

Section 1. Summary

BACKGROUND

In 1986 the California State Legislature passed into law SB 1086, which called for development of a management plan for the Sacramento River and its tributaries that would protect, restore, and enhance fisheries and riparian habitat. The law established an Advisory Council of local interests and federal and state agencies to develop the management plan. In 1998, the Advisory Council published the Draft Sacramento River Conservation Area (SRCA) Handbook, which contains a set of principles and guidelines, as well as a number of recommended actions, to guide habitat management along the river. In 2000, a local nonprofit organization was developed to coordinate habitat restoration efforts along the river in accordance with the guidance in the SRCA Handbook. This nonprofit organization is the Sacramento River Conservation Area Forum (SRCAF).

The Nature Conservancy (TNC), through its Sacramento River Project, is an active participant in the SRCAF and in habitat restoration along the Sacramento River. Through its participation in SRCAF, TNC recognized that restoration of native habitats along the Sacramento River represents a modification of the existing Sacramento Valley landscape with potential social and economic consequences to the region. The actions envisioned in the SRCA Handbook constitute just one element of a much larger federal, state, and local effort to restore native habitats along the Sacramento and San Joaquin River corridors and in the Sacramento–San Joaquin River Delta.

In 2000, TNC sought and received a grant from the joint federal/state CALFED ecosystem restoration program to conduct a socioeconomic assessment of the riparian habitat restoration efforts underway along the Sacramento River from Red Bluff to Colusa. A draft socioeconomic assessment was released for public review in September of 2002. This document has been modified and a response memorandum has been developed to reflect public comment on the draft document. This final report presents the findings of the socioeconomic assessment. TNC's goal is to provide information that generally defines and broadly communicates the social and economic consequences that could result from the conversion of agricultural land along the river to develop a riparian corridor. The analysis is not intended to predict the results of habitat restoration; rather, it is intended to describe possible future conditions on the basis of a number of broad assumptions, and to serve as a tool for those entities involved in habitat restoration programs along the Sacramento River.

REPORT ORGANIZATION

The first five sections of this report develop the foundation for the technical analyses. Section 2 presents the assessment objectives. Section 3 describes the general assessment scope and methods. Section 4 describes the current conditions in the study area (including an overview of evaluation and restoration activities underway regionally). Section 5 establishes a set of assumptions intended to depict conditions that might exist after 30 years of land conversion and restoration. The specific details of assessment methods and results appear in Section 6. Effects on the local economy and fiscal conditions, including changes in agricultural production, recreation activity, jobs and personal income, and local tax revenues, are discussed in detail. Changes in social costs and benefits are assessed; these include changes in farmers' profits, costs for bank and flood protection, recreation benefits, and ecosystem protection benefits. A brief set of conclusions are presented in Section 7, Citations are listed in Section 8, and four technical appendices are attached for those readers interested in the details of technical analysis data sources and methodology. Appendix E has been added to this final report to describe stakeholder involvement in the study, present letters of comment on the draft report, and present Jones & Stokes' response to draft report comments.

SETTING – BASELINE CONDITIONS

The study area includes a stretch of the Sacramento River between Red Bluff and Colusa, an area of focus for habitat restoration programs. The study area boundaries are based on existing flood control levees and flood boundaries of the 2.5-year return frequency flood event on the Sacramento River. The 42,543-acre area includes land in four counties: Butte, Colusa, Glenn, and Tehama. The area currently comprises a mix of agricultural lands, patches of native and restored riparian vegetation, sand bars and river surface. Approximately 40% of the land produces agricultural crops, including a variety of fruits and nuts, as well as field crops. Nearly 49% of the land is covered with riparian vegetation; the remainder supports small areas of urban and vacant land. Ownership of the riparian and agricultural areas is split between private individuals and public agencies, with the majority held in private ownership (approximately 60%) (see Section 4).

ASSUMED FUTURE CONDITONS

It was necessary to develop a set of assumptions regarding future conditions (following habitat restoration activities) so that a socioeconomic assessment of the restoration could be completed. The assumptions were developed and reviewed with SRCAF stakeholders prior to conducting the technical analyses (see Section 5). The future conditions assume that riparian

vegetation would expand to 30,000 acres within the study area by 2030. This acreage would include 20,610 acres of existing public and private habitat and 4,496 acres of land already acquired for conversion to habitat. An additional 4,894 acres of privately owned agricultural land would be purchased for conversion to complete the riparian corridor. A total of 9,390 acres of land currently in agricultural production would be converted (see Table 5-1). Future acquisitions would be made from willing sellers and all private land to be restored would be transferred to state or federal agency ownership. At the end of the habitat restoration process, 29% of the study area would remain in agriculture or other uses while 71% of the area would provide a corridor of riparian vegetation extending from Red Bluff to Colusa. Use of public funds to protect agricultural lands from flooding and bank erosion may be reduced in places where the protection is no longer needed for private agricultural land or public safety.

