Appendix H

SOCIOECONOMIC REPORT ON REGULATORY AMENDMENTS

SOCIOECONOMIC REPORT

SUCTION DREDGE PERMIT PROGRAM ENVIRONMENTAL IMPACT REPORT

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INTRODUCTION

This report provides socioeconomic information that informs the analysis and conclusions to be presented in the Economic and Fiscal Impact Statement (Standard Form 399) for the proposed Suction Dredge Permit Program. The information focuses on the economic contribution that suction dredging activities makes to regional and local economies in California. In addition, the report addresses the socioeconomic implications of existing and potential conflicts between suction dredging activities and other beneficial uses. Information on the amount and value of gold recovered by dredgers and on related tax revenues generated also is presented.

Most of the information presented in this report is based on data collected in a mail survey, conducted between January and April of 2010, of persons who obtained a suction dredging permit in California during 2008. Because all persons who participated in suction dredging activity in California in 2008 were required to obtain a permit, the sample of persons contacted to participate in the survey is considered representative of the population of suction dredgers. Both resident and nonresident dredgers participated in the survey. Appendix A includes a description of the methods followed to conduct the survey, procedures used to process the survey data, and summary statistics from the survey.

This report first describes economic conditions pertaining to suction dredging activity in California in 2008, which was the most recent full year that suction dredging was permitted in California. It then discusses the impacts of various regulatory alternatives. Because the 1994 Regulations were in effect during 2008, the characterization of 2008 dredging activity based on the survey results is presumed to closely align with conditions under the 1994 Regulations Alternative. As such, this information provides a foundation for assessing economic effects of the proposed program and other program alternatives on regional and local economies, and of potential changes in beneficial use conflicts.

It should be noted that the 2008 suction dredging conditions used as a base period for this socioeconomic report are different from the baseline conditions used for the draft subsequent environmental impact report (DSEIR) being prepared on the proposed suction dredge permit program. The DSEIR baseline consists of the conditions at the time that the Notice of Preparation was circulated. At that time, the suction dredging moratorium was in effect. That said, the 2008 base period conditions in which suction dredging was permitted are considered more useful for the socioeconomic evaluation because they reflect the best available information for evaluating socioeconomic effects of the DSEIR alternatives. The alternative - using the DSEIR baseline for evaluating socioeconomic effects - would not support a meaningful analysis since no socioeconomic activity related to suction dredging occurred at that time.

2008 BASE PERIOD CONDITIONS

This section characterizes the contribution of suction dredging activities on regional and local economies in 2008, based on the recently conducted Suction Dredger survey (refer to Appendix A for additional survey details).

Contribution of Suction Dredging to Regional and Local Economies

Number of Dredgers and Dredging Activity

According to California Department of Fish and Game (CDFG) records, 3,479 persons obtained a permit to suction dredge in California waters in 2008. Of these, 2,946 permits were issued to California residents and 533 permits were issued to nonresidents of California. Residents who participated in suction dredging reported on average an estimated15 trips per dredger in 2008, and nonresident dredgers reported on average 4 separate trips to California per dredger to participate in suction dredging. Based on survey results, it is estimated that 5.8 percent of the resident permittees (171 permit holders) made no suction dredging trips in 2008 and 3.9 percent of nonresident permittees (21 permit holders) made no trips to suction dredge in California. (Because these 192 dredgers made no trips in 2008, it was assumed that they did not make any trip-related spending.)

For evaluating the economic impacts of suction dredging activity on regional and local economies, suction dredging activity was estimated for 22 watersheds throughout California (Table 1). The top five most popular watersheds and key communities in these watersheds that are economically affected by the trip-related spending of suction dredgers are identified.

As shown in Table 2, it is estimated that residents participated in about 83,900 days of suction dredging in 2008, and nonresidents accounted for an estimated 17,350 days of dredging. For dredgers residing in-state, the most popular watersheds for suction dredging were: the Yuba River (13,424 dredging days, which account for 15.9% of all dredging days by resident dredgers), the Feather River (13,592 dredging days, which account for 14.2% of all resident dredging days), and the American River (9,061 dredging days, which account for 10.8% of all resident dredging days). For nonresident dredgers, the Klamath River watershed accounted for more than 40 percent of dredging days. Overall, the top five watersheds for dredging activity (Yuba, Feather, Klamath, American, and Trinity) accounted for about 60 percent of all dredging activity in the 22 watersheds.

Expenditures by Suction Dredgers

Persons participating in suction dredging make expenditures on trip-related items, such as gasoline, food and beverages, restaurants, and miscellaneous supplies and services, and on the purchase and maintenance of equipment used for suction dredging. As shown in Table 3, annual trip-related expenditures were on average $6,170 per dredger

for resident dredgers, and were $4,530 on average for nonresident dredgers. Total trip-related spending was an estimated $14.2 million for resident dredgers and $2.3 million for nonresident dredgers. In terms of expenditures on the purchase and maintenance of suction dredging equipment, resident dredgers spent on average $2,112 per dredger and nonresident dredgers spent on average $2,893 per dredger; total spending in 2008 on the purchase and maintenance of equipment is estimated at $5.9 million for resident dredgers and about $1.5 million for nonresident dredgers (Table 3).

Trip-related spending of suction dredgers by watershed is shown in Table 4. (As indicated in the first footnote in Table 4, these expenditures exclude spending near home in preparation for suction dredging trips and a portion of the spending en-route to the trip destination; for purposes of analysis, the amount of expenditures made locally associated with suction dredge-related activity is assumed to occur whether locals participate in suction dredging or some alternative activity.) Similar to the pattern of dredging days (Table 2), suction dredging-related expenditures most benefit the Klamath, Yuba, and Feather River watershed economies. The 2008 contribution of trip-related suction dredging spending in these three watersheds ranged between $584,000 and $703,000.

Economic and Fiscal Impacts of Expenditures Made by Suction Dredgers

The assessment of regional economic and fiscal impacts generated by the trip-related spending of dredgers was performed using a model based on IMPLAN, an economic input-output (I-O) database and modeling routine. Originally developed by the USDA Forest Service to assist with land and resource management planning, the IMPLAN I-O model is a widely used analytical tool that is employed to assess the regional economic impacts of private and public projects (Minnesota IMPLAN Group 2000). I-O analysis is a means of examining relationships within an economy, both between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. I-O models, such as the IMPLAN model, allow for assessing the effects of a change in one or several economic activities, such as dredging-related expenditures, on an entire economy, as expressed by changes in jobs, personal income, and tax revenues.

Trip-related spending on supplies and services by those engaged in dredging generates economic activity throughout the 22 watersheds within the study area. (The effects of equipment purchase and maintenance spending on regional economic activity are not estimated because the location of this spending could not be accurately determined.) Regional effects include direct and secondary jobs and personal income in several sectors of regional economies, and sales tax revenue for local governments. As Table 5 shows, trip-related spending by dredgers who live outside the watershed generated an estimated total of about 50 jobs (mostly in retail and service sectors, including gasoline stations), $2.5 million in personal income, and $123,600 in sales tax revenue throughout the 22 watersheds in 2008. Dredgers residing in California accounted for about 75 percent of the study area effects, and nonresident dredgers accounted for the remaining effects.

The economic effects of dredging on regional economies are relatively small compared to overall levels of economic activity within the affected watersheds, which comprise one or more counties in each watershed (see Table 1). One factor underlying the relatively minor effect is that a portion of the dredging-related economic activity in each watershed is attributable to dredgers who reside in the watershed and whose spending is assumed to generate no net economic benefit to the watershed-wide economy. Following the approach advocated by Johnson and Moore (1993), this assumption is based on the premise that local spending related to dredger activity would still mostly occur and recirculate through local economies even if a moratorium on dredging eliminated dredger-related spending by locals. A second factor is that much of the trip-related spending by dredgers occurs in retail sectors, where a significant portion of the economic benefits generated by the spending is shifted to manufacturers and distributors located outside of the directly affected watersheds.

