Intermunicipal Flood Control in the San Francisquito Watershed: Why Portola Valley Hasn't Joined

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Abstract The San Franciquito Creek Joint Powers Authority (JPA) is a partnership between municipalities, county agencies, and non-governmental organizations attempting to jointly develop and implement a long term flood plan for the San Francisquito Watershed. This study addresses the feasibility of incorporating Portola Valley, a town located in the upper reaches of the watershed, into the JPA's membership. Making use of a survey of Portola Valley residents, I attempt to determine (1) the town's attitude towards participation in a watershed management regime and (2) the presence or absence of several commonly identified barriers to incorporating specific stakeholder groups into a public partnership. I also aim to uncover (3) any relationships between these two previous factors. Lastly, the study investigates (4) the relationship between citizens' economic stake in the creek and factors 1 and 2. Results suggest that most citizens are favorable towards their town's participation in a watershed partnership, but are not aware of any opportunities for Portola Valley to do so. Attitude towards "natural" flood control methods was found to best predict residents' willingness to participate. Economic stake in the land appears to have no correlation with this willingness, but very moderate association with concern about the ecological impacts of flooding.

Introduction

Ecosystem management attempts to resolve environmental issues and problems by focusing on how proposed solutions impact an ecosystem as a whole, rather than considering only some socioeconomic or biophysical values and not others (Korfmacher 2000). One implication of this approach is an expansion of the geographic scope in which environmental problems have traditionally been studied and addressed. In this way, ecosystem management hopes to better account for adverse effects that arise in one locale as a result of processes taking place in another (Czech and Krausman 1997).

Often the watershed is deemed a relatively ecologically self-contained and organizationally practical scale for environmental management. (Mullen and Allison 1999, Nelson and Weschler 1999). Thus, in many areas, regulatory agencies and non-governmental organizations have sought to organize watershed-wide partnerships and collaboratively assess conditions and implement projects across traditional jurisdictional and political boundaries (Griffin 1999, Kenney 1999, Ruhl 1999). A major challenge facing such partnerships is eliciting collective approval for projects among the divergent interests of a watershed's stakeholder groups. (Kenney 1999, Korfmacher 2000, Ruhl 1999). Such a situation is exemplified by the case of the San Franciquito Creek Joint Powers Authority (JPA), an intermunicipal partnership attempting to develop a long term flood plan in its watershed. My investigation centers around the perspectives of flood control of one town that has thus far remained elusive to the JPA's process.

The San Francisquito watershed is adjacent to the southwest portion of the San Francisco Bay Area and includes the municipalities of East Palo Alto, Palo Alto, Menlo Park, Portola Valley, Woodside, and Stanford, as well as portions of Santa Clara and San Mateo Counties (Figure 1). The San Francisquito Creek begins in the southwestern extremities of the watershed, drains into Searsville Lake near Upper Portola Valley, resumes as overflow, and feeds into the Bay some fourteen miles later. The creek contains one of the few remaining spawning runs for steelhead salmon in the San Francisco Bay Area (San Francisquito Creek Bank Stabilization and Revegetation Master Plan 2001). Located near the headwaters are the towns of Portola Valley and Woodside, while further downstream reside Menlo Park, Palo Alto and East Palo Alto. The following passage taken from the San Francisquito Coordinated Resource Management and Planning Group (a local NGO) study effectively summarizes the creek's flooding situation:

The San Francisquito Creek has overtopped its banks 11 times since 1907. The implications of these events are all too real, given the flood of February 3, 1998. This storm inflicted damage to an estimated 400 homes in Palo Alto, 10 homes in Menlo Park, 56 homes and 131 apartments in East Palo Alto, and Stanford Uiversity. In addition, there was extensive storm-related damage to roads and residential areas in the upper watershed areas of Portola Valley and Woodside (Reconnaissance Investigation Report of San Francisquito Creek 1998).

