



**I-092 Training and Support for Pest Control**

**I-093 Wetland Restoration Project-City of American Canyon**

**I-094 American River Study**

**I-095 Realtime CALFED Operations Group Decision Support**

**I-096 East Antioch creek Wetland Restoration**

**I-097 Chinook Salmon Attraction into the Merced River**

**I-098 Shasta Temperature Control Device**

**I-099 Impacts of Multiple Stresses on Water Quality**

**I-100 Granite Watershed Restoration Pilot Project**

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*Assessment of CALFED Program Vulnerability to Climate Change*

consultation with the referenced experts and CALFED as to how CALFED can or should adjust its program (adaptive management) to incorporate emerging regional climate change results and assure that ecosystem restoration goals are undiluted by climate change effects.

Because the scope of climate change study is very large and the desire is to move rather "fast and light" in this first assessment, we propose a principal investigator who is experienced and familiar with interdisciplinary research, has already conducted a broad review of climate change effects and the climate change literature, and has a background in the key fields (ecology, water and energy). He will conduct the consultation with regional and national experts, coordinate with CALFED, synthesize input and direction from these sources, and write white papers to summarize these task milestones:

1. Delineate scenarios of regional climate change effects of significance to the Bay-Delta (to the extent existing work allows).
2. Relate scenarios to CALFED Program objectives in terms of primary stressors, and priority species and habitats.
3. Assess potential magnitude of effects in terms of additional efforts that may be required in order to maintain CALFED Program goals under conditions of climate change.
4. Recommend how CALFED can or should adjust its program to incorporate emerging regional climate change results and assure that ecosystem restoration goals are undiluted by climate change effects.

We have already made contact with many of the collaborators listed on the Title Page and discussed our proposal to CALFED; all those contacted to date have been receptive to lending their support, consultation, and advice to the proposed course of work. There is also an initial receptivity to participation in the California workshop, should CALFED so desire.

Based on the preliminary assessment, issues which CALFED wishes to pursue further are likely to emerge. We strongly suggest funding during the present cycle in order to allow for a refined and more detailed approach to be developed, as needed and justified by the results of this first phase of work, in time for CALFED consideration and possible support during the next funding cycle. This would also greatly facilitate consideration of CALFED Bay-Delta Program Issues during the early 1998 California workshop. Also, first conversations with the White House OSTP and NSF indicate that there may be a potential for additional support for future phases of work building on this early assessment. For example, EPA,

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DAMES & MOORE SEALED BID DELTA PROJ # 07 9

Assessment of CALFED Program Vulnerability to Climate Change

**Knowledge of CALFED Program:** Mr. Pratt lived and consulted in California from 1981-1997 and has followed CALFED and its driving issues from its inception. During his California tenure with Dames & Moore, he was assigned to track the CALFED Bay-Delta Program and attended meetings of a number of the working groups, including BDAC and the Ecosystem Roundtable. He has a good grasp of the Program, its objectives, progress and status, including the Category III Program and the vision for ecosystem restoration represented in the Ecosystem Restoration Program Plan.

**Ecology:** Mr. Pratt received his M.S. in Environmental Science from Washington State University in 1979 and served for twelve years as a principal with a California consulting firm specializing in biological issues and endangered species management. He is internationally recognized as a leader in the development and application of the interdisciplinary field of human ecology. Mr. Pratt founded the Institute for Human Ecology in 1982 and served for five years on the board and in leadership positions with the United States Society for Human Ecology. Experienced in the study and management of the interface between complex human and natural systems and their application to environmental problem-solving, he integrates an understanding of ecosystems, policy, and technologies with strengths in strategic thinking, management and planning. Mr. Pratt uses his interdisciplinary background and systems perspective to help define and manage environmental problems and relationships for clients concerned with the development and management of natural resources. He has been deeply involved over the past ten years with natural and social carrying capacity studies, water resources and global change issues.

**Water:** Mr. Pratt's experience in water resources emphasizes overall workable solutions that integrate competing water interests, including fisheries, irrigated agriculture, recreation, and municipal supply. His background ranges from broad water supply program plans and integrated resource plans to river and watershed management plans and strategies for the development, transfer and protection of water rights. He was integrally involved on consulting teams providing large-scale, long-term water supply plans for the East Bay Municipal Water Districts, the Monterey County Water Resources Agency, and the Contra Costa Water District. Each of these programs sought to establish water self-sufficiency for the client agency over a period of 30-50 years through an appropriate mix of water supply projects and conservation.

