. Luloff, G.J. San Julian, J.C. Finley, and J. Steele. 2006. Why landowners in Pennsylvania post their property against hunting. *Human Dimensions of Wildlife* 11:15-26.
- Kaplan R., and S. Kaplan. 2008. Bringing out the best in people: a psychological perspective. *Conservation Biology* 22:826-829.
- Knight, A.T., R.M. Cowling, M. Rouget, A. Balmford, A.T. Lombard, and B.M. Campbell. 2007. Knowing but not doing: selecting priority conservation areas and the research – implementation gap. *Conservation Biology* 22:610-617.
- Land Trust Alliance. 2005. National Land Trust census report. Available online <<http://www.landtrustalliance.org/about-us/land-trust-census/2005-report.pdf>>. Accessed 5 July 2011.
- Lawler J.J., D. White, and L.L. Master. 2003. Integrating representation and vulnerability: two approaches for prioritizing areas for conservation. *Ecological Application* 13:1762-1772.
- Leigh R., and A. Olive. 2008. Landowner beliefs regarding biodiversity protection on private property: an Indiana case study. *Society and Natural Resources* 21:483-497.
- Lubowski, R.N. M. Vesterby, S. Bucholtz, A. Baez, and M.J. Roberts. 2006. Major uses of land in the United States, 2002. *Economic Information Bulletin No. (EIB-14)*. Available online <<http://www.ers.usda.gov/Publications/EIB14>>. Accessed 5 July 2011.
- Lueck, D. 1991. Ownership and the regulation of wildlife. *Economic Inquiry* 29:249-260.
- Lueck, D., and J.A. Michael. 2003. Preemptive habitat destruction under the Endangered Species Act. *Journal of Law Economics XLVO (April):27-60*.
- Main, M.B., F.M. Roka, and R.F. Noss. 1999. Evaluating costs of conservation. *Conservation Biology* 13:1262-1272.
- Michigan Legislature. 1994. Natural Resources and Environmental Protection Act 451 of 1994. Available online <<http://legislature.mi.gov/doc.aspx?mcl-Act-451-of-1994>>. Accessed 5 July 2011.
- Miller, R.B., and J. Glass. 1989. Parent-child attitude similarity across the life course. *Journal of Marriage and the Family* 51:991-997.
- Mitsch, W.J., and J.G. Gosselink. 1993. *Wetlands*, 2nd ed. Van Nostrand, Reinhold, New York.
- Morrison, J.L., and S.R. Humphrey. 2001. Conservation value of private lands for Crested Caracaras in Florida. *Conservation Biology* 15:675-684.
- Norton, D.A. 2000. Editorial: conservation biology and private land: shifting the focus. *Conservation Biology* 14:1221-1223.
- [NCRS] Natural Resources Conservation Service. n.d. Partnerships, USDA. Available online <<http://www.nrcs.usda.gov/partners/>>. Accessed 5 July 2011.
- [NCRS] Natural Resources Conservation Service. 2005. Michigan NRCS programs, United States Department of Agriculture (USDA). Available online <<http://www.mi.nrcs.usda.gov/programs/>>. Accessed 5 July 2011.
- Parker, D.P. 2002. Cost-effective strategies for conserving private land – an economic analysis for land trusts and policy makers. PERC Research Center. Available online <http://www.perc.org/pdf/land_trusts_02.pdf>. Accessed 5 July 2011.
- Parkhurst, G.M., J.F. Shogren, C. Bastian, K. Paul, J. Donner, and R.B.W. Smith. 2002. Agglomeration bonus: an incentive mechanism to reunite fragmented habitat for biodiversity conservation. *Ecological Economic* 41:305-328.
- Pergams, O.R.W., and P. Zaradic. 2008. Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings National Academy Science USA*. 10.1073/pnas.0709893105. Available online <<http://www.videophilia.org/uploads/PNAScomplete.pdf>>. Accessed 14 Aug 2011.
- Pilgrim, S., D. Smith, and J. Pretty. 2007. A Cross-regional assessment of the factors affecting ecoliteracy: implications for policy and practice. *Ecological Applications* 17:1742-1751.
- Randolph, J. 2004. *Environmental Land Use Planning and Management*. Island Press, Washington, D.C.