Table 5 shows the estimated economic effects of trip-related dredging spending within each of the watersheds. Effects are largest in the Klamath River watershed, with 8.2 jobs and $360,700 in personal income generated by trip-related spending in 2008. Effects are similar in the Yuba River watershed, where 7.1 jobs and $367,300 in income was generated. Other watersheds with notable effects include the Feather River basin (6.6 jobs, $334,000 in personal income), the American River Basin (3.7 jobs, $214,800 in personal income), and the Trinity River basin (3.3 jobs, $168,500 in personal income). All dredging-related economic activity in two watersheds (Salmon River and Scott River watersheds) and most (an estimated 90%) of dredging-related economic activity in the Klamath River watershed are estimated to occur in Siskiyou County. Together, trip-related dredging spending in these three watersheds generated an estimated 12.0 jobs and $524,830 in personal income in Siskiyou County in 2008 (Table 5).

Similar to jobs and income effects, the sales tax revenue effects of trip-related dredging spending in individual watersheds are relatively minor. Based on estimated 2008 trip-related spending, sales tax revenues ranged from about $100 in the Suisun Bay region to $18,500 in the Klamath River watershed (Table 5). It should be noted that these estimates of sales tax revenues include sales taxes on gasoline sales. Within Siskiyou County, which comprises the Salmon River and Scott River watersheds and most of the Klamath River watershed, sales tax revenue generated by trip-related spending is estimated to total $26,850.

Gold Prices, Dredger Revenues, and Associated Tax Revenues

As a commodity, gold is a popular investment, often held by investors as a hedge against economic and political uncertainty that may affect the value of other investments, such as stocks. Similar to markets for other commodities, the gold market is subject to speculation, and gold prices can vary substantially during times of economic uncertainty. As a case in point, the current financial crisis that began in 2007 has had a significant upward effect on gold prices, with gold climbing in value from an average price of $603 per ounce in 2006 to an historic nominal high of over $1,400 per

ounce in November 2007. When viewed over the past 50 years, nominal gold prices were relatively flat between 1960 and 1970, increased by a factor of 15 between 1970 and 1980, declined by 35 percent between 1980 and 1990, and declined by another 28 percent by 2000 before rising to its historically high price level (Austin Gold Information Network 2010). Although volatile, annual average gold prices have risen every year since 2001, when gold traded at $271 per ounce. Based on the number of dredging permits issued annually since 2001 (see Figure 3-1 in the DSEIR), which have remained relatively stable, little discernible effect of rising gold prices on the number of dredgers is apparent.

According to the 2008 survey of suction dredgers, the average amount of gold recovered by a dredging operation was about 3.4 ounces for both resident and nonresident dredgers, with about half of all dredgers recovering an ounce or less of gold during 2008. Based on a price of $1,000 per ounce, which is similar to the price in 2009 prior to the recent run-up in prices, the average income produced by a suction dredging operation was about $3,400, with about half of the operations earning $1,000 or less in income. On average, income from gold recovery represented about 6 percent of a dredging operator's total income in 2008, although 69 percent of resident and nonresident dredgers reported that income from suction dredging represented one percent or less of their total income.

The importance of income generated by suction dredging varies across dredging operations, with 20 percent of resident dredgers reporting that making a profit from dredging was very important, 27 percent reporting that it was somewhat important, and 53 percent reporting that it was not at all important. According to the Suction Dredge survey, 82 percent of resident dredgers considered themselves recreational dredgers (gold recovery not a significant source of income), 16 percent considered themselves semi-commercial dredgers (gold recovery a supplemental source of income), and 2 percent considered themselves commercial dredgers (gold recovery a primary source of income). Survey results suggest that income from dredging operations is somewhat more important to nonresident dredgers, with 24 percent of dredgers considering themselves semi-commercial and 2 percent considering themselves commercial operators.

Under Public Resources Code Section 2207(d)(4)(B), miners are assessed $5 per ounce of gold mined by any operator within the State to fund the remediation of abandoned mines. Revenue from this assessment goes to the State's Abandoned Mine Reclamation & Minerals Fund Subaccount of the Mine Reclamation Account (California Department of Finance 2009). Based on survey results, about half of dredging operations recover an ounce or less of gold during a year, suggesting that many dredgers would owe little or no tax on their gold recovery. For an average operation, which recovers about 3.4 ounces in gold, an annual tax of about $17 would be required. According to the California Department of Mine Reclamation, however, the agency is unaware of any suction dredge operation paying this fee, although it was noted that failure to pay is a violation of the Surface Mining and Reclamation Act (SMARA) and subject to daily fines (O'Bryant pers. comm.).

Conflicts between Suction Dredging and Other Beneficial Uses

Effects of suction dredging activities on beneficial uses of socioeconomic concern include potential impacts on municipal and domestic water supplies, water-contact recreation (e.g., swimming, rafting), non-contact water recreation (e.g., camping, boating), and sport and commercial fishing.

Water quality-related impacts of suction dredging could adversely affect municipal and domestic water supplies, the safety of water-contact recreation, and the safety of fish caught for human and wildlife consumption. Major water quality issues of concern associated with suction dredging activity are the waste discharges of dispersed encampments, instream waste discharges from dredging equipment, and instream resuspension of sediments and related sediment-bound contaminants. The water-quality effects of suction dredging were evaluated in the 1994 environmental impact report for the dredging regulations that were adopted and in place in 2008, and were found to be less than significant. However, the environmental analysis for the DSEIR currently being prepared on the proposed suction dredge program, which proposes regulations that are more restrictive than the 1994 regulations, identified potentially significant water-quality impacts related to mercury and other trace metals discharged from suction dredging that have potential to increase the human health risks through consumption of contaminated fish.

The 1994 EIR considered the effects of suction dredging on two forms of recreation: rafting and sport fishing. Both rafting and fishing participants were found to experience a high degree of conflict with suction dredging. For rafters, conflicts arise from noise, engine exhaust, and the physical presence of dredgers in the waterway. Fishing participants are affected by access barriers (including intimidation, lack of parking, equipment conflicts), safety issues (e.g., dredge holes), and localized effects on fish caused by turbidity and disturbances. Suction dredging can conflict with other recreational uses, such as hiking, picnicking, and camping, by generating noise and engine exhaust in the vicinity of recreationists. Because these activities generate recreation-related spending, conflicts can potentially reduce use levels and associated economic effects in regional and local economies.

An assessment of the economic trade-offs between suction dredging and other beneficial uses would require a substantially more comprehensive and detailed study than is needed by CDFG to adopt regulations in accordance with existing law. Additionally, this type of focused study would require many speculative assumptions about how dredging activity affects these other uses, and therefore, any conclusions would not be considered particularly reliable.

IMPACTS OF THE ALTERNATIVES

Contribution of Suction Dredging to Regional and Local Economies

Implementation of the Proposed Program would impose additional restrictions on suction dredging in California compared to regulations in effect in 2008. Assuming that other factors associated with the Proposed Program would not affect the number of persons statewide obtaining a suction dredge permit, these restrictions are anticipated to result in slightly lower levels of dredging activity, and slightly reduced dredger spending on trip supplies and services and on equipment compared to 2008 levels. This is because some dredgers would likely decide to stop dredging altogether in response to the additional restrictions, and other dredgers would likely either change dredging locations or possibly make fewer trips. The regional and local economic benefits supported by dredger spending, including employment and personal income, also would be expected to be slightly reduced, as would the sales tax revenue generated by this spending.

Relative to the socioeconomic effects of the Proposed Program, the effects of the alternatives would vary, as summarized in Table 6. Under the No Program Alternative, no suction dredging permits would be issued by CDFG, resulting in the elimination of dredging activity in California, and the loss (compared to 2008 levels of dredging) of spending, employment, personal income, and tax revenues supported by dredgers who live outside of the affected watersheds. These impacts would be concentrated in the regional and local economies that currently benefit the most from suction dredging activity, as described for 2008 Base Period conditions (Tables 1 through 5).