The same study estimates that, under the current conditions, a one hundred-year flood event would cost the cities along the creeks and their residents approximately $155 million (in 1996 dollars).

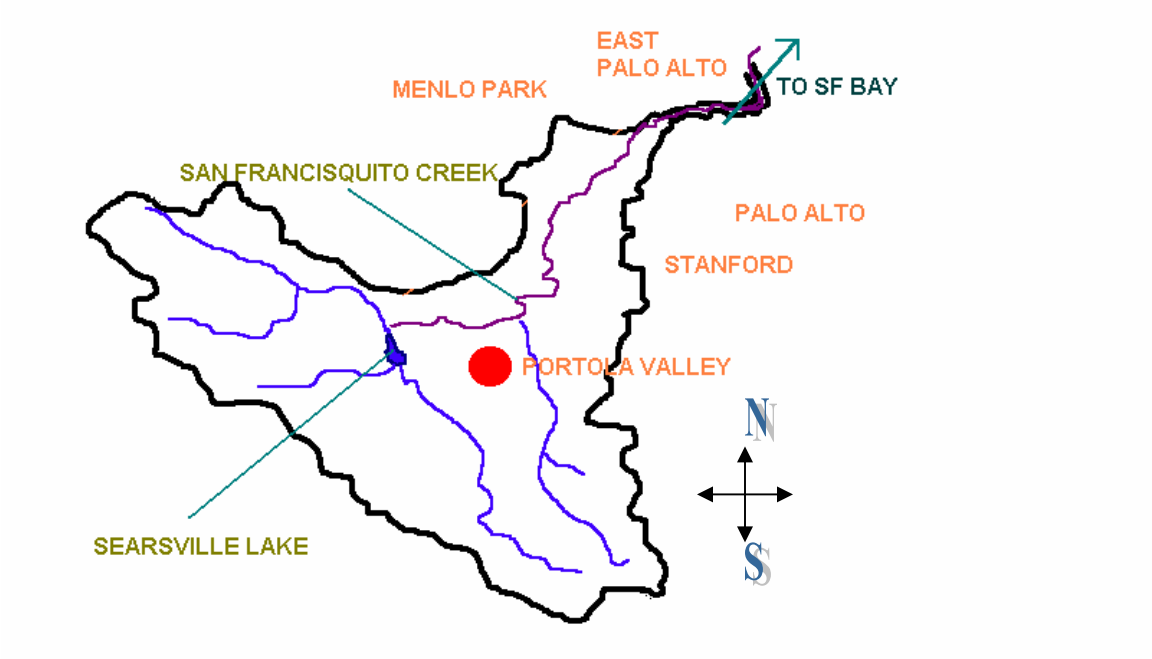

Figure 1. Map of San Francisquito Watershed

The Joint Powers Authority formed in May 1999 as a result of an agreement between the San Mateo and Santa Clara County Water Districts, and all the of watershed's municipalities, excepting Portola Valley and Woodside. The Joint Powers Agreement (1999) states that two of the organization's main goals are to "plan flood control measures for the San Francisquito Creek watershed" and "make recommendations to member entities for funding and alternatives for long-term flood control for member entity consideration" (p. 2). The Agreement also states that projects are funded by a combination of state and federal grants and contributions from member agencies. Portola Valley and Woodside have yet to join the JPA. In January 2001, members of

the JPA Steering Committee introduced the organization to the Portola Valley Town Council and extended an invitation to the town to join. The Council never made an official motion to allocate membership dues ($60,000) and join (Lambert, pers. comm). Because Portola Valley's social and ecological processes eminently affect and are affected by the San Francisquito Creek's hydrology, ecosystem management principles will not have been met unless the township's perspectives are brought to bear on the JPA's decision-making process regarding a flood plan.