**Rivers and Deltas:** Mr. Pratt coauthored Stream Corridor Inventory and Evaluation System (SCIES), a computer-based methodology for determining stream corridor values for fish and wildlife, developed for U.S. Fish and Wildlife Service. He has project experience with several dozen western rivers, including riverine and riparian ecological research, river use capacity studies, and

Assessment of CALFED Program Vulnerability to Climate Change

management plans. These include the Sacramento-San Joaquin, Mokelumne, South Fork American, Salinas, Columbia, Snake, Truckee-Carson, Gunnison, Virgin, and Green rivers.

**Energy:** Mr. Pratt's background includes environmental regulatory compliance and environmental review of major energy facilities and programs, power plant siting, transmission line routing, and fuel supply and transportation. He has managed independent review of fossil fuel-fired power projects, analyzed renewable energy alternatives, assessed power project sites, developed environmental mitigation plans for energy development, developed power plant siting programs for regulatory agencies, and assisted power project developers in the United States and internationally in evaluating potential sites, determining the climate for project development, and complying with applicable regulations and environmental standards.

**References:** (1) for recent work gathering and compiling a vast body of interdisciplinary information on a fixed budget and applying it to policy, contact Dr. Curt Brown, Western Water Policy Review Advisory Commission, 303-238-6211 regarding the *Truckee-Carson River Basin Study*.

(2) for research on climate change and preparation of a strategic Carbon Emission Management and Mitigation Program, contact Keith Krumweide, Mission Energy Company, 909-593-3474.

(3) for work on the Stream Corridor Inventory and Evaluation System and on climate change strategic planning for Mission Energy, and a general reference on California experience, as well as background in ecology and human ecology, contact John Garcia, President, GANDA, 415-789-9242.

## VI COMPLIANCE WITH STANDARD TERMS & CONDITIONS

In general, the standard contract terms provided with the RFP are acceptable. Dames & Moore requests that the indemnity term be more clearly tied to our own negligence or willful misconduct and that our exposure be capped. We will have proposed language to submit at the appropriate time. We also would not normally agree to retention from progress payments. The forms required to be submitted with the proposal for the Other Services category (non-discrimination compliance) are attached.

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**DAMES & MOORE**

A DAMES & MOORE GROUP COMPANY

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Seattle, Washington 98121  
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July 24, 1997

CALFED Bay-Delta Program  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814  
Attention: Kate Hansel

**Category III Funding Proposal  
Assessment of CALFED Bay-Delta Program  
Vulnerability to Climate Change**

The CALFED Bay-Delta Program provides an excellent example of the vulnerability of American resource management and restoration programs to the potential effects of climate change. With consensus now achieved among the international scientific community, the climate change focus is shifting to the regional level. There are striking similarities between both the kinds of effects which climate change may produce and the conditions which the Bay-Delta program is intended to redress on the one hand, and the measures to deal with the effects of climate change and those under consideration by the Bay-Delta Program on the other.

Dames & Moore has joined with the Institute for Human Ecology to propose to provide an early assessment of the vulnerability of the CALFED Bay-Delta Program to climate change effects in terms of the potential for these effects to reduce or even nullify the gains in ecosystem restoration and protection which the CALFED process has so painstakingly prepared to achieve. Potential beneficiaries include all CALFED priority species and habitats; all four CALFED primary objectives are at stake under conditions of climate change.

We look forward to your favorable review and to the opportunity to further explain our proposal to you.

Very truly yours,

DAMES & MOORE

Jeremy Pratt  
Senior Associate

Offices Worldwide

**ASSESSMENT OF CALFED BAY-DELTA PROGRAM  
VULNERABILITY TO CLIMATE CHANGE**

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<b>Applicant:</b>	<b>Dames &amp; Moore</b>	<b>Institute for Human Ecology</b>
address	500 Market Place Tower 2025 First Avenue Seattle, WA 98121	5817 Petaluma Hill Road Santa Rosa, CA 95476
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e-mail	seajp@dames.com	jeremypratt@msn.com
<b>Principal Investigator, Technical and Financial Contact:</b>	Jeremy Pratt	Jeremy Pratt
<b>Type of Organization/Tax Status:</b>	for-profit corporation	501(c)(3) non-profit corporation
<b>Tax Identification Number:</b>	95-4316617	94-2901792

**Participants/Collaborators:** Consultation with White House Office of Science and Technology Policy; U.S. Global Change Research Program, including National Science Foundation, Environmental Protection Agency, National Oceanic and Atmospheric Administration, and Department of Interior programs; regional programs including those under the National Institute for Global Environmental Change (operated by the University of California), the UC Santa Barbara National Center for Ecological Analysis and Synthesis, Joint Institute for the Study of Atmosphere and Oceans (NOAA and University of Washington), and those under the EPA.