Under the 1994 Regulations Alternative, CDFG would administer the suction dredging permit program under the 1994 regulations, providing for an unlimited number of permits to be issued. This would result in slightly greater overall economic benefits, compared to the Proposed Program, because of fewer restrictions on dredging activity. At the regional and local levels, economic effects would be beneficial in locations closed to suction dredging under the Proposed Program but open under the 1994 regulations, and adverse in areas closed to dredging under the 1994 regulations but open under the Proposed Program. In effect, total spending, employment, personal income, and tax revenues supported by suction dredging activity would be slightly higher than under the Proposed Program across the 22 watersheds, with effects higher in some watersheds and lower in others as compared to the Proposed Program.

Regional and local economic activity related to suction dredging would be slightly reduced under the Water Quality Alternative compared to levels under the Proposed Program. The Water Quality Alternative focuses on reducing the water quality impacts of the CDFG's suction dredging program. Specifically, water bodies listed as impaired pursuant to Clean Water Act section 303(d) for sediment and mercury would be closed to section dredging, including portions of the Trinity River, Eel River, Feather River, San Joaquin River, Stanislaus River, and American River. Although total regional and local economic activity would be moderately reduced across the 22 watersheds as a whole,

adverse economic effects would be concentrated in the watersheds containing closed portions of these rivers, and beneficial economic effects would likely occur in watersheds that remain open and that experience an increase in dredging activity from dredgers displaced from closed areas.

Under the Reduced Intensity Alternative, regional and local economic activity supported by suction dredging would be moderately reduced, with the reduction anticipated to be greater than under the Water Quality Alternative. The Reduced Intensity Alternative is similar to the Proposed Program but would incorporate a combination of additional restrictions on the total number of dredging permits issued and on the general methods of operation to reduce the intensity of environmental effects in the program area. This would result in reduced dredging and lessened regional and local economic effects throughout the 22 watersheds, with effects focused in areas with existing high levels of dredging activity.

Conflicts between Suction Dredging and Other Beneficial Uses

Potential conflicts between suction dredging and other beneficial uses would generally follow levels of dredging activity, with potential conflicts increasing at locations with higher levels of dredging activity and decreasing at locations with lower dredging levels. Under the Proposed Program, overall conflicts with beneficial uses, including water supply, recreation, and fishing uses, across the 22 watersheds would be slightly reduced from 2008 levels as a result of minor reductions in dredging activity. In particular, conflicts would be eliminated in areas where dredging is closed; however, conflicts could increase in areas that were closed under the1994 regulations but opened under the Proposed Program. In addition, conflicts could increase in areas affected by the displacement of dredgers from closures at nearby areas.

Under the No Program Alternative, conflicts with other beneficial uses would be entirely eliminated because dredging would not be allowed in California. Levels of conflict under the 1994 Regulations Alternative would be similar to the 2008 Base Period, as described previously in this report, with overall levels of conflict slightly higher than under the Proposed Program, but lower in areas that are closed to dredging under the 1994 regulations but opened under the Proposed Program. Compared to the Proposed Program, potential conflicts with other beneficial uses would be lower under both the Water Quality Alternative and the Reduced Intensity Alternative because overall dredging activity would be reduced. This would be particularly true under the Reduced Intensity Alternative, which would set a maximum number of suction dredging permits to be issued.

REFERENCES

Austin Gold Information Network. 2010. *Research - History of Gold Prices since 1793*. Accessed at: http://goldinfo.net/yearly.html Accessed on November 10, 2010.

California Department of Finance. 2009. State of California Manual of State Funds. Sacramento, CA.

Johnson Rebecca L. and Eric Moore. 1993. *"Tourism Impact Estimation".* Annals of Tourism Research. Vol. 20, pp. 279-288.

Minnesota IMPLAN Group, Inc. 2000. User's guide, analysis guide, data guide: IMPLAN Professional Version 2.0. 2nd Edition. Stillwater, MN.

Mitchell Robert C. and Richard T. Carson. 1989. *Using Surveys to Value Public Goods*. Resources for the Future. Washington D.C.

O'Bryant, Dennis, Assistant Director, Office of Mine Reclamation, Department of Conservation. Email communication to Sandy Devoto, Horizon Water and Environment. July 16, 2009.

Osborn Maury F. and Gary C. Matlock. 2010. *"Recall Bias in a Sportfishing Mail Survey"*. North American Journal of Fisheries Management. Vol. 30, pp. 665-670.

Table 1. 2008 Base Period Conditions: Watersheds (of destination) and affected key communities within each watershed

Watersheds[1]	Primary Counties	Key Communities[2]
American River	El Dorado, Placer	***Auburn, Colfax***, Foresthill, Georgetown, Placerville
Calaveras River	Calaveras	San Andreas, Valley Springs
Cosumnes River	Amador, El Dorado	Somerset, Placerville
Feather River	Butte, Nevada, Plumas, Sutter	Belden, Genesee, Greenville, La Porte, Oroville, ***Quincy***, Taylorsville, Twain
Fresno River	Madera	Camptonville, North Fork, Oakhurst
Honey Lake	Lassen	
Kern River	Kern	Bakersfield, Lake Isabella
Klamath River	Siskiyou, Humboldt	Hamburg, ***Happy Camp***, Hornbrook, Seiad Valley, Yreka
Merced River	Mariposa	Bagby, Coulterville, Greely Hill, Mariposa
Mokelumne River	Amador, Calaveras	Jackson, Mokelumne Hill, Pine Grove, West Point
Sacramento River	Butte, Shasta, Tehama	French Gulch, Igo/Ono, Magalia, Paradise, Redding
Salmon River	Siskiyou	Cecilville, Etna, Forks of Salmon, Sawyers Bar
San Gabriel River	Los Angeles	Azusa, San Gabriel
San Joaquin River	Fresno, Madera	Fresno, North Fork
Santa Ana River	San Bernardino	Lytle Creek, Rancho Cucamonga
Scott River	Siskiyou	Callahan, Fort Jones, Hamburg, Happy Camp, Scott Bar
Smith River	Del Norte	Crescent City, Gasquet
Stanislaus River	Calaveras, Tuolumne	Columbia, Sonora
Suisun Bay	Contra Costa	Clayton
Trinity River	Shasta, Trinity	Big Bar, Coffee Creek, Douglas City, Hayfork, Junction City, Weaverville
Tuolumne River	Stanislaus, Tuolumne	Coulterville, Groveland, Jamestown , Tuolumne
Yuba River	Nevada, Sierra, Yuba	Alleghany, Camptonville, ***Downieville*****,** Grass Valley/Nevada City, North San Juan, Sierra City

Notes:

1 Watersheds that are ***italicized and bolded*** represent the top five watersheds in terms of number of dredging days, as shown in Table 2.

2 Key communities that are ***italicized and bolded*** are communities that are believed, based on the frequency in which these communities were identified by survey respondents, to account for more than 25 percent of all suction dredging-related spending in that watershed.