Through surveying a sample of the populace of Portola Valley (approximately 5,000), this study aims to determine residents' attitude towards their town's entrance into the JPA as well as towards flood issues in general. Based on this information, I discuss how reflective the council's decision to elide membership was of community opinion as a whole. Surveying residents' attitudes towards flood issues also helps illuminate the presence or absence of several commonly identified barriers to collaboration between citizens and governmental stakeholders on environmental issues. These barriers are tested as predictors of the town's aforementioned *attitude towards partnership*. Said barriers are as follows:

Residents are not concerned enough about the impact of flooding. In the context of watershed management, adverse conditions that originate in areas peripheral to where their impacts are the most prominent are often characterized as "downstream" or "upstream" effects, denoted by the impacted region's position along the watershed's creek relative to the region of the effects' origin. Hence, one of the ways conflicted interests in watershed management often arise is between one group of stakeholders incurring the downstream or upstream effects that result from the activities of another group living elsewhere. In the instance of the San Francisquito watershed, the worst flooding occurs downstream from Portola Valley. As such, Portolans may only be subject to marginal local effects and may not be concerned enough about downstream effects to consider the potential role their town plays in exacerbating flooding in the watershed. Among the primary negative effects associated with flooding are destruction of native vegetation along stream banks, reduction of the creek's capacity as a steelhead salmon run, and public and private property damage (San Francisquito Creek Bank Stabilization and Revegetation Master Plan 2001). These effects can be further divided into categories of human impacts (property damage in and downstream from Portola Valley) and ecological impacts (destruction of plant and animal habitat, including that of steelhead trout). Though the JPA has placed emphasis on mitigating both categories, residents may believe the watershed partnerships

are prone to dedicate more attention and resources to one type than the other. Hence, I make this distinction when looking for relationships.

Residents disagree with the proposed methods of flood control. Portola Valley may share flooding concerns with the rest of the watershed, but may take issue with the methods meant to address flooding thus far due to questions of efficacy, feasibility, or fairness (Gregory and Wellman 2001). The JPA's consideration of plans has been primarily informed by the San Francisquito Coordinated Resource Management and Planning Group's 1998 Reconnaissance Investigation Report referred to earlier. The report outlines previously proposed methods of flood control, two of which currently being considered are building and maintenance of levees and natural channel-widening. In addition, the JPA is considering employing natural bank stabilization and revegetation techniques on parcels of private property through which the creek runs. While levee building necessitates engineering and introduction of "non-natural" structures to the creek banks, the latter two methods are perceived as much more ecologically friendly and congruous with restorative goals (Chang, pers. comm). Although the JPA has advocated all three methods at different places and times, Portolans might expect the organization to favor one side of the engineering/natural divide over the other. As a result, residents' own perspectives on the issue may significantly influence their *attitude towards partnership*.

Residents may not be aware of the opportunity for their town to join the JPA or participate in the development of a flood plan. Robinson (1997) has pointed out that awareness of similar programs in Canada is limited to a select group of citizens even in areas where projects are intended to be directly implemented. The JPA has approached the Portola Valley Town Council about flooding issues, but has not attempted extensive outreach towards Portola Valley's citizenry.

Furthermore, this study attempts to characterize the relationship between the types of values Portolans ascribe to the land and their perceptions regarding flood effects and control methods. Jones and Dunlap (1992) and Reading (1994) both explore relationships between financial reliance upon a "resource extractive" occupation (e.g., farming, ranching, fishing, mining) and environmental beliefs. The former study found that this reliance was negatively correlated with environmental concern among US citizens, while the latter found that that reliance was negatively correlated with support for ecosystem management and protection of wildlife among residents in the Greater Yellowstone Ecosystem. Moreover, Raedeke et al (2001) theorizes that

landowners with more of a financial stake in land tend to be more wary of participating in environmental management programs for fear that EM will open the door for increasingly strict governmental regulations on land use. I intend to test the similar hypothesis that residents who value the land adjacent the creek and the creek itself more for economic/commercial purposes than environmental/recreational purposes are (1) less likely to favor participation in watershed management, (2) less likely to be concerned about the effects of flooding, and (3) less likely to favor proposed flood control methods.