**RFP Project Group Type:** Other Services

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*prepared for:*  
**CALFED BAY-DELTA PROGRAM**  
**1997 Category III Ecosystem Restoration Projects and Programs**  
1416 Ninth Street, Suite 1155  
Sacramento, CA 95814

July 28, 1997

## EXECUTIVE SUMMARY

**Project Title and Applicant Name:** Assessment of CALFED Bay-Delta Program Vulnerability to Climate Change; proposed by a joint venture of Dames & Moore and the Institute for Human Ecology.

**Project Description and Primary Biological/Ecological Objectives:** Dames & Moore and the Institute for Human Ecology propose to provide an early assessment of the vulnerability of the CALFED Bay-Delta Program to climate change effects in terms of the potential for these effects to reduce or even nullify the gains in ecosystem restoration and protection which the CALFED process has so painstakingly prepared to achieve. Our approach will provide CALFED consultation opportunities and advice from national and regional experts on climate change, possible involvement (if desired) in a White House-sponsored California workshop planned to be held in early 1998 on regional climate change effects, and recommendations for the Program to consider that may help offset the countervailing effects of climate change on Program goals and objectives. The primary biological/ecological objective is to preserve the gains represented by the CALFED Ecological Restoration Program Plan.

**Approach/Tasks/Schedule:** A rapid, early assessment of CALFED Bay-Delta Program vulnerability and best options to contain the potential effects of climate change on CALFED objectives will be accomplished through direct contact and consultation with leading national and regional experts on climate change. Because the scope of climate change study is very large and the desire is to move rather "fast and light" in this first assessment, we propose to focus work through a principal investigator who is experienced and familiar with interdisciplinary research, has already conducted a broad review of climate change effects and the climate change literature, and has a background in the key fields (ecology, water, and energy). He will conduct the consultation with regional and national experts, coordinate with CALFED, synthesize input and direction from these sources, and write white papers to summarize these task milestones:

1. Delineate scenarios of regional climate change effects of significance to the Bay-Delta, insofar as the state-of-the-art allows. (By November 15, 1997)
2. Relate scenarios to CALFED Program objectives in terms of primary stressors and priority species and habitats. (By November 30, 1997)
3. Assess potential magnitude of effects in terms of additional efforts that may be required in order to maintain CALFED Program goals under conditions of climate change. (By December 15, 1997)
4. Recommend how CALFED can or should adjust its program to incorporate emerging regional climate change results and assure that ecosystem restoration goals are undiluted by climate change effects. (By December 15, 1997)

**Justification for Project and Funding by CALFED:** Climate change has a strong potential to affect variables of great concern to Bay-Delta management, including all

four primary objectives of the CALFED Bay-Delta Program. At risk are the timing and amount of flows in the Sacramento and San Joaquin rivers and all of the priority species and habitats identified in the Ecosystem Restoration Program Plan, salinity in the Bay-Delta, the reliability of water supplies, and the structural integrity of Delta levees (under increased extreme storm events). An assessment of vulnerability and potential adjustments that can preserve CALFED ecosystem restoration objectives against the diluting effects of climate change is indeed well-justified and timely.

**Budget Costs and Third Party Impacts:** A total of \$26,000 is requested from CALFED to fund this proposal. The applicants propose to provide an additional \$6,400 in cost-sharing. The value of expert services contributed through project collaborators is estimated to amount to a further \$10,000.

**Applicant Qualifications:** The proposed principal investigator has recently completed a two-year in-depth literature review and investigation of the state of knowledge regarding global warming and climate change, and the availability and efficacy of technologies capable of offsetting these effects. He has 17 years' experience in California biological and ecological consulting, a strong interdisciplinary background, and has specialized in two of the key areas driving and/or affected by climate change: energy and water. He is very familiar with the CALFED Bay-Delta Program, has attended Ecosystem Roundtable and BDAC meetings, and has extensive project and modeling experience with stream corridors and California rivers.

**Monitoring and Data Evaluation:** This is not entirely applicable to this proposal. Recommendations will include the source and types of information which should be gathered and monitored to stay abreast of developing climate change models and forecasts in the region and how the CALFED Program might cost-effectively participate in or be informed by ongoing climate change monitoring and forecasting efforts.