Table 2. 2008 Base Period Conditions: Estimates of suction dredging days, by destination watershed

Watershed	Residents		Nonresidents		Total	
	Dredging Days[1]	Percent of Total	Dredging Days[1]	Percent of Total	Dredging Days[1]	Percent of Total
American River	9,068	10.8	701	4.0	9,769	9.6
Calaveras River	461	0.5	0	0.0	461	0.5
Cosumnes River	4,611	5.5	295	1.7	4,906	4.8
Feather River	12,526	14.9	1,809	10.4	14,334	14.2
Fresno River	1,614	1.9	37	0.2	1,651	1.6
Honey Lake	154	0.2	0	0.0	154	0.2
Kern River	1,383	1.6	148	0.9	1,531	1.5
Klamath River	6,839	8.2	7,124	41.1	13,963	13.8
Merced River	6,532	7.8	221	1.3	6,753	6.7
Mokelumne River	1,921	2.3	148	0.9	2,069	2.0
Sacramento River	2,843	3.4	185	1.1	3,028	3.0
Salmon River	2,075	2.5	1,403	8.1	3,477	3.4
San Gabriel River	2,766	3.3	74	0.4	2,840	2.8
San Joaquin River	845	1.0	0	0.0	845	0.8
Santa Ana River	307	0.4	0	0.0	307	0.3
Scott River	1,691	2.0	1,587	9.1	3,278	3.2
Smith River	307	0.4	0	0.0	307	0.3
Stanislaus River	5,379	6.4	591	3.4	5,970	5.9
Suisun Bay	77	0.1	0	0.0	77	0.1
Trinity River	6,455	7.7	886	5.1	7,341	7.2
Tuolumne River	2,075	2.5	37	0.2	2,112	2.1
Yuba River	13,986	16.7	2,104	12.1	16,090	15.9
TOTAL	**83,915**	**100.1**	**17,350**	**100.0**	**101,263**	**99.9**

Notes:

[1] Estimates of dredging days derived from dredging day estimates by subwatershed and then aggregated to watersheds, based on data from the 2008 Suction Dredge survey.

Table 3. 2008 Base Period Conditions: Average annual spending per dredger and total spending related to suction dredging activity

Type of Expenditure	Average Annual Spending per Dredger[1]		Total Annual Spending by All Dredgers[1]	
	Residents	**Nonresidents**	**Residents**	**Nonresidents**
Trip-related expenditures				
Gasoline	$ 2,788	$ 1,566	$ 6,981,104	$ 792,742
Food and beverages	$ 1,509	$ 1,162	$ 3,334,123	$ 556,784
Restaurants	$ 627	$ 496	$ 1,117,692	$ 229,065
Misc. trip supplies	$ 837	$ 702	$ 1,816,219	$ 365,008
Misc. services	$ 410	$ 604	$ 985,365	$ 322,668
Total trip-related	**$ 6,170**	**$ 4,530**	**$ 14,234,503**	**$ 2,266,267**
Expenditures on equipment purchase and maintenance	**$ 2,112**	**$ 2,893**	**$ 5,850,634**	**$ 1,481,198**

Notes:
[1] Estimates of trip-related spending and equipment purchase and maintenance were derived from the 2008 Suction Dredge survey data.

Table 4. 2008 Base Period Conditions: Trip-related spending of suction dredgers, by destination watershed

Watershed	Resident Dredgers	Nonresident Dredgers	All Dredgers
American River	$ 312,679	$ 43,819	$ 356,498
Calaveras River	$ 25,852	-	$ 25,852
Cosumnes River	$ 183,549	$ 18,450	$ 201,999
Feather River	$ 470,548	$ 113,007	$ 583,555
Fresno River	$ 90,482	$ 2,306	$ 92,788
Honey Lake	$ 8,617	-	$ 8,617
Kern River	$ 77,556	$ 9,225	$ 86,781
Klamath River	$ 258,076	$ 445,107	$ 703,183
Merced River	$ 278,706	$ 13,838	$ 292,543
Mokelumne River	$ 107,716	$ 9,225	$ 116,941
Sacramento River	$ 159,420	$ 11,531	$ 170,952
Salmon River	$ 116,334	$ 87,638	$ 203,971
San Gabriel River	$ 155,112	$ 4,613	$ 159,724
San Joaquin River	$ 47,395	-	$ 47,395
Santa Ana River	$ 17,235	-	$ 17,235
Scott River	$ 94,790	$ 99,169	$ 193,959
Smith River	$ 17,235	-	$ 17,235
Stanislaus River	$ 231,332	$ 36,900	$ 268,232
Suisun Bay	$ 4,309	-	$ 4,309
Trinity River	$ 234,529	$ 55,350	$ 289,879
Tuolumne River	$ 116,334	$ 2,306	$ 118,640
Yuba River	$ 542,650	$ 131,457	$ 674,106
TOTAL	**$ 3,550,454**	**$ 1,083,940**	**$ 4,634,395**

Notes:

Estimates of trip-related spending represent spending in the destination watersheds where suction dredgers visit; because these estimates do not include spending at home in preparation for suction dredging trips or a portion of en-route spending, the spending estimates do not correspond with the trip-related expenditures shown in Table 3.

Estimates of trip-related spending were derived from data from the 2008 Suction Dredge survey.

Table 5. 2008 Base Period Conditions: Estimates of jobs, personal income, and sales tax revenue by watershed (of destination) supported by trip-related spending associated with suction dredging activity

Watershed	Resident Dredgers			Nonresident Dredgers			Total		
	Jobs[1,3]	Personal Income[2,3]	Sales Tax Revenue[2,3]	Jobs[1,3]	Personal Income[2,3]	Sales Tax Revenue[2,3]	Jobs[1,3]	Personal Income[2,3]	Sales Tax Revenue[2,3]
American River	3.2	$ 185,300	$ 8,900	0.5	$ 29,500	$ 1,400	3.7	$ 214,800	$ 10,300
Calaveras River	0.3	$ 11,600	$ 600	0.0	$ 0	$ 0	0.3	$ 11,600	$ 600
Cosumnes River	1.9	$ 98,100	$ 4,900	0.2	$ 11,200	$ 600	2.1	$ 109,300	$ 5,500
Feather River	5.2	$ 262,500	$ 12,800	1.4	$ 71,500	$ 3,500	6.6	$ 334,000	$ 16,300
Fresno River	0.9	$ 44,100	$ 2,200	0.0	$ 1,300	$ 100	0.9	$ 45,400	$ 2,300
Honey Lake	0.1	$ 4,100	$ 200	0.0	$ 0	$ 0	0.1	$ 4,100	$ 200
Kern River	0.8	$ 45,000	$ 2,100	0.1	$ 6,100	$ 300	0.9	$ 51,100	$ 2,400
Klamath River	2.8	$ 122,500	$ 6,300	5.4	$238,200	$12,200	8.2	$ 360,700	$ 18,500
Merced River	2.3	$ 118,500	$ 5,800	0.1	$ 6,600	$ 300	2.4	$ 125,100	$ 6,100
Mokelumne River	0.8	$ 52,400	$ 2,700	0.1	$ 5,100	$ 300	0.9	$ 57,500	$ 3,000
Sacramento River	1.8	$ 89,800	$ 4,300	0.1	$ 7,400	$ 400	1.9	$ 97,200	$ 4,700
Salmon River	1.3	$ 55,200	$ 2,800	1.1	$ 46,900	$ 2,400	2.4	$ 102,100	$ 5,200
San Gabriel River	1.7	$ 103,700	$ 4,900	0.1	$ 3,400	$ 200	1.8	$ 107,100	$ 5,100
San Joaquin River	0.5	$ 28,800	$ 1,300	0.0	$ 0	$ 0	0.5	$ 28,800	$ 1,300
Santa Ana River	0.2	$ 10,800	$ 500	0.0	$ 0	$ 0	0.2	$ 10,800	$ 500
Scott River	1.0	$ 45,000	$ 2,300	1.2	$ 53,100	$ 2,700	2.2	$ 98,100	$ 5,000
Smith River	0.2	$ 7,200	$ 400	0.0	$ 0	$ 0	0.2	$ 7,200	$ 400
Stanislaus River	2.4	$ 114,400	$ 5,900	0.4	$ 20,700	$ 1,100	2.8	$ 135,100	$ 7,000
Suisun Bay	0.0	$ 2,300	$ 100	0.0	$ 0	$ 0	0.0	$ 2,300	$ 100
Trinity River	2.6	$ 132,800	$ 6,400	0.7	$ 35,700	$ 1,700	3.3	$ 168,500	$ 8,100
Tuolumne River	1.3	$ 62,100	$ 3,100	0.0	$ 1,400	$ 100	1.3	$ 63,500	$ 3,200
Yuba River	5.6	$ 288,200	$ 14,000	1.5	$ 79,100	$ 3,800	7.1	$ 367,300	$ 17,800
Total	**36.9**	**$1,884,400**	**$ 92,500**	**12.9**	**$617,200**	**$31,100**	**49.8**	**$2,501,600**	**$123,600**

Notes:

[1] Includes full- and part-time jobs

[2] Includes wage earnings, profits, and other property income

[3] Impacts were estimated using IMPLAN I-O models and do not account for effects of spending by local residents of affected watersheds.