SOCIOECONOMIC IMPLICATIONS

Analytical Framework

This economic analysis (see Section 6) focuses on evaluating two kinds of effects associated with establishing a riparian corridor along the Sacramento River: changes in regional economic activity and fiscal conditions, and changes in resource costs and benefits. Regional economic analysis measures changes in economic activity within a particular geographic region stemming from changes in within-region production of goods and services. This type of analysis, which focuses on changes in employment and personal income, typically examines the initial direct effect of a change in production plus the secondary indirect and induced multiplier effect (indirect impacts on input industries and induced impacts from household spending of labor income). The regions for the regional economic impact analyses are the counties where the direct impacts are expected to occur (e.g., Butte, Colusa, Glenn, and Tehama).

Analysis of resource costs and benefits measures the change in economic welfare or value to the producers and consumers that would be affected by establishment of a riparian corridor. This type of analysis typically focuses on changes without consideration of where the effects occur. For this type of analysis, value to consumers is measured in terms of their willingness to pay for a change in resource conditions, whereas value to producers can be approximated by the change in net income or profits. Key resource cost and benefit topics for this assessment include the loss in net profits to farmers, the avoided flood control costs to farmers and government agencies, and the gain in benefits to persons involved in recreation activities.

This report does not include a formal benefit-cost analysis. Important components of costs and benefits could not be estimated reliably on the basis of existing data and available resources. Moreover, the level of uncertainty regarding certain effects—such as the benefits of restoration to persons involved in recreation—is believed to be high. Accordingly, a hybrid

analysis that includes assessing changes in some of the key economic measures has been conducted. This analysis is intended to give decision makers some insight into the relative magnitude and tradeoffs of economic changes associated with habitat restoration along the Sacramento River.

Effects on the Local Economy and Fiscal Conditions

Agricultural Resources Effects

The principal effect of establishing a riparian corridor along the river would be a reduction in agricultural production and associated reductions in farmer income and agricultural jobs. The economic losses to the agricultural sector would increase gradually as land is taken out of production over a 30-year period. By 2030, the annual loss in agricultural production could be as much as \$11.5 million. While this loss is substantial, it is relatively small when taken in the context of the 4-county economy. The estimated losses in agricultural production are approximately 1% of the combined annual value of agricultural production reported by the four counties in 2000. The economic losses would be spread among the four counties proportionately with the relative share of agricultural land conversion occurring in the county. This study assumed that the percentage of the 30,000 acres of riparian corridor that would be within each county at the end of the 30-year period would be the same as the percentage of the overall study area in each county. Based on this assumption, Tehama County would be subject to the largest acreage of agricultural land conversion, with 3,153 acres going out of production. Butte and Glenn Counties would experience slightly lower conversions (2,593 and 2,696 acres respectively), while Colusa County would experience a smaller 948-acre conversion. Based on the study assumptions, the estimated annual agricultural production losses (in 2030) for the four counties would be:

- Butte County – \$2.5 million (<1% of total county ag. production in 2000)
- Colusa County – \$1.2 million (<1% of total county ag. production in 2000)
- Glenn County – \$3.8 million (1.4% of total county ag. production in 2000)
- Tehama County – \$4.0 million (3.5% of total county ag. production in 2000)

The major losses would be associated with removal of walnut, almond, and prune orchards along the river.

Recreation Spending Effects

The increase in riparian habitats along the river would improve conditions for fish and wildlife resources. The enhanced quality of these resources would stimulate increases in recreation activity in the study area, resulting in increased recreation-related spending. However,

a general lack of information linking habitat restoration activities to all types of recreation has limited the ability of this study to quantify the positive effects of recreation increases. Fishing associated with increased fish populations in the Sacramento River is the only recreation activity that can be readily predicted. It is estimated that, with a doubling of fish populations by the end of the 30-year time frame of the analysis, recreation-related spending would increase by \$948,400 annually in the 4-county area. Additional significant increases could occur from other recreation activities (wildlife observation, hunting), but these have not been predicted due to the lack of available data to quantify the relationship between habitat restoration and such activities. The estimated annual increase in recreation-related spending by county is listed below.