**Local Support/Coordination with Other Programs/Compatibility with CALFED Objectives:** The proposed approach will coordinate with the planned California workshop on regional effects of climate change and will involve the local leadership and experts participating in that workshop (coordinated by the University of California at Santa Barbara). It will also coordinate with the major U.S. programs addressing climate change (see list of collaborators). It supports all four CALFED objectives, because climate change can affect ecosystem restoration, water supply reliability, water quality, and Delta levees.

**III PROJECT DESCRIPTION**

**Project Description and Approach**

Dames & Moore and the Institute for Human Ecology propose to provide an early assessment of the vulnerability of the CALFED Bay-Delta Program to climate change effects in terms of the potential for these effects to reduce or even nullify the gains in ecosystem restoration and protection which the CALFED process has so painstakingly prepared to achieve. Our approach will provide CALFED consultation opportunities and advice from national and regional experts on climate change, possible involvement (if desired) in a White House-sponsored California workshop planned to be held in early 1998 on regional climate change effects, and recommendations for the Program to consider that may help offset the countervailing effects of climate change on Program goals and objectives.

Climate change concerns the effects of a buildup of greenhouse gases in the atmosphere on the global environment. Greenhouse gases, such as carbon dioxide, methane, and others, re-radiate solar energy, keeping the earth warmer than it would otherwise be. Human-induced buildup of greenhouse gases and consequent effects have received intense scrutiny over the past decade, and in 1995 the Intergovernmental Panel on Climate Change (IPCC) for the first time reached sufficient consensus to state that human activity is the likely cause of global climate change. As early as 1992, national leaders at the Rio "Earth Summit" signed a Climate Change Convention, comprising a voluntary agreement to roll back carbon emissions to 1990 levels; however, this has been largely ineffective.

Although the phenomena of climate change are global, their effects are regional and local. Global models of climate change have been refined and have achieved increasing consensus in the past few years, but regional modeling is much more uncertain and local impacts remain far more difficult to predict. Nevertheless, scenarios are emerging as to what a future under conditions of climate change may look like. As the United States prepares to deal with the effects of a warmer world, the White House is sponsoring a series of regional conferences on the impacts of climate change. A California workshop is tentatively planned for early 1998, coordinated through the University of California at Santa Barbara National Center for Ecological Analysis and Synthesis. A similar workshop, just held in the Pacific Northwest, offers some instructive insights (discussed below).

The purpose of this proposal is to bring together access to significant regional climate change study resources, including California scientists expert in climate change, and a principal investigator with long-term experience in California, knowledge of the Bay-Delta Program, and a background in ecology, water resources, and climate change, to conduct an assessment of the potential vulnerability of the CALFED Bay-Delta Program to climate change effects.

#### **Location and/or Geographic Boundaries of Project**

The project boundaries comprise the entire study area of the CALFED Bay-Delta Program, with emphasis on the interactions of regional hydrology, including both freshwater and marine systems, under conditions of climate change.

#### **Expected Benefits**

Accounting for climate change in CALFED ecosystem restoration plans and calculations should benefit most (if not all) priority species and habitats covered in the CALFED program. Climate change has the potential to exacerbate many of the primary stressors and seriously affect progress in ecosystem restoration. Third parties and other programs are included in the benefits to the extent that they already expect to be beneficiaries of the CALFED Program, inasmuch as the objective is to preserve CALFED gains from being canceled by climate change effects.

The consideration of climate change effects also bears on CALFED non-ecosystem objectives in terms of planning for a reliable water supply, considering the potential effects of climate change-driven extreme weather events on the potential for catastrophic breaching of Delta levies, and protecting water quality (e.g., climate-change driven increases in salinity of deltas worldwide are forecast; this is a key control variable for the entire Delta and was a fundamental driver in creating the CALFED program).

#### **Background and Biological/Technical Justification**

The IPCC's *Climate Change 1995: Summary for Policymakers* discusses vulnerability — defined as the extent to which climate change may damage or harm a system — in a number of terms with clear relevance to the Bay-Delta Program. *Climate Change 1995* states that increases in flow variability, particularly the frequency and duration of large floods and droughts, are expected. These would tend to reduce water quality as well as biological productivity and habitat in

streams. It further states that climate change and a rise in sea level or changes in storms or storm surges may erode shores and associated habitat, increase the salinity of estuaries, alter tidal ranges in rivers and bays, and change sediment and nutrient transport. Among the coastal ecosystems listed by *Climate Change 1995* as particularly at risk are **river deltas**.