Table 6. Comparison of the Socioeconomic Effects of the Alternatives Relative to the Proposed Program

Socioeconomic Impact Measure	No Program Alternative	1994 Regulations Alternative	Water Quality Alternative	Reduced Intensity Alternative
Number of dredging days	– – –	+	–	– –
Trip-related spending by dredgers	– – –	+	–	– –
Spending on equipment by dredgers	– – –	n/c	–	– –
Regional employment	– – –	+	–	– –
Regional personal income	– – –	+	–	– –
Sales tax revenues	– – –	+	–	– –

Notes:
n/c denotes no measurable change anticipated.
+ denotes slight or minor *increase* in socioeconomic impact measure.
- denotes slight or minor *decrease* in socioeconomic impact measure.
- - denotes moderate *decrease* in socioeconomic impact measure.
- - - denotes substantial *decrease* in socioeconomic impact measure.

APPENDIX A

SUCTION DREDGER SURVEY CONDUCTED IN 2010

This appendix describes the Suction Dredger survey conducted for this report.

Survey Methods

A mail survey was conducted of 2008 suction dredge permit holders in California to collect information important for environmental and socioeconomic analysis of the proposed permit program. The survey was conducted by mail, beginning in late January 2010. Suction dredge permittees residing both in-state (resident dredgers) and out-of-state (nonresident dredgers) participated in the survey.

The sampling frame for the survey was a list of suction dredge permit holders in 2008 provided by CDFG. According to CDFG records, 2,956 resident persons obtained permits to suction dredge in 2008, and 533 nonresident persons obtained dredging permits. To achieve samples with margin-of-error (sample error) characteristics of less than 5 percent (plus or minus) at a 95-percent confidence level, a sample of 1,000 resident dredgers and all 533 nonresident dredgers were selected to participate in the mail survey. (Sample error measures that portion of the difference between the value of a statistic derived from observations and the value that it is supposed to estimate in the population; this error is attributed to the fact that samples represent only a portion of a population.)

Based on previous experience of the research team, the sampling levels were expected to produce, at a minimum, 400 completed (and usable) surveys from resident dredgers and 250 completed (and usable) surveys from nonresident dredgers, with estimated sample errors of 4.65 percent and 4.61 percent, respectively. These levels of sample error were considered acceptable for accurately characterizing the respective resident and nonresident dredging population from which the samples were drawn.

For the resident survey, a mail survey form (see enclosed forms) was sent to the 1,000 permit holders who were randomly selected from the list provided by CDFG of 2,956 permit holders. For the nonresident dredger survey, surveys were sent to all 533 permit holders. To increase participation in the survey, three “follow-ups” (one reminder postcard and two mailings with replacement surveys) were sent to persons who had not submitted a completed survey within about two weeks of the previous mailing.

Survey Data Processing

For the survey of resident dredgers, a total of 750 surveys were returned, of which 734 had useable data. For the nonresident dredger survey, a total of 344 surveys were returned, of which 337 had useable data. The response rate (number of usable surveys as a percent of the survey population) was 73.4 percent for the resident dredger survey

and 63.2 percent for the nonresident dredger survey. These response rates were considerably higher than anticipated for both surveys, resulting in smaller sample errors (at the 95% confidence level) of 3.2 percent for the resident dredger survey (compared to an expected error of 4.65%), and 3.31 percent for the nonresident dredger survey (compared to an expected error of 4.61%).

Each returned survey was inspected by the Applied Research and Evaluation Program at Chico State to determine completeness and legibility of responses, and surveys with useable data were then entered in databases for analysis. As with most mail surveys, data provided by some survey participants were not useable for a variety of reasons (e.g., illegible responses, incomplete information). Some surveys that were returned had to be inspected further to determine if responses to certain questions were valid; in some cases, judgments were made concerning the usefulness of responses. The data processing procedures that were followed to finalize the databases for data analysis are described in more detail below.

Re-Assign Observations to the Appropriate Database

The zip code identified by survey respondents was used to confirm whether the respondent belonged in the resident or nonresident database. In a few cases, respondents had either moved out of state or had moved to California since 2008, indicating that their responses belonged in the other database. There were three respondents from the nonresident sample who had to be re-assigned to the resident database, and five respondents from the resident sample who had to be moved to the nonresident database.

Coding of Non-Numeric Responses to Open-Ended Questions

Certain open-ended questions in the survey elicited responses that were not numeric or were a range of values. For example, Question 7a asked survey respondents “how much mercury did you personally collect and remove from streams?” with a space for identifying the amount in ounces. Although most respondents provided a numeric response, some respondents provided responses such as “trace”, “several”, or a range of values. These responses were converted in the databases to appropriate numeric values. Ranges of values were converted to a single numeric value using the mid-point of the range; the protocol used to convert non-numeric values to numeric values are identified in the databases, which are available upon request.

Identifying Outliers and Invalid Responses for Key Questions

For certain key survey questions, such as the number of dredging days and expenditures per trip, responses were reviewed to ensure that valid data were provided. Outlying responses were flagged and first double-checked against the returned survey to ensure that no coding error had occurred. The values were then checked against other survey information provided by the respondent to determine the consistency of responses. Cases in which the values provided by the respondent could not be verified,

either because the response was illegible or inconsistent with other data provided by the respondent, were subsequently deleted from the databases. These cases accounted for less than one percent of the responses to these key questions.

Measurement Error in the Sample Estimates

Data collected in mail and telephone surveys often have certain kinds of systematic error resulting from survey design or implementation issues. These forms of systematic error can produce biases in the sample estimates. Mitchell and Carson (1987) developed a typology of potential response effects biases that are common in surveys that value public goods.

For the Suction Dredger survey, two types of potential biases were of particular concern: recall bias and strategic bias. Bias based on recall or memory error is an issue often encountered in mail or telephone surveys in which respondents are asked to recall information from some time in the past. In the case of the Suction Dredger survey, participants were asked to recall information from 2008. Because the survey was conducted in early 2010, recall error would appear to affect to some extent the reliability and precision of information provided, particularly for questions asking about the frequency of suction dredging activity (i.e., trips made or days of dredging). Recall error also would be expected to affect the reliability of responses pertaining to expenditures, both trip-related spending and spending on the purchase and maintenance of dredging equipment. Because data from these types of questions are central to the economic analysis conducted for this study, the sample estimates of total dredger expenditures are likely biased to some extent by recall error. Although the exact nature of this error is uncertain, Osborn and Matlock (2010) in their study of recall error in sportfishing surveys report that previous studies on recall error generally conclude that longer recall periods tend to produce larger estimates of fishing and hunting activity.

Strategic bias also is a potential source of measurement error of concern for the sample estimates derived from the Suction Dredger survey. Strategic bias occurs when a respondent provides a value in response to a question with the intent to influence an outcome from use of that data (Mitchel and Carson 1989). For example, a respondent might inflate the number of dredging trips or the amount spent per trip in order to convey that he spent more than he actually did to engage in an activity. This type of bias is a significant concern for surveys in which respondents are asked questions based on hypothetical conditions, such as their willingness to pay for improved resource conditions. Because the Suction Dredger survey did not ask hypothetical questions, the effect of strategic bias on the sample estimates is not believed to be a significant source of measurement error.