Butte County – \$118,900
Colusa County – \$380,500
Glenn County – \$50,500
Tehama County – \$438,500

Local, state and federal governments could significantly improve the likelihood of positive changes in the local recreation-based economy by improving access to the riparian corridor and updating, expanding and constructing infrastructure and facilities that support recreation along the river. Several current planning efforts are underway offering opportunities to improve access and facilities, including comprehensive planning by the U.S. Fish and Wildlife Service and the California Department of Fish and Game regarding their land holdings along the river.

Site Monitoring Effects

At the end of the 30-year time frame, an annual riparian habitat site monitoring program would be in effect. Each year the riparian vegetation would be surveyed to determine its general condition. This effort would stimulate local spending for salaries and equipment. It is estimated that the ongoing annual spending for this program would be approximately \$187,800.

Regional Economic Effects

The regional economic effects of establishing the riparian corridor have been estimated using IMPLAN, a regional economic software model that describes flows from producers to intermediate and final consumers using a series of economic multipliers. This model of county level economic interactions is used to predict, using input-output multipliers, total regional activity based on changes in expenditures. For this analysis, changes in spending were input for agriculture, recreation and habitat restoration.

The changes in agricultural production (and therefore agricultural expenditures) anticipated by 2030 would have direct, indirect, and induced effects on the economy; these effects would derive from the loss of jobs and reductions in personal income in the 4-county

area. As agricultural acreage is reduced, the number of agricultural jobs available would be reduced and the income these individuals would accumulate would be eliminated (direct losses). These reductions in personal income would lead to less spending in other sectors of the economy, including the retail and services sectors (indirect and induced losses). For the 4-county area, the total losses are estimated to be 228 jobs and \$7.5 million in personal income. The loss in jobs represents less than 0.15% of the 4-county 2000 total employment base and the reduction in personal income is 0.09% of the 2000 personal income in the four counties. The estimated losses in the four counties (by 2030) would be:

- Butte County – 49 jobs; \$1.66 million in personal income (<0.05% of 2000 county employment and <0.04% of 2000 county personal income)
- Colusa County – 19 jobs; \$586 thousand in personal income (<0.18% of 2000 county employment and <0.13% of 2000 county personal income)
- Glenn County – 66 jobs; \$2.07 million in personal income (<0.57% of 2000 county employment and <0.41% of 2000 county personal income)
- Tehama County – 96 jobs; \$3.19 million in personal income (<0.41% of 2000 county employment and <0.30% of 2000 county personal income)

Changes in expenditures associated with increased recreation activity and restoration site monitoring would also have regional economic effects. Even though the availability of data restricted the recreation analysis, the direct, indirect, and induced changes in jobs and personal income associated with these activities would be positive in the study area. County total increases are estimated to be:

- Butte County – 4 jobs; \$69,170 in personal income
- Colusa County – 14 jobs; \$223,768 in personal income
- Glenn County – 3 jobs; \$57,615 in personal income
- Tehama County – 15 jobs; \$280,995 in personal income

Fiscal Effects

The analysis of riparian restoration effects on county revenues (fiscal effects) indicates that there would be little effect. One of the four counties would experience a minor increase in revenues as property taxes were replaced by in lieu payments from the state and revenue sharing from the federal government. Butte County's revenues would increase by \$5,700 annually. Tehama County would experience a decrease in revenue of \$23,100 annually as a result of the restoration. This represents less than 0.3% of Tehama County's 2000–2001 countywide revenues for the revenue sources affected by restoration.. Colusa County would experience a

small decline in revenues, estimated at \$2,400 annually, and Glenn County's revenues would decrease by \$6,600 annually.

The fiscal effects analysis did not consider changes in county costs associated with law enforcement on the river. Information provided by Butte County through review of the draft study indicates that counties may experience un-reimbursed increases in law enforcement costs as fishing activity increases on the river over the 30-year study period. The increases associated only with restoration-induced fishing activity could be as much as several thousand dollars in 2030 (McIntosh pers.comm.).

Changes in Social Costs and Benefits

Loss of Agricultural Benefits (Producer's Surplus)

The conversion of farmland associated with establishing a riparian corridor along the Sacramento River would result in a loss of benefits currently accruing to agricultural producers. These benefits are frequently described as producer's surplus and are represented by profits to the producer. The greatest losses would be associated with elimination of walnuts and prunes. The estimated annual losses for each county in 2030 are:

- Butte County – \$1,060,300
- Colusa County – \$485,000
- Glenn County – \$1,230,600
- Tehama County - \$1,343,100

No attempt was made to determine future profits that could be generated by landowners who sell their property, using the receipts of land sales.