Appendix A provides a complete list of variables and dimensions.

Methods

In order to test the previously delineated hypotheses, I administered telephone questionnaire surveys to a random sample of 154 Portola Valley residents. The Pacific Bell Street Address Directory for the Los Altos-Palo Alto area lists 817 phone numbers for residences in Portola Valley arranged by area code and three-digit prefix in the directory. To select a systematic random sample, I generated a random number between one and three using Microsoft Excel, called the telephone number with the corresponding position on my list, and then called every third number thereafter (Lavrakas 1993). I cycled through the sampling frame in this way, eliminating refusals and respondents for each round from selection in subsequent rounds. The days and times at which residents were called varied. About 48% of the 34 hours I spent calling occurred during the weekend and yielded around 51% of total responses, while 24% of that time took place during standard work hours on weekdays and yielded 16% total responses, and 28% of calling time happened on weekdays after 5 p.m., wherein 33% of total responses were collected. My response rate was around 16%.

Residents were asked to rate their concern regarding various flooding effects, attitudes toward participation in a watershed partnership and proposed flood control methods, and awareness of flood control efforts on scales ranging from 1, " least concerned/favorable/aware" to 4, "most concerned/favorable/aware." Respondents were also given the option to respond "I don't know" to all questions. In addition, residents were asked to rate how much they value land adjacent to the creek for economic/commercial purposes relative to how much they value this land for recreational/environmental purposes on a scale ranging from "1. value land for

economic/commercial purposes only" to "4. value land for environmental/recreational purposes only."

Mann Whitney U Tests were used to uncover differences between the distributions of concern regarding human and ecological impacts, as well as between the distributions of attitudes towards engineering and natural flood control methods. For these tests, responses relating concern about local and downstream private property damage were lumped together in one set of measures, while the responses relating concern about loss of plant and animal habitat and reduced trout levels were lumped into a second set. These were then the two sets of measures that were paired and ranked to illuminate any differences between the distributions of concern about human and ecological impacts. Similarly, scores denoting attitudes towards establishing a more natural flood plain and modifications to private property were combined into one set of values to which attitude towards levees was compared.

Statistical significance of associations between the independent variables *concern about human impacts*, *concern about ecological impacts*, *attitudes towards levees*, *attitudes towards natural methods*, and *awareness of a watershed partnership* and the dependent variable *attitudes towards participation* were determined using chi-square where applicable and Fisher's Exact Test for cases in which small expected values were present. Spearman's rho was used to measure the strength of associations. The same statistical tests were also applied to elucidate any correlation between the independent variable *type of land value (economic vs. environmental)* and the dependent variables *attitude towards participation*, *concern about human impacts*, *concern about ecological impacts, attitudes towards levees,* and *attitudes towards natural methods.*

The variables *concern about human impacts, concern about ecological impacts*, and *attitudes towards natural methods* are composite measures of their various dimensions delineated in the introduction. Hence, responses denoting concern about local property damage and downstream flooding impacts were recoded into an index of overall concern about the socioeconomic impacts of flooding. This was achieved by collapsing the original scale of 1 to 4 into two categories, 0 (consisting of the original 1s and 2s) and 1 (consisting of the original 3s and 4s). The scores for both dimensions were then summed up to yield an aggregate measure of concern that ranges from 0 to 2 (Babbie et al 2000). Likewise, respondents' concerns about destruction of plant and animal habitat and reduction of the creek's capacity as a trout run were combined into an index

expressing concern about ecological impacts. One last index expressing attitudes towards natural methods was arranged in the same fashion from responses relating favor towards establishing more a natural flood plain and modifications to private property.