Climate change will intensify the global hydrological cycle (i.e., increase "throughput") and can have major impacts on regional water resources. A change in the volume and distribution of water will affect water supply to all uses. Changes in the total amount of precipitation and in its frequency and intensity directly affect the magnitude and timing of runoff and the intensity of floods and droughts. Relatively small changes in temperature and precipitation, together with non-linear effects on evapotranspiration and soil moisture, can result in relatively large changes in runoff, especially in arid or semi-arid regions. A warmer climate can decrease the proportion of precipitation falling as snow, leading to reductions in spring runoff and increases in winter runoff. These effects can reduce and degrade the quantity and quality of water in river deltas, making the people, institutions, species, and ecological functions and values which depend upon them particularly vulnerable. Sea level rise is another predicted effect of especial importance to deltas. As to fisheries, climate change effects are expected to interact with those of overfishing, diminishing nursery areas, and extensive pollution to potentially affect reproductive patterns, migration routes and ecosystem relationships of fish on a large scale.

*Climate Change 1995* concludes that there may be substantial water-related economic, social, and environmental costs, especially in regions that are already water-limited and where there is considerable competition among users. This would appear to characterize the Bay-Delta situation in particular.

*Climate Change 1995* also identifies options for dealing with the possible impacts of a changed climate and increased uncertainty about future supply and demand for fresh water, including more efficient management of existing supplies and infrastructure; institutional arrangements to limit future demands and promote conservation; improved monitoring and forecasting systems for floods and droughts; rehabilitation of watersheds; and the construction of new reservoir capacity to capture and store excess flows produced by altered patterns of snowmelt and storms.

The foregoing presents a rather striking overlap between both the kinds of effects which climate change may produce and the conditions which the Bay-Delta

## Assessment of CALFED Program Vulnerability to Climate Change

program is intended to redress on the one hand, and the measures to deal with the effects of climate change and those under consideration by the Bay-Delta Program on the other. It needs no great insight to point out the significance of the potential effects of climate change on the extended Bay-Delta system and the need to take these into account so as not to allow the profound efforts by so many parties to forge an enduring solution to be negated by this large and potentially powerful variable.

In the Pacific Northwest, for the past two years the Joint Institute for the Study of Atmosphere and Oceans (JISAO), sponsored by the National Oceanic and Atmospheric Administration (NOAA) and the University of Washington (UW), have been carrying out the nation's only regional climate-change research program, investigating climate variability and ecosystem change at the regional level. The JISAO is producing scenarios for the region which include such possibilities as warmer, wetter winters with less snow buildup in the mountains and more rain. The result would be to shift peak flows of the region's rivers toward the winter months (with less snow retained for the spring freshet), dropping summer and fall runoff substantially. Changes in the timing of flows could dramatically affect fish flows and irrigation and urban water supplies. All of this could intensify skirmishes between irrigation, fish, recreation, urban, and other water interests. Certainly if climate change poses a scenario of similarly profound potential to affect the resources of the Sacramento-San Joaquin Bay-Delta, the CALFED program must take into account its vulnerability, or risk having its hard-won gains erased.

### **Proposed Scope of Work**

A rapid, early assessment of CALFED Bay-Delta Program vulnerability and best options to contain the potential effects of climate change on CALFED objectives will be accomplished through direct contact and consultation with leading national and regional experts on climate change. These include the 11 agencies of the U.S. Global Change Research Program (GCRP, including several CALFED agencies), the National Institute for Global Environmental Change, operated by the University of California, and EPA's GCRP Regional Vulnerabilities program. We will first delineate likely scenarios of regional climate change effects, to the extent that these have been fleshed out, and relate them to CALFED Program objectives in terms of primary stressors, and priority species and habitats. Consulting intensively with CALFED, the potential magnitude of effects will be sketched in terms of the additional efforts that may be required in order for the CALFED Program to maintain parity in achieving its goals under conditions of climate change (i.e., not lose ground). Recommendations will be developed in

consultation with the referenced experts and CALFED as to how CALFED can or should adjust its program (adaptive management) to incorporate emerging regional climate change results and assure that ecosystem restoration goals are undiluted by climate change effects.