In summary, although recall bias and strategic bias would appear to have some effect on the reliability and precision of sample estimates derived from the survey data, the extent of measurement error from these two sources appears limited and would not be expected to undermine the overall reliability of estimates derived from the sample. The higher-than-expected response rates and associated lower-than-anticipated sample

errors, combined with efforts to validate survey responses, contribute to protecting the integrity and statistical properties of the data.

Summary Statistics from the Survey

Frequency distributions were generated for responses to all questions in the resident and nonresident dredger surveys. These values are reported in the survey forms that follow.

Suction Dredger Survey
(California Residents)

This brief survey is being conducted to better understand participation in suction dredging activities in California. ALL QUESTIONS PERTAIN TO YOUR SUCTION DREDGING ACTIVITIES IN CALIFORNIA IN 2008. Your participation is important to the study. Please answer all questions completely and accurately.

IMPORTANT: What was the ZIP CODE of your primary residence in 2008? _____

A. Suction Dredging Activity in California in 2008

This section asks about your suction dredging activity in California in 2008.

1. How many separate trips *from your primary place of residence* did you make to suction dredge in California in 2008? ___ trips
   (If none or "0" trips, this completes the survey. Please return the questionnaire in the postage paid envelope provided.) [N= 723]

Number of trips	Frequency
0	45
1-10	422
11-20	138
21-30	44
31-100	66
101-200	8

2. About how many days did you operate a suction dredge in California in 2008? ___ days [N= 678]

Number of days	Frequency
0	3
1-20	368
21-40	149
41-60	69
61-80	36
81-100	33

101-120	12
121-150	5
151-200	3

3. In which California *county(ies)* did you operate your suction dredge in 2008? (please list all counties)

_____Co. _____Co. _____Co. _____Co. _____Co.

		Frequency				
County	Total	Q3a	Q3b	Q3c	Q3d	Q3e
Amador	29	19	5	3	2	
Butte	35	22	6	3	1	3
Calaveras	22	9	8	5		
Contra Costa	1			1		
Del Norte	4	3		1		
El Dorado	68	44	18	5	1	
Fresno	8	7		1		
Humboldt	6	2	3	1		
Kern	18	11	3	4		
Lassen	4	2	1	1		
Los Angeles	34	31	3			
Madera	20	13	7			
Mariposa	64	42	9	6	7	
Merced	10	4	1	4		1
Modoc	1			1		
Nevada	55	34	11	7	1	2
Placer	94	60	21	9	3	1
Plumas	112	78	21	9	3	1
Sacramento	3	1			1	1
San Benito	1		1			
San Bernardino	5	2	3			
Shasta	29	22	5	1		1
Sierra	115	88	25	2		
Siskiyou	110	84	11	9	6	
Solano	1			1		

Stanislaus	16	6	4	4	1	1
Sutter	2	1			1	
Tehama	1			1		
Trinity	65	45	15	5		
Tuolumne	62	31	22	6	2	1
Yolo	1		1			
Yuba	41	17	18	5	1	
Total responses	1,037	678	222	95	30	12

4. In which California *streams* did you operate a suction dredge in 2008 and what *town* is closest to that location?

Stream ***Nearby Town***

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

[N= 678] [N= 667]
Number of streams identified= 264 Number of towns identified= 240

5. **OPTIONAL**: Approximately how many ounces of gold did you recover in 2008? ___ ounces [**Please note:** Your response to this question and all other questions are considered confidential and will be combined with responses from all other respondents for summary purposes only.] [N= 547]

0 ounces =48
<=0.5 ounces = 160
0.5<x<=1 ounces = 82
1<x<2 ounces = 85
2<x<=5 ounces = 80
5<x<=10 ounces = 47
10<x<=20 ounces = 37
20<x<=30 ounces = 5
>40 ounces = 3

6. Did you use mercury and/or nitric acid to process the concentrates in 2008? [N= 684]
___ Yes 17
___ No 667

7. Did you collect and remove any mercury from any streams during your suction dredging activities in 2008? [N= 677]
___ Yes (**go to Q7a**) 380
___ No (**skip to Q8**) 297

7a. If YES, approximately how much mercury did you personally collect and remove from streams during your suction dredging activities in California in 2008? ___ounces [N= 362]
0 ounces = 8

0.05 -0.99 ounces = 218
1-5 ounces = 110
5.1-10 ounces = 10
10.1-20 ounces = 8
20.1-30 ounces = 1
30.1-40 ounces = 3
64 ounces = 1
90-100 ounces = 3

8. For each dredge that you used in California streams in 2008, please tell us the nozzle size, horsepower, and the approximate percent of your suction dredging time spent in California that each dredge was used over that year.

	Nozzle Size	Horsepower	% of Time Used
Dredge #1	N= 680 1-1.5" = 14 2-5" = 582 6-8" = 84	N=664 0.25-5 =274 5.2-10 =282 10.5-20 =85 20.5-50 =16 50.5-65 =5 90 =1 200 =1	N= 669 1-20%= 45 21-40% = 44 41-60" = 58 61-80% = 51 81-100%= 471
Dredge #2	N= 212 1-1.5" = 6 2-5.25" = 179 6-8" = 27	N=207 1.5-5 = 93 5.5-10 = 75 10.5-20 = 34 20.5-50 = 5	N= 208 0%= 3 1-20% = 79 21-40" = 48 41-60% = 39 61-80%= 24 81-100% = 15
Dredge #3	N= 52 1-1.5" = 1 2-5.5" = 39 6-8" = 12	N=52 1-5 = 17 5.5-10 = 19 10.5-20 = 13 20.5-50 = 1 Other = 2	N= 52 0%= 1 1-20% = 29 21-40" = 15 41-60% = 3 61-80%= 3 81-100% = 1
Dredge #4	N= 6 1-1.5" = 0 2-5.5" = 4 6-8" = 2	N=6 4-5 = 2 5.5-10 = 2 10.5-16 = 2	N= 6 10-20%= 5 60% = 1

Dredge #5 _____ _____ _____ = 100%

N= 3 N=3 N= 3
1-5" = 3 1-5 = 2 1-10%= 3
5.5 = 1

B. Typical (or Last) Suction Dredging Trip in California in 2008

This section asks about your "typical trip" made in California in 2008 (that is, the trip that you made most of the time). We recognize that, for some dredgers, it may be difficult to generalize about their "typical trip" because each trip was different. ***If you did not have a typical trip in 2008, please tell us about your last trip in 2008 (and check the appropriate response in the box below)***.

Please check **one** of the following responses:
__ The following describes my typical suction dredging trip in California in 2008.
__ I did not have a typical trip, so the following describes my last suction dredging trip in California in 2008.

[N= 649]
Response 1 = 561
Response 2 = 88

9. On average, how many hours per day were you in the water operating your suction dredge on your typical trip in California in 2008? ____ hours per day

[N= 687]

Number of Hours	Frequency
0	1
0.5-3.5	104
4-6	458
7-9	118
10-12	6

10. On average, how much area (in square feet) did you dredge per day on your typical trip? ___ square feet

[N= 660]

Square Feet	Frequency
1-20	440
21-40	87
41-60	31
61-80	24

81-100	41
101-200	20
201-300	8
301-400	4
800	1
1,000	2
2,500	1
4,000	1

11. On average, how deep (in feet) did you typically dredge? ___ feet
[N= 676]

Number of Feet Deep	Frequency
0.25-3	305
3.5-6	285
6.5-9	49
10-12	19
12.5-15	6
16-18.5	1
20-22	6
23-25	2
30-35	3

12. On the typical trip, did you use more than one suction dredge in California in 2008? [N= 688]
___ Yes (**go to Q12a**) 116
___ No (**skip to Q13**) 572

12a. IF YES, how many suction dredges did you typically use in 2008? ___ dredges [N= 117]
2 = 99
3 = 17
4 = 1

13. How many people (including friends and family members who did not participate in suction dredging activities) typically accompanied you on your trips to conduct suction dredging in California in 2008? [N= 685]
____ no other people, went by myself 83
____ 1-2 other people 376