The categories for the indices were then further collapsed for ease of interpretation, to maximize low expected values so that chi-square tests could be applied, and to enable the use of Fisher's Exact Test. The indices were recoded from a range of 0 to 2 to that of 1 (0 on the previous index) to 2 (1 or 2 on the previous index). Similarly, *attitudes towards participation* and *type of land value* were dichotomized for correlation tests for the same reason as the indices. For both these variables, responses of 1 or 2 became a 1 while responses of 3 or 4 became a 2.

Results

Those surveyed responded with a great amount of favor towards the idea of their town participating in a watershed-wide food control effort, with close to 60% selecting the highest level of favor and around 90% selecting a level of 3 or 4 (Table 2.1). Of the

Question: How favorable are you towards…?	Most Fav.			Least Fav.
	4	3	2	1
Portola Valley entering into a partnership with other cities along the S.F. Creek in order to reduce the adverse impacts of flooding all along the creek (N=146)	59.6%	29.5%	2.1%	8.9%

Table 2.1 Distribution of Attitude Towards Participation

four dimensions of negative impacts associated with floods, destruction of habitat in and surrounding the creek garnered the greatest concern (Table 2.2). Around 69% of those polled responded to these impacts with levels of concern of 3 or 4. Respondents also professed fairly high concern for disruption of steelhead trout spawning, with around 62% rating their concern at levels of 3 or 4. Respondents with high levels of concern for storm-related property damage and flooding downstream were not as common, respectively comprising only about 33% and 42% of people who replied to the questions. A Mann Whitney U test suggested statistically significant differences in the distributions for concern about ecological and human impacts (2-tailed p=.000).

Question: How concerned are you about…?	Most Conc.			Least Conc.
	4	3	2	1
storm-related property damage in Portola Valley (N=149)	9.4%	23.5%	38.9%	28.2%
flooding in downstream cities, including Stanford, Menlo Park, Palo Alto, and East Palo Alto (N=146)	15.1%	26.7%	30.1%	28.1%
destruction of plant and animal habitat in and surrounding the S.F. Creek (N=151)	35.8%	33.2%	19.2%	11.9%
reduction of the creek's capacity as a steelhead trout run (N=140)	37.9%	23.6%	22.9%	15.7%

Table 2.2 Distribution of Concern about Flood Impacts

Those surveyed expressed much more favor for "natural" methods of flood control than for engineering techniques (Table 2.3). About 74% responded with levels of favor of 3 or 4 to the proposal of natural channel-widening, while over 82% responded with the same levels of favor for natural modifications to private property. In contrast, only around 42% reported levels of favor of 3 or 4 for building and repairing damaged levees. The Z-value produced by a Mann Whitney U Test again yielded a 2-tailed p-value of .000 and bolstered the contention that respondents are more favorable towards natural methods.

Question: How favorable are you towards…?	Most Fav.			Least Fav.
	4	3	2	1
levee building and refortification downstream from Portola Valley (N=118)	15.3%	27.1%	27.1%	30.5%
an agency purchasing property and restoring a more natural flood plain by removing or widening levees (N=134)	39.6%	34.3%	10.4%	15.7%
natural modifications to private property adjacent to the creek including bank stabilization and revegetation techniques (N=143)	42.7%	39.2%	9.8%	8.4%

Table 2.3 Distribution for Attitude Towards Proposed Methods

The lion's share of respondents (88%) were unaware of any efforts to organize flood control efforts across city jurisdictions (Table 2.4). The Portolans I spoke with also

Question:	Yes	No
Are you aware of any such partnerships between cities along the creek attempting to address flood issues? (N=152)	11.8%	88.2%

Table 2.4 Distribution for Awareness of Watershed Partnership

claimed to have much more of an environmental and recreational stake in the land rather than an economic or commercial one (Table 2.5). 94% replied that they valued the land surrounding San Francisquito Creek more for environmental purposes or for environmental purposes alone. No one said that they perceived the land as having only economic or commercial value.