Because the scope of climate change study is very large and the desire is to move rather "fast and light" in this first assessment, we propose a principal investigator who is experienced and familiar with interdisciplinary research, has already conducted a broad review of climate change effects and the climate change literature, and has a background in the key fields (ecology, water and energy). He will conduct the consultation with regional and national experts, coordinate with CALFED, synthesize input and direction from these sources, and write white papers to summarize these task milestones:

1. Delineate scenarios of regional climate change effects of significance to the Bay-Delta (to the extent existing work allows).
2. Relate scenarios to CALFED Program objectives in terms of primary stressors, and priority species and habitats.
3. Assess potential magnitude of effects in terms of additional efforts that may be required in order to maintain CALFED Program goals under conditions of climate change.
4. Recommend how CALFED can or should adjust its program to incorporate emerging regional climate change results and assure that ecosystem restoration goals are undiluted by climate change effects.

We have already made contact with many of the collaborators listed on the Title Page and discussed our proposal to CALFED; all those contacted to date have been receptive to lending their support, consultation, and advice to the proposed course of work. There is also an initial receptivity to participation in the California workshop, should CALFED so desire.

Based on the preliminary assessment, issues which CALFED wishes to pursue further are likely to emerge. We strongly suggest funding during the present cycle in order to allow for a refined and more detailed approach to be developed, as needed and justified by the results of this first phase of work, in time for CALFED consideration and possible support during the next funding cycle. This would also greatly facilitate consideration of CALFED Bay-Delta Program issues during the early 1998 California workshop. Also, first conversations with the White House OSTP and NSF indicate that there may be a potential for additional support from these sources for future phases of work building on this early assessment.

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## Assessment of CALFED Program Vulnerability to Climate Change

Moreover, EPA, Interior and NOAA, which are all CALFED agencies, have compatible objectives, budgeted under the U.S. Global Change Research Program, suggesting possible opportunities for program integration and enhanced support within the circle of existing CALFED agencies.

### **Monitoring and Data Evaluation**

This proposal is not of the type which entails field data collection, the monitoring of restoration measures and data evaluation. However, it will lead to specific recommendations as to the source and types of information which should be gathered and monitored to stay abreast of developing climate change models and forecasts in the region and how the CALFED Program might cost-effectively participate in or be informed by ongoing climate change monitoring and forecasting efforts.

### **Implementability**

The proposed project does not raise implementation issues of the type associated with restoration projects, such as regulatory compliance, permits, easements, etc., toward which this portion of the RFP appears to be directed.

## **IV COSTS AND SCHEDULE**

### **Budget Costs**

As noted above, it is possible that CALFED may wish to fund further work to investigate the vulnerability of the Bay-Delta Program and offsetting adjustments that may be made, as issues emerge. This budget does not attempt to address the potential costs of such work, as it depends on unknown results.

Table 1 shows the proposed budget by task and by participant, which correspond to funding source. It includes the categories of cost identified in the RFP and is in the RFP-recommended format.

The budget shows three participants, which represent three corresponding sources of funds: (1) The Dames & Moore (D&M) budget, listed first, is requested to be paid from CALFED funds. (2) The Institute for Human Ecology (IHE) budget is funded by a combination of contributions made from D&M to the IHE and contributions made by IHE to the project, and represents applicant cost-sharing. Both the D&M and IHE labor budgets will support time spent by the Principal

Assessment of CALFED Program Vulnerability to Climate Change

Investigator, who serves both organizations and will split time on this project between them in the proportions shown, and administrative support. (3) The consultant budget represents the estimated value of services provided by experts in global warming and climate change who will be directly contacted as discussed in the proposed approach. Preliminary contacts with these parties (listed as "participants/collaborators" on the title page) have indicated their willingness to lend their advice and guidance to the project. This budget represents a further value-added to the project and CALFED which is not to be paid from CALFED funds.

**Table 1. Proposed Budget**

**Dames & Moore (requested from CALFED)**

Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (G&A, fee)	Service Contracts	Material & Acquisition Contracts	Misc and ODCs	Total Cost
1. Scenarios	120	\$5,750	\$8,650	\$0	\$500	\$1,000	\$16,100
2. CALFED Objectives	80	\$3,830	\$5,770	\$0	\$0	\$500	\$9,900
<b>Total</b>	<b>200</b>	<b>\$9,580</b>	<b>\$14,420</b>	<b>\$0</b>	<b>\$500</b>	<b>\$1,500</b>	<b>\$26,000</b>