____ 3-5 other people 184
____ 6-10 other people 30
____ more than 10 other people 12

14. Did you typically work as a team with other suction dredge permit holders to operate a single suction dredge on your trips to conduct suction dredging in California in 2008? [N=685]
___ Yes 342
___ No 343

15. About how far in distance (miles) did you typically travel (**one-way**) from your residence to the primary site where you suction dredged in California in 2008? ____ miles [N= 675]
0 miles = 6
0.25-100 miles = 423
101-500 = 211
501-1,000 = 35

16. Did you typically stay overnight when you were away from home on suction dredging trips in California in 2008? [N= 690]
____ Yes (**go to Q16a**) 495
____ No (**skip to Q17**) 190

16a. If YES, where did you typically stay?
____ Developed campground → (circle one or more): State, Federal, Private 216
____ Undeveloped campsite → (circle one or more): State, Federal, Private 266
____ Hotel/motel 90
____ Friend or family 35
____ Other (please explain: _____) 110

17. Did you typically drive off of paved roads to get to/from your usual suction dredge site(s) or camping location on your typical trip in California? [N= 682]
___ Yes (**go to Q17a**) 492
___ No (**skip to Q18**) 190

17a. If YES, did you typically use a car/truck or off-highway vehicle when driving off of paved roads? [N= 492]
___ car/truck 428
___ off-highway vehicle 32
Combination car/truck/off-highway vehicle = 32

18. On your typical trip in California in 2008, what were your TOTAL personal expenditures on the following?

Gasoline: $ _____ per trip
[N= 672]
$0 = 7
$1-$999 = 655
$1,000-$1,999 = 7
$2,000-$2,999 = 1
$3,000-$3,999 = 1
$5,000 = 1

Food and beverages: $ _____ per trip
[N= 666]
$0 = 23
$1-$1,999 = 637
$2,000-$2,499 = 5
$2,500-$2,999 = 0
$3,000 = 1

Restaurants: $ _____ per trip
[N= 620]
$0 = 258
$1-$999 = 361
$1,000-$1,200 = 1

Miscellaneous trip supplies: $ _____ per trip
[N= 649]
$0 = 113
$1-$999 = 532
$1,000-$1,999 = 3
$2,000-$2,500 = 1

Miscellaneous services: $ _____ per trip
[N= 583]
$0 = 274
$1-$999 = 308
$1,000-$1,800 = 1

TOTAL TRIP-RELATED $ _____ per trip
[N= 689]
$0 = 3
$1-$2,999 = 664
$3,000-$4,999 = 6
$5,000-$6,999 = 6
$9,999-$12,750 = 1

C. Equipment and Other Questions

This section asks about your suction dredge equipment and maintenance expenditures in 2008

19. Approximately how much money did you spend IN TOTAL on the purchase and maintenance of equipment used for suction dredging in California in 2008? $_____
[N= 661]
$0 = 26
$1-$4,999 = 555
$5,000-$9,999 = 58

$10,000-$14,999 = 17
$15,000 = 4
$35,000 = 1

20. Please tell us (*by checking the appropriate box*) where you purchased most of your suction dredge equipment in 2008? [N= 682]
___ At stores in the county where you live 185
___ At stores in counties other than where you live 185
___ Ordered by telephone 21
___ Ordered over the Internet 17
___ Mail order 3
___ Other (Please explain: _____) 66
Combinations of the above = 205

21. Do you consider yourself to be a recreational dredger, semi-commercial dredger, or commercial dredger? (Please check only one.) [N= 678]
___ Recreational dredger (not a significant source of income) 546
___ Semi-commercial dredger (supplementary source of income) 107
___ Commercial dredger (primary source of income, commercial enterprise) 15
Recreational/semi-commercial dredger = 10

22. About what percentage of your annual income do you derive from suction dredging?
___% [N= 614]
0% = 369
0.0001-1.5% = 68
2-90% = 174
100% = 3

23. How important is it that you make a profit each year on your suction dredging activities? [N= 675]
____ Very important 137
____ Somewhat important 181
____ Not at all important 357

D. Comments (please provide comments about the survey or any other concerns below)
_____
_____
_____
_____

THANK YOU FOR PARTICIPATING IN THIS SURVEY

PLEASE RETURN SURVEY IN THE ENCLOSED ENVELOPE -
MAILING POSTAGE IS PREPAID

Suction Dredger Survey
(Non-Residents of California)

This brief survey is being conducted to better understand participation in suction dredging activities in California. ALL QUESTIONS PERTAIN TO YOUR SUCTION DREDGING ACTIVITIES IN CALIFORNIA IN 2008. Your participation is important to the study. Please answer all questions completely and accurately.

IMPORTANT: What was the ZIP CODE of your primary residence in 2008? _____

A. Suction Dredging Activity in California in 2008

This section asks about your suction dredging activity in California in 2008.

2. How many separate trips *from your primary place of residence* did you make to suction dredge in California in 2008? ___ trips
(If none or "0" trips, this completes the survey. Please return the questionnaire in the postage paid envelope provided.) [N= 334]

Number of trips	Frequency
0	12
1-10	285
11-20	26
21-30	5
31-48	2
Range (not a specific number)	4

2. About how many days did you operate a suction dredge in California in 2008? ___ days [N= 320]

Number of days	Frequency
0	2
1-20	141
21-40	81
41-60	49
61-80	15
81-100	15
101-120	8

121-135	3
200	1
Range (not a specific number)	5

3. In which California *county(ies)* did you operate your suction dredge in 2008? (please list all counties)

_____Co. _____Co. _____Co. _____Co. _____Co.

		Frequency				
County	Total	Q3a	Q3b	Q3c	Q3d	Q3e
Amador	1	1				
Butte	4	4				
Calaveras	7	6			1	
Del Norte	1	1				
El Dorado	5	3	1			1
Humboldt	6	3	2	1		
Kern	4	2	2			
Lassen	2		2			
Los Angeles	2	1	1			
Madera	1	1				
Mariposa	5	3	2			
Nevada	6	4	2			
Placer	20	13	5	2		
Plumas	43	37	4		2	
Shasta	2	1	1			
Sierra	45	39	6			
Siskiyou	172	160	12			
Stanislaus	2		2			
Trinity	15	10	5			
Tuolumne	14	11	2	1		
Yuba	10	9	1			
Total responses	367	309	50	4	3	1

4. In which California *streams* did you operate a suction dredge in 2008 and what *town* is closest to that location?

Stream	***Nearby Town***
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
[N= 318]	[N= 318]
Number of streams identified= 103	Number of towns identified= 116

5. **OPTIONAL**: Approximately how many ounces of gold did you recover in 2008? ___ ounces [**Please note:** Your response to this question and all other questions are considered confidential and will be combined with responses from all other respondents for summary purposes only.] [N= 252]

0 ounces =16
<=0.5 ounces = 58
0.5<x<=1 ounces = 52
1<x<2 ounces = 44
2<x<=5 ounces = 43
5<x<=10 ounces = 24
10<x<=20 ounces = 9
20<x<=30 ounces = 2
30<x<=40 ounces = 2
>40 ounces = 2

6. Did you use mercury and/or nitric acid to process the concentrates in 2008? [N= 320]
___ Yes 5
___ No 315

7. Did you collect and remove any mercury from any streams during your suction dredging activities in 2008? [N= 320]
___ Yes (**go to Q7a**) 192
___ No (**skip to Q8**) 128

7a. If YES, approximately how much mercury did you personally collect and remove from streams during your suction dredging activities in California in 2008? ___ounces [N= 181]

0 ounces= 8
Trace = 12
0.1-0.99 ounces = 95
1-5 ounces = 46
5.1-10 ounces= 4
10.1-20 ounces = 2
20.1-30 ounces = 1
30.1-40 ounces= 2
64 ounces = 1
Other =10

8. For each dredge that you used in California streams in 2008, please tell us the nozzle size, horsepower, and the approximate percent of your suction dredging time spent in California that each dredge was used over that year.