Question:	Econ/ Comm only	Both, more Econ	Both, more Environ	Environ/ Rec only
	4	3	2	1
How much do you value the land adjacent to the creek and the creek itself for economic/commercial purposes as compared to how much you value it for environmental/recreational purposes? (N=151)	0.0%	6.0%	42.3%	51.7%

Table 2.5 Distribution for Type of Land Value

Crosstabulations and measures of association testing for relationships between *concern* variables and *attitude towards participation* (displayed in Tables 3.1 and 3.2) revealed that the dependent variable is significantly positively correlated with *concern about ecological impacts* (p= .001), but has no discernable relationship with *concern about human impacts* (p= .416). Spearman's rho for the significant correlation was .309, suggesting that ecological concern accounts for around 31% of the variation in *attitude towards participation* in a positive linear model (Gibbons 1993).

	Recoded Concern about Human Impacts		
Recoded Attitude towards Participation	Less Conc. 1	More Conc. 2	total
Less Favorable 1	9	7	16
More Favorable 2	55	66	121
total	64	73	137

chi-square= .662, 2-Tailed P= .416

Table 3.1 Human Concerns X Attitude Towards Participation

	Recoded Concern about Ecological Impacts		
Recoded Attitude towards Participation	Less Conc. 1	More Conc. 2	total
Less Favorable 1	9	6	15
More Favorable 2	22	96	118
total	31	102	133

Fisher's Exact 2-Tailed Sig.= .001
Spearman rho= .309

Table 3.2 Ecological Concern X Attitude Towards Participation

The relationship between respondents' opinion about building levees and *attitude towards participation* is on the cusp of statistical significance (Table 3.3). Spearman's correlation coefficient (.181) implies that the two variables likely have a weak linear association. The index of a*ttitudes towards natural methods* was found to have a much stronger positive correlation with the dependent variable (Table 3.4). Rho indicates that the scores for these variables abide by a linear model about 50% of the time.

	Recoded Attitude towards Levees		
Recoded Attitude towards Participation	Less Fav. 1	More Fav. 2	total
Less Favorable 1	12	3	15
More Favorable 2	53	46	99
Total	65	49	114

chi-square= 3.723, 2-Tailed P= .054
Spearman rho= .181

Table 3.3 Attitude Towards Levees X Attitude Towards Participation

	Recoded Attitude towards Natural Methods		
Recoded Attitude towards Participation	Less Fav. 1	More Fav. 2	total
Less Favorable 1	7	6	13
More Favorable 2	5	111	116
total	12	117	129

Fisher's Exact 2-Tailed Sig.= .000
Spearman rho= .513

Table 3.4 Attitude Towards Natural Methods X Attitude Towards Participation

Awareness of a partnership did not appear to have an impact on whether or not respondents favored participation (Table 3.5).

	Awareness		
Recoded Attitude towards Participation	Yes	No	total
Less Favorable 1	2	14	16
More Favorable 2	16	114	130
total	18	128	146

Fisher's Exact 2-Tailed Sig.= 1.000

Table 3.5 Awareness X Attitude Towards Participation

Type of land value was found to be associated with only *concern about ecological impacts* (Tables 4.1-4.5). A linear model predicts ecological concern based on the independent variable with significant accuracy about 21% of the time.

	Recoded Type of Land Value		
Recoded Attitude Towards Participation	More Econ. 1	More Environ. 2	total
Less Favorable 1	2	14	16
More Favorable 2	7	121	128
total	9	135	144

Fisher's Exact 2-Tailed Sig. = .262

Table 4.1 Type of Land Value X Attitude Towards Participation

	Recoded Type of Land Value		
Recoded Concern About Human Impacts	More Econ. 1	More Environ. 2	total
Less Favorable 1	3	61	64
More Favorable 2	6	71	77
total	9	132	141

Fisher's Exact 2-Tailed Sig. = .511

Table 4.2 Type of Land Value X Human Concern

	Recoded Type of Land Value		
Recoded Concern About Ecological Impacts	More Econ. 1	More Environ. 2	total
Less Favorable 1	5	25	30
More Favorable 2	4	101	105
total	9	126	135