**Institute for Human Ecology (applicant cost-sharing, including D&M contribution to IHE)**

Task	Direct Labor Hours	Direct Salary & Benefits	Overhead on Labor (G&A, fee)	Service Contracts	Material & Acquisition Contracts	Misc and ODCs	Total Cost
3. Adjustments	30	\$2,400	\$600	\$0	\$0	\$200	\$3,200
4. Recommendations	30	\$2,400	\$600	\$0	\$0	\$200	\$3,200
<b>Total</b>	<b>60</b>	<b>\$4,800</b>	<b>\$1,200</b>	<b>\$0</b>	<b>\$0</b>	<b>\$400</b>	<b>\$6,400</b>

**Expert Consultants (estimated value of contributed services)**

Task	Direct Labor Hours	Direct Salary & Benefits	Overhead on Labor (G&A, fee)	Service Contracts	Material & Acquisition Contracts	Misc and ODCs	Total Cost
All tasks	50-100	NA	NA	NA	NA	NA	\$10,000
<b>Total</b>							<b>\$10,000</b>

Planning for further current and future funding needs will be initiated during this initial study, in consultation with CALFED, and we will pursue cost sharing with the White House Office of Science and Technology Policy, U.S. Global Change

Research Program (involving 11 agencies, including several CALFED agencies) and others as discussed above. There are no proposed subcontracts in the current phase of funding.

#### **Schedule Milestones**

Assuming that contracting is accomplished by September 1997, we propose the following milestones:

- November 15: Scenarios of regional climate change effects
- November 30: Relate scenarios to CALFED Program objectives
- December 15: Assess additional efforts to maintain CALFED Program goals
- December 15: Recommendations
- (Not included in this phase, but of importance, will be preparations to participate in the early-1998 regional workshop on climate change in California)

#### **Third Party Impacts**

No third party impacts from this work are anticipated.

### **V APPLICANT QUALIFICATIONS**

The Principal Investigator will work through both Dames & Moore and the Institute for Human Ecology to provide the proposed services. He will consult intensively with CALFED, and will coordinate and obtain expert input from the proposed collaborators. A biosketch for the principal investigator and brief summaries of the experience and capabilities of D&M and the IHE are given below, including references. We know of no conflicts of interest in completing this assignment.

#### **Dames & Moore**

Dames & Moore's strength is innovation, dealing strategically with emerging issues based on a well-integrated diversity of core services offered at local, regional, national, and worldwide scales. Since Dames & Moore was established in 1938, we have grown to become a trusted, known resource providing design, environmental management, and construction-phase services. Our environmental expertise goes beyond regulatory compliance to encompass strategic programs that improve operations and reduce long-term risks. We leverage true full-service capabilities to help clients address risks in the planning phase and throughout the life-cycles of their needs. With several thousand employees and 140 offices worldwide, Dames & Moore has the depth of expertise and breadth of resources to take on such global issues as climate change.

### **Institute for Human Ecology**

The Institute for Human Ecology is a nonprofit research center established in 1982 to extend and apply human ecology in an interdisciplinary framework. Our central focus is the relationship between complex human and natural systems. An internationally recognized association of more than 70 Fellows in more than two dozen countries conduct and lead the Institute's research program. We focus on core research themes of critical importance over long periods in order to develop substantial and meaningful work. New themes initiated every five years join those ongoing; to date, these include issues of carrying capacity (initiated 1988) and environmental conflict (initiated 1993), both of which touch on issues of great importance to global warming and climate change.

### **Principal Investigator**

Jeremy Pratt is a senior associate of Dames & Moore and Executive Director of the Institute for Human Ecology. He meets the criteria set forth above; he is experienced in interdisciplinary research, has recently completed a broad review of climate change effects and the climate change literature, and has 20 years of experience in key fields related to climate change and the Bay-Delta Program, including ecology, water, and energy.

**Global Warming & Climate Change:** Mr. Pratt recently completed an in-depth literature review and investigation of the state of knowledge regarding global warming and climate change and the availability and efficacy of mitigation measures for these effects. The project, conducted for a large, private California generating company, was based on the recognition that potential long-term effects of greenhouse warming posed serious potential implementation barriers and could require offsetting carbon emissions from its coal-fired power plants. Mr. Pratt developed a Carbon Management and Mitigation Program comprising a strategic plan to improve the environmental acceptability of six large overseas plants. He also developed terms for an Agreement in Principle to purchase "offset credits" from a World Bank-funded project to plant 100 million trees in the Mexico City Valley over a ten year period. The credits were to be applied to a power plant proposed to be located in Mexico that was later canceled. The project resulted in six technical and executive publications, covering results, background, emerging strategic issues, goals and priorities, and a global strategic plan. Strategic analysis entailed detailed research into technical, economic, financial, institutional, and sociocultural aspects of global warming, climate change and related carbon offset options.