	Nozzle Size	Horsepower	% of Time Used
Dredge #1	_____	_____	_____
	N= 319	N=313	N= 318
	1.5" = 3	0.5-5 =74	0%= 3
	2-5" = 266	5.5-10 =166	1-20% = 21
	6-8" = 50	10.5-20 =61	21-40" = 19
		20.5-50 =8	41-60% = 25
		50.5-100 =4	61-80%= 28
			81-100% = 220
			Other = 2
Dredge #2	_____	_____	_____
	N= 91	N=89	N= 90
	1.5" = 2	1.5-5 = 31	0%= 3
	2-5" = 74	5.5-10 = 35	1-20% = 38
	5.25-8" = 15	10.5-20 = 19	21-40" = 17
		20.5-50 = 3	41-60% = 17
		100 = 1	61-80%= 10
			81-100% = 3
			Other = 2
Dredge #3	_____	_____	_____
	N= 18	N=17	N= 18
	2-5" = 14	2-5 = 6	0%= 1
	6" = 4	5.5-10 = 8	1-20% = 10
		10.5-15 = 3	21-40" = 1
			41-60% = 1
			61-75%= 4
			Other = 1
Dredge #4	_____	_____	_____
	N= 2	N= 2	N= 2
	2" = 1	8.5 = 1	0%= 0
	6" = 1	18 = 1	1-20% = 1
			21-40" = 1
Dredge #5	_____	_____	_____
			= 100%
	N=0	N=0	N=0

B. Typical (or Last) Suction Dredging Trip in California in 2008

This section asks about your "typical trip" made in California in 2008 (that is, the trip that you made most of the time). We recognize that, for some dredgers, it may be difficult to generalize about their "typical trip" because each trip was different. ***If you did not have a typical trip in 2008, please tell us about your last trip in 2008 (and check the appropriate response in the box below)***.

Please check **one** of the following responses:

__ The following describes my typical suction dredging trip in California in 2008.

__ I did not have a typical trip, so the following describes my last suction dredging trip in California in 2008.

[N= 286]

Response 1 = 230

Response 2 = 56

9. On average, how many hours per day were you in the water operating your suction dredge on your typical trip in California in 2008? ____ hours per day [N= 323]

Number of Hours	Frequency
0	1
1-3	29
4-6	235
7-9	54
10-12	4

10. On average, how much area (in square feet) did you dredge per day on your typical trip? ___ square feet [N=311]

Square Feet	Frequency
0	1
1-20	208
21-40	47
41-60	20
61-80	6
81-100	12
101-200	11
201-300	4
301-400	1
2,000	1

11. On average, how deep (in feet) did you typically dredge? ___ feet [N= 324]

Number of Feet Deep	Frequency
0	1

1-3	128
3.5-6	148
7-9	23
10-12	17
12.5-15	2
16-18.5	4
100	1

12. On the typical suction dredging trip in California, did you use more than one suction dredge in 2008? [N= 327]
___ Yes (**go to Q12a**) 74
___ No (**skip to Q13**) 253

12a. IF YES, how many suction dredges did you typically use in 2008? ___ dredges [N= 78]
0 = 1
1 = 4
2 =61
3 = 12

13. How many people (including friends and family members who did not participate in suction dredging activities) typically accompanied you on your trips to conduct suction dredging in California in 2008? [N= 322]
____ no other people, went by myself 41
____ 1-2 other people 182
____ 3-5 other people 80
____ 6-10 other people 16
____ more than 10 other people 3

14. Did you typically work as a team with other suction dredge permit holders to operate a single suction dredge on your trips to conduct suction dredging in California in 2008? [N= 318]
___ Yes 131
___ No 187

15. About how far in distance (miles) did you typically travel (**one-way**) from your residence to the primary site where you suction dredged in California in 2008? ____ miles [N= 317]
0 miles = 2
1-1,999 miles = 270
2,000-3,000 miles = 31
3,000-3,700 miles = 14

16. Did you typically stay overnight when you were away from home on suction dredging trips in California in 2008? [N= 321]

____ Yes (**go to Q16a**) 315
____ No (**skip to Q17**) 6

16a. If YES, where did you typically stay?
____ Developed campground → (circle one or more): State, Federal, Private 162
____ Undeveloped campsite → (circle one or more): State, Federal, Private 171
____ Hotel/motel 86
____ Friend or family 25
____ Other (please explain: _____) 58

17. Did you typically drive off of paved roads to get to/from your usual suction dredge site(s) or camping location on your typical trip in California? [N= 321]
___ Yes (**go to Q17a**) 212
___ No (**skip to Q18**) 109

17a. If YES, did you typically use a car/truck or off-highway vehicle when driving off of paved roads? [N= 212]
___ car/truck 186
___ off-highway vehicle 14
Combination car/truck/off-highway vehicle = 12

18. On your typical trip in California in 2008, what were your TOTAL <u>personal</u> expenditures on the following?

Gasoline: $ _____ per trip
[N= 315]
$0 = 11
$1-$999 = 238
$1,000-$1,999 = 45
$2,000-$2,999 = 15
$3,000-$3,999 = 3
$4,000-$5,000 = 3

Food and beverages: $ _____ per trip
[N= 316]
$0 = 13
$1-$1,999 = 290
$2,000-$2,499 = 6
$2,500-$2,999 = 2
$3,000-$3,499 = 2
$3,500-$4,200 = 3

Restaurants: $ _____ per trip
[N= 311]
$0 = 33
$1-$999 = 273
$1,000-$1,499 = 3
$1,500-$2,000 = 2

Miscellaneous trip supplies: $ _____ per trip
[N= 311]
$0 = 25
$1-$999 = 269
$1,000-$1,999 = 10
$2,000-$2,999 = 4
$3,000-$3,999 = 1
$4,000-$5,582 = 2

Miscellaneous services: $ _____ per trip
[N= 299]
$0 = 82
$1-$999 = 199
$1,000-$1,999 = 13
$2,000-$3,000 = 4
$18,431 = 1

TOTAL TRIP-RELATED $ _____ per trip
[N= 320]
$0 = 3
$1-$2,999 = 260
$3,000-$4,999 = 22
$5,000-$6,999 = 16
$7,000-$8,999 = 9
$9,000-$14,999 = 3
$15,000 = 2
$30,486 = 1
Other = 4

C. Equipment and Other Questions

This section asks about your suction dredge equipment and maintenance expenditures in 2008

19. Approximately how much money did you spend IN TOTAL on the purchase and maintenance of equipment used for suction dredging in California in 2008? $_____
[N= 314]
$0 = 6
$1-$4,999 = 243
$5,000-$9,999 = 46
$10,000-$14,999 = 11
$15,000-$19,999 = 5
$20,000-$27,500 = 3

20. Please tell us (*by checking the appropriate box*) where you purchased most of your suction dredge equipment in 2008? [N= 319]
___ At stores in the county where you live 23
___ At stores in counties other than where you live 119
___ Ordered by telephone 113
___ Ordered over the Internet 19

___ Mail order 2
___ Other (Please explain: _____) 43
Combinations of the above = 43

21. Do you consider yourself to be a recreational dredger, semi-commercial dredger, or commercial dredger? (Please check only one.) [N= 321]
___ Recreational dredger (not a significant source of income) 237
___ Semi-commercial dredger (supplementary source of income) 77
___ Commercial dredger (primary source of income, commercial enterprise) 7

22. About what percentage of your annual income do you derive from suction dredging?
___% [N= 289]
0% = 147
0.000001-1.0% = 36
2-99% = 92
100% = 1
Non-specific/range responses = 13

23. How important is it that you make a profit each year on your suction dredging activities? [N= 320]
____ Very important 69
____ Somewhat important 121
____ Not at all important 130

D. Comments (please provide comments about the survey or any other concerns below)
_____
_____
_____
_____
_____

THANK YOU FOR PARTICIPATING IN THIS SURVEY

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