Flood Control Benefits and Costs

Development of a riparian corridor along the Sacramento River would result in small reductions in local government costs associated with flood damages. Based on information provided by the counties, only Glenn and Tehama Counties have experienced costs associated with repair of infrastructure following flood events. Glenn County has expended an annual average of \$2,900 over the past 10 years. If that infrastructure were abandoned, the county would benefit from an estimated savings of \$87,000 over the 30-year study period. Tehama County has expended an annual average of \$6,000 in maintenance costs. With infrastructure abandonment, the county would benefit from an estimated savings of \$180,000 over the 30-year study period. State and federal agencies that reimburse the counties for flood-related damages

would have an annual average savings of about \$270,000. This savings would be \$8.1 million over the 30-year study period.

Recreation Benefits

Development of the proposed riparian corridor is expected to improve fish and wildlife resource conditions along the Sacramento River. This improvement is expected to result in increased benefits to persons involved in recreation along the river. While information is limited to estimate effects on all recreation activities, the benefits can be quantified for anglers engaged in sport fishing as the additional amount the anglers would be willing to pay (over and above what they actually did pay) to participate in sport fishing along the Sacramento River. This willingness to pay has been established through comprehensive angler surveys in the Sacramento River reach between Redding and Colusa. An annual increase of \$641,000 in angler benefits has been estimated, assuming a doubling of fish populations in the study area over the 30-year study time frame. Additional benefits would be expected to accrue to other recreational users in the vicinity of the study area, including those participating in hunting and wildlife observation. Estimates of these benefits have not been developed because the restoration effects on biological resources other than fish are unknown or have not been estimated.

Ecosystem Protection Benefits

Ecosystem protection benefits are benefits accrued to society as a result of protection or restoration of natural habitats. The proposed restoration of riparian habitat along the Sacramento River would affect both riparian and aquatic habitats in the study area and would have ecosystem protection benefits. A review of recent literature that associates monetary values with ecosystem protection indicates that significant societal values can be placed on protection activities. The values are generally described as use values (benefits to resource users who depend, either directly or indirectly, on the affected resources) and non-use values (benefits not related to people's use of the resource, but simply to knowing that the resource is being protected).

While it was difficult to establish the magnitude of values associated with development of the riparian corridor along the Sacramento River, a recent study estimated that up to \$2.6 million in benefits (annually) could be assigned to removal of chinook salmon from protected species status. This dollar amount represents an avoided cost of administration and compliance incurred by resource agencies responsible for implementing provisions of the Endangered Species Act. Similar large benefits have been assigned to restoration of salmon populations on the Trinity River, which could restore commercial fishing along the California coast. These values are use values. Based on the results of other studies, the non-use benefits, as measured by society's willingness to pay for habitat restoration and ecosystem protection programs, also appears to be substantial (in the millions of dollars per year). Other examples of the economic and social value that society places on ecosystem protection include recent legislation such as the

Central Valley Project Improvement Act and the CALFED Bay-Delta Program, and the passing of several parks and water propositions in California (Propositions 12, 13 and 40).

CONCLUSIONS

The social and economic effects of fish and wildlife habitat restoration in California's Central Valley have been investigated and documented at various scales and in varying levels of detail in recent years, including large-scale state and federal efforts (CALFED and Central Valley Improvement Act studies), and smaller-scale, locally-focused efforts (Adams and Gallo and Grasslands Water District). The Nature Conservancy, supported by a CALFED grant, undertook this regional-scale socioeconomic evaluation to consider the effects of various collaborative restoration programs along the Sacramento River between Red Bluff and Colusa. The report is intended to be both useful and instructive as a tool for decision makers and residents with interests in the Sacramento River riparian corridor.

The information available to estimate effects on agricultural production, county tax base and the regional economy is extensive. Conversely, there is limited information available to quantify the effects of restoration on recreation activity, flood and bank protection programs, and society as a whole. Nonetheless, a reasonable description of the social and economic effects is presented in this report.

The agricultural sector of the regional economy would be most affected by riparian habitat restoration. The conversion of 9,390 acres of agricultural land to riparian habitat would result in small reductions to agricultural production, local jobs and personal income. These reductions would be relatively small when taken in the context of the 4-county agricultural economy. County tax revenues would see minor adjustments. The easily quantified benefits of the restoration would be small in comparison to the losses, but the potential for substantial local benefits in the recreation sector and societal benefits from the improvement in habitat conditions in the Sacramento Valley is large. The key to realizing substantial recreation-related benefits would be the expansion of public access and recreation-related facilities along the Sacramento River. It is hoped that the information in this report will be useful as decisions are made regarding future habitat restoration and recreation-related improvements along the river (see Section 7).