Fisher's Exact 2-Tailed Sig. = .026
Spearman's rho= .214

Table 4.3 Type of Land Value X Ecological Concern

	Recoded Type of Land Value		
Recoded Attitude towards Levees	More Econ. 1	More Environ. 2	total
Less Favorable 1	3	64	67
More Favorable 2	6	43	49
total	9	107	116

Fisher's Exact 2-Tailed Sig. = .165

Table 4.4 Type of Land Value X Attitude Towards Levees

	Recoded Type of Land Value		
Recoded Attitude towards Natural Methods	More Econ. 1	More Environ. 2	total
Less Favorable 1	2	10	12
More Favorable 2	7	111	118
total	9	121	130

Fisher's Exact 2-Tailed Sig. = .195

Table 4.5 Type of Land Value X Attitude Towards Natural Methods

Discussion

A small sample size, low response rates, and an incomplete sample frame all render the conclusions I can draw from my data extremely tentative. There are five thousand people residing in Portola Valley, and I received responses from 154 of them. As such, I have gained only a very rough estimate of the population's viewpoints. A response rate of 16% is low and owes mostly to busy signals or no telephone answer (72% of nonresponses all together), as opposed to outright refusals (26%). As a result, many of the nonresponsive numbers were called again in successive rounds of my sample frame and may reply then. In that I did not take steps to ensure each household was only listed once in my frame, my sample may have a slight bias

towards households with more than one listed number. In addition, my survey is biased against households not listed in the phone book.

Another matter that must be taken into account while interpreting the results is the phraseology employed in some of my survey questions. In particular, the questions that determine *attitude towards modifications to private property* and *attitude towards participation* do not specifically refer to some significant facets of the conditions they describe. For instance, the question asking respondents to rate their favor towards participation did not explicitly state that any town joining a partnership would be required to pay membership dues ($60,000 in the case of the JPA). How accurately this question assesses respondents' favor towards joining the JPA then hinges upon one's belief that most people assume that joining a flood control effort entails some cost sharing. Also, the question about natural modification to private property does not specify who would perform such modifications and to what extent they would require the property owners' consent. If these modifications are at the expense of the owners or enacted by public enforcement, many respondents may well respond negatively to the proposal.

Despite this study's manifold flaws, several interesting findings can be applied with confidence to the sample, if not the population of Portola Valley. Frequency distributions reveal a general favor towards Portola Valley's participation in a watershed group, as well as which potential barriers to partnership exist. Concern about negative flood impacts is high for ecological disruption (reduced trout run, general destruction of habitat), but relatively low for monetary and social disruption linked with flooding in downstream cities and property damage in Portola Valley. Consequently, residents may require further education about the extensive infrastructural damage and enormous financial costs incurred during the previous flood to become more sympathetic to those affected by these impacts.

Respondents were also far more favorable towards the two more natural methods to mitigate flooding than to the use of levees to contain flows, despite that it was specified in the survey that the latter would be built downstream from Portola Valley. Hence, it appears that people in the town significantly prefer natural methods that may have to be implemented in their area to engineering techniques elsewhere. This suggests that if the JPA sticks to more restorative natural methods of flood control, it will more easily gain the favor of Portolans. Most respondents rated their attitude towards modification to private property as favorable, thereby intimating that residents are not wholly opposed to altering their property in the name of flood

control. However, that the alteration be natural and restorative was a stipulation of the question and the interpretive restrictions due to the question's wording addressed above still apply.

A lack of awareness of a watershed partnership among Portola Valley residents is also suggested by the survey data and may be acting as a significant barrier to the town's entrance into the JPA. This potential to impede partnership will be discussed in more detail below.