- Raudsepp, M. 2001. Some socio-demographic and socio-psychological predictors of environmentalism. *TRAMES* 5 (55/50):355-367.
- Rissman, A.R., L. Lozier, T. Comendant, P. Kareiva, J.M. Kiesecker, M.R. Shaw, and A.M. Merenlender. 2007. Conservation easements: biodiversity protection and private use. *Conservation Biology* 21:709-718.
- Ruhl, J.B., A. Glen, and D. Hartman. 2005. A practical guide to habitat conservation banking law and policy. *Natural Resources and Environment* 20:26-32.
- Sobel, D. 1999. Beyond Ecophobia: Reclaiming the Heart in Nature Education, Nature Literacy Series 1. The Orion Society and the Myrin Institute, Great Barrington, Mass.
- Stern, P. 2000. Toward a coherent theory of environmentally significant behaviour. *Journal of Social Issues* 56:407-424.
- Taylor, M.F.J., K.F. Suckling, and J.J. Rachlinski. 2005. The effectiveness of the Endangered Species Act: a quantitative analysis. *Bioscience* 55:360-367.
- Teasley R.J., J.C. Bergstrom, H.K. Cordell, S.J. Zarnoch, and P. Gentle. 1997. Private lands and outdoor recreation in the United States. Department of Agricultural and Applied Economics, College of Agriculture and Environmental Sciences, University of Georgia. Available online <www.agecon.uga.edu/~erag/nplostxt.htm>. Accessed 5 July 2011.
- Troy A.R., A.M. Strong, S.C. Bosworth, T.M. Donovan, N.J. Buckley, and M.L. Wilson. 2005. Attitudes of Vermont dairy farmers regarding adoption of management practices for grassland songbirds. *Wildlife Society Bulletin* 33:528-538.
- [USFWS] U.S. Fish and Wildlife Service. 2006. 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Available online <<http://www.census.gov/prod/2008pubs/fhw06-nat.pdf>>. Accessed 5 July 2011.
- [USGAO] U.S. General Accounting Office. 1994. Endangered Species Act: information on species protection on nonfederal lands. GAO/RCED-95-16, U.S. General Accounting Office, Washington, D.C. Available online <<http://www.gpo.gov/fdsys/pkg/GAOREPORTS-RCED-95-16/pdf/GAOREPORTS-RCED-95-16.pdf>>. Accessed 11 Aug 2011.
- Wallace, G.N., D.M. Theobald, T. Ernst, and K. King. 2008. Assessing the ecological and social benefits of private land conservation in Colorado. *Conservation Biology* 22:284-296.
- Wiebe, K., and N. Gollehon (eds.). 2006. *Wetlands: status and trends, Agricultural Resources and Environmental Indicators (AREI) - the economics of food, farming, natural resources, and rural America*, Ch. 2.3. *Economic Information Bulletin No. (EIB-16)*, U.S. Department of Agriculture, Economic Research Service, Available

-
- online <<http://www.ers.usda.gov/publications/arei/eib16/eib16fm.pdf>>. Accessed 11 Aug 2011.
- Wilcove, D.S., and J. Lee. 2004. Using economic and regulatory incentives to restore endangered species: lessons learned from three new programs. *Conservation Biology* 18: 639-645.
- Winter, S.J., K.J. Esler, and M. Kidd. 2005. An index to measure the conservation attitudes of landowners towards Overberg Coastal Renosterveld, a critically endangered vegetation type in the Cape Floral Kingdom, South Africa. *Biological Conservation* 126:383-394.
- Yung, L., and J.M. Belsky. 2007. Private property rights and community goods: negotiating landowner cooperation amid changing ownership on the Rocky Mountain Front. *Society and Natural Resources* 20:689-703.
- Zhang, D., A. Hussain, and J.B. Armstrong. 2006. Supply of hunting leases from non-industrial private forest lands in Alabama. *Human Dimensions of Wildlife* 11:1-14.
- Zinn, J.A., and C. Copeland. 2007. CRS report for Congress, wetlands & overview of issues. Available online <<http://www.cnier.org/nle/crsreports/07Jul/RL33483.pdf>>. Accessed 5 July 2011.