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The Role of Farm Edge Management in Increasing On-Farm Biodiversity

Introduction

Introduction and Objectives

Research suggests that on-farm biodiversity has potential to benefit both the farm ecosystem as well as the larger natural ecosystems affected by farms. Several governmental and nongovernmental organizations are promoting the inclusion of more diversity in non-cropped edge areas of farms. However, which practices farmers currently use to manage their non-cropped edges, why they use these practices, and what factors affect their willingness to manage farm edges for biodiversity are little studied topics. Our study set out to identify the range and awareness of practices currently used to manage non-cropped field edges, roadsides, pond edges, and banks of permanent watercourses (sloughs, canals, ditches) in a case study area in western Yolo County, California. A secondary objective is to identify incentives and constraints to adopting these practices.

Previous work on farm ecosystem benefits shows the role of border plantings in providing alternative food sources and habitat for predator and pollinator insect populations and wildlife. They may also function as buffers to slow soil erosion and runoff, and intercept airborne dust caused by agricultural operations. Evidence also suggests that a diversity of perennial vegetation along watercourses may increase net accumulation of soil carbon and soil organic matter, improve retention of nutrients, reduce nitrate leaching and runoff, and reduce greenhouse gas emissions.

Several voluntary federal conservation programs for private land give farmers technical and financial assistance in installing conservation-oriented features on farmland. The four largest programs include the Conservation Reserve Program (CRP), which, besides subsidizing the retirement of land from active farming, funds installation of structures such as riparian buffers and wildlife habitat on working lands. The Conservation Reserve Enhancement Program, a federal-state partnership, targets land retirement in specific geographic areas, and the Wetlands Reserve Program works to retire and restore wetlands. Finally, the Environmental Quality Incentives Program provides technical assistance and funding for 50-75 percent of the cost of installing working-land conservation structures, including hedgerows, buffer strips, and grassed waterways, among others.

We chose the geographic area for this study to include farm and rangeland in western Yolo County encompassing 17,786 acres, or roughly 28 square miles. It includes both lowland, irrigated and intensively farmed cropland (both annual and perennial crops), as well as hilly, more extensively farmed, unirrigated rangeland. This area was also chosen because of its prevalence of public and private sector programs that assist farmers in increasing biodiversity on their farms. Yolo County has a very active Resource Conservation District (RCD) that works closely with the local office of the Natural Resources Conservation Service to

connect local farmers with federal conservation cost-share programs. In the private, non-profit sector, Audubon California's Landowner Stewardship Program has been proactive in farmer and landowner conservation projects in and near the study area.

We sought to interview all individuals who make day-to-day farm management decisions over the land in our study area and identified 28 individuals or farm businesses. Telephone interviews were conducted in August-November, 2006. We succeeded in interviewing 22 farm managers, a response rate of 81 percent. The land managed by the interviewed farmers represents 71 percent of the total study area. Of this total acreage, ten percent are enrolled in the CRP. The study acres produce over 20 different crops at different times of the year, from field crops like tomatoes, alfalfa, and vegetable seeds to orchard crops including almonds, walnuts, and plums, to cattle. About 61 percent, are owned by the farm operator, with the remaining 39 percent of total acres being rented. The total farm size ranges from 26 to 9,000 acres, with a mean of 2,257 acres and a median of 450 acres. Twelve of the 22 respondents (55 percent) pursue farming as their sole occupation, while 10 farmers (45 percent) have off-farm employment. Physical features such as total length of waterways and roads within the area were estimated using a Geographic Information System (GIS) of the study area.

The sample farmers use a large variety of practices to manage edges, with the most common being mechanical control (discing or scraping) and herbicide application. Mowing is also very common, sometimes used in combination with discing and herbicide use, but often used in place of either of these two practices, especially by most orchard crop growers. Burning edges occasionally was also reported by two respondents and hand hoeing by three. Most farmers reported using a combination of two or more practices from a set of six active management practices (disc, apply herbicide, mow, hand hoe, burn, graze). Almost half use discing and herbicide applications in combination either with or without additional practices. In the sample as a whole, edges along natural watercourses tend to be less intensively-managed than other farm edges. Five farmers reported using no active management practices on watercourse edges while all farmers mentioned using at least one active practice on field and road edges. Half of the farmers reported leaving naturally occurring vegetation, including large trees, along waterways compared to only 18 percent for field and road edges. Half of farmers in the sample have planted hedgerows, windbreaks, individual trees, and/or native grasses and sedges. Of the remaining farmers, all but one indicated that they had heard of these practices before. Nine of the farmers have installed tailwater or rangeland ponds.

One of the most frequently mentioned objectives in edge management is to keep undesirable elements out of crop fields, in almost all cases weeds but in some cases also rodents and other pests. While RCD materials suggest that filling edge areas with non-invasive native and introduced plants can suppress the growth of

invasive weeds, only a minority of farmers in the study appear to consider this potential of hedgerows in their edge management decisions. Six individuals expressed a desire to attract beneficials and possibly even decrease pesticide use as a strong motivating factor, in keeping with the relatively larger number of research studies that have suggested important roles for hedgerows in pest management. Several of these farmers also indicated, however, that the direct impact of such plantings on pest populations is currently difficult for them to discern on their farms and is a topic that could benefit from further research. This observation is consistent with research on conservation practices that technical and performance information about practices is inadequate. The benefits that were more visible to farmers who had edge plantings included increasing wildlife habitat, especially for birds such as quail and pheasants. Two farmers observed dust control as a benefit of hedgerows. Three farmers mentioned water quality and soil stabilization concerns as possible motivators. Finally, ranch owners and managers are interested in planting or retaining trees in patches throughout their land to provide shade for livestock.

Three fourths of the farmers explicitly mentioned awareness of cost-share and technical assistance programs for hedgerow and pond installation. All sampled farmers who have hedgerows and ponds have taken advantage of one of these programs. Despite the presence of and high familiarity with cost-share programs, however, the high cost of hedgerows and other planted features is still one of the most frequently noted constraints to installing such features. Seven farmers expressed concerns over some combination of high establishment costs, maintenance costs, and required time commitments for edge plantings in an economic climate when full-time farmers are already working very hard just to make ends meet.

Space constraints were also mentioned, not only in terms of trying to plant crops all the way to the field edge to maximize returns, but also in terms of leaving enough room at row ends for equipment to turn around. Absentee landlords whose main concern is getting a rent check were also mentioned by two farmers as potential blocks to conservation projects, consistent with previous research associating tenure with adoption of all types of conservation practices in other parts of the country. Finally, most of the farmers with hedgerows are full-time farmers with no off-farm income and farm relatively larger acreages. These findings are also consistent with other research on adoption of all types of on-farm conservation practices.

The survey results suggest a need for additional information on the benefits of planted farm edges including pest and weed management services provided by different species combinations of hedgerows and grassed edges. Detailed information is also needed on the total costs and resource use for alternative edge management practices for comparison of relative costs and management requirements. Demand for relevant information will likely increase along with the

growing awareness of farmers, landowners, scientists, and government of the potential capacity for on-farm planted features and tailwater ponds to provide ecosystem services, and in particular, improve water quality.