In addition, the survey data reveal relationships between *attitude toward participation* and the barrier variables. According to chi-square and Spearman correlation coefficients, the best predictor of the dependent variable was *attitude towards natural methods*, followed by *concern about ecological impacts*. *Attitude towards participation* also had a weak linear correlation with *attitude towards levees.* That favor towards ecologically friendly methods was found to have a stronger relationship with favor towards participation than concern about either type of flood impact is somewhat perplexing. It appears that some people are willing to join in a watershed partnership and are favorable towards flood control methods even in the absence of high concern. Perhaps residents perceive other benefits to implementing restoration than mitigating ecological disruption and property damage such as beautification and increased property value. Additionally, people may see such methods as worthwhile in the name of insurance against future threats rather than mitigation of any currently existing problem.

Residents polled overwhelmingly sided with environmental over economic interest in the creek. The only variable found to be significantly associated with such interest was *concern about ecological effects*. Hence, in the case of Portolans, having more of an economic stake may exert some influence on whether or not a person believes ecological resources are at risk, but does not appear to make that person more wary of watershed partnership or modifications to private property.

While lack of awareness may not be correlated to respondents' favor towards participation, it may still be acting as a very significant barrier to partnership. If we can overlook misgivings about the wording of questions and sample representativeness of the survey, then it appears that Portolans are very favorable towards their town's participation as a member in the JPA, as well as unaware of groups like the JPA and San Francisquito Watershed Council. It then stands to reason that, a greater awareness of the JPA and flooding issues in the watershed may create more of an expressed willingness to join in public fora, which, if great enough, might in turn prompt the Town Council to reconsider membership.

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APPENDIX A—List of Variables and Dimensions:

I. Concern About Flood Impact:
   A. Human Impacts :
      1. Storm Damage in Portola Valley
      2. Flooding in Stanford, Menlo Park, Palo Alto, and East Palo Alto
   B. Wildlife Impacts:
      1. Destruction of Plant and Animal Habitat in and Surrounding the S.F. Creek
      2. Reduction of the Creek's Capacity as a Steelhead Trout Run

II. Attitudes Towards Flood Control Methods:
   A. Engineering—Levee Building and Refortification Downstream from Portola Valley
   B. Eco-Friendly
      1. Purchasing Tracts of Land along the Creek and Restoring a More Natural Floodplain by Removing or Widening Levees
      2. Natural Modifications to Private Property Adjacent to the Creek Including Bank Stabilization and Revegetation Techniques

III. Attitude Towards Partnership

IV. Awareness of Any Such Partnership

V. Type of Land Value (Environmental/Recreational vs. Economic/Commercial)

APPENDIX B—Survey

I. How concerned are you about…?
(Select from 1-4 for each of the following, 4 being "the most concerned," 1 being "the least concerned,")

A. storm-related property damage in Portola Valley
B. flooding in Stanford, Menlo Park, Palo Alto, and East Palo Alto
C. destruction of plant and animal habitat
D. promotion of the creek's capacity as a steelhead trout run

II. How favorable are you towards…?
(Select from 1 "most favorable" to 4 "least favorable")

A. levee building and refortification downstream from Portola Valley
B. a public agency purchasing tracts of land along the creek and restoring a more natural floodplain by removing or widening levees
C. natural modifications to private property adjacent to the creek include bank stabilization and revegetation techniques

III. How favorable would you be towards Portola Valley entering a partnership with other municipalities situated along San Francisquito Creek in order to mitigate the adverse impacts of flooding all along the creek?
(same options as II)

IV. Are you aware of any such partnership that already exists?
("yes" or "no")

V. How much do you value the land adjacent to the creek and the creek itself for economic/commercial purposes as compared to how much you value it for environmental/recreational purposes?
(Select one: 1 "I value the land for economic/commercial purposes only," 2 "I value land for both reasons, but more for economic/commercial purposes," 3 "I value the for both reasons, but more for environmental/recreational purposes," 4 "I value the land for environmental/recreational purposes only")