Assessment of CALFED Program Vulnerability to Climate Change

**Knowledge of CALFED Program:** Mr. Pratt lived and consulted in California from 1981-1997 and has followed CALFED and its driving issues from its inception. During his California tenure with Dames & Moore, he was assigned to track the CALFED Bay-Delta Program and attended meetings of a number of the working groups, including BDAC and the Ecosystem Roundtable. He has a good grasp of the Program, its objectives, progress and status, including the Category III Program and the vision for ecosystem restoration represented in the Ecosystem Restoration Program Plan.

**Ecology:** Mr. Pratt received his M.S. in Environmental Science from Washington State University in 1979 and served for twelve years as a principal with a California consulting firm specializing in biological issues and endangered species management. He is internationally recognized as a leader in the development and application of the interdisciplinary field of human ecology. Mr. Pratt founded the Institute for Human Ecology in 1982 and served for five years on the board and in leadership positions with the United States Society for Human Ecology. Experienced in the study and management of the interface between complex human and natural systems and their application to environmental problem-solving, he integrates an understanding of ecosystems, policy, and technologies with strengths in strategic thinking, management and planning. Mr. Pratt uses his interdisciplinary background and systems perspective to help define and manage environmental problems and relationships for clients concerned with the development and management of natural resources. He has been deeply involved over the past ten years with natural and social carrying capacity studies, water resources and global change research.

**Water:** Mr. Pratt's experience in water resources emphasizes overall workable solutions that integrate competing water interests, including fisheries, irrigated agriculture, recreation, and municipal supply. His background ranges from broad water supply program plans and integrated resource plans to river and watershed management plans and strategies for the development, transfer and protection of water rights. He was integrally involved on consulting teams providing large-scale, long-term water supply plans for the East Bay Municipal Water Districts, the Monterey County Water Resources Agency, and the Contra Costa Water District. Each of these programs sought to establish water self-sufficiency for the client agency over a period of 30-50 years through an appropriate mix of water supply projects and conservation.

**Rivers and Deltas:** Mr. Pratt coauthored Stream Corridor Inventory and Evaluation System (SCIES), a computer-based methodology for determining stream corridor values for fish and wildlife, developed for U.S. Fish and Wildlife Service. He has project experience with several dozen western rivers, including riverine and riparian ecological research, river use capacity studies, and

management plans. These include the Sacramento-San Joaquin, Mokelumne, South Fork American, Salinas, Columbia, Snake, Truckee-Carson, Gunnison, Virgin, and Green rivers.

**Energy:** Mr. Pratt's background includes environmental regulatory compliance and environmental review of major energy facilities and programs, power plant siting, transmission line routing, and fuel supply and transportation. He has managed independent review of fossil fuel-fired power projects, analyzed renewable energy alternatives, assessed power project sites, developed environmental mitigation plans for energy development, developed power plant siting programs for regulatory agencies, and assisted power project developers in the United States and internationally in evaluating potential sites, determining the climate for project development, and complying with applicable regulations and environmental standards.

**References:** (1) for recent work gathering and compiling a vast body of interdisciplinary information on a fixed budget and applying it to policy, contact Dr. Curt Brown, Western Water Policy Review Advisory Commission, 303-236-6211 regarding the *Truckee-Carson River Basin Study*.

(2) for research on climate change and preparation of a strategic Carbon Emission Management and Mitigation Program, contact Keith Krumweide, Mission Energy Company, 714-752-5588.

(3) for work on the Stream Corridor Inventory and Evaluation System and on climate change strategic planning for Mission Energy, and a general reference on California experience, as well as background in ecology and human ecology, contact John Garcia, President, GANDA, 415-789-9242.

## VI COMPLIANCE WITH STANDARD TERMS & CONDITIONS

In general, the standard contract terms provided with the RFP are acceptable. Dames & Moore requests that the indemnity term be more clearly tied to our own negligence or willful misconduct and that our exposure be capped. We will have proposed language to submit at the appropriate time. We also would not normally agree to retention from progress payments. The forms required to be submitted with the proposal for the Other Services category (non-discrimination compliance) are attached.

## NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME

Dames &amp; Moore

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

## CERTIFICATION

*I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.*

OFFICIAL'S NAME

Roy Elliott

DATE EXECUTED

7-24-97

EXECUTED IN THE COUNTY OF

King (Washington)

PROSPECTIVE CONTRACTOR'S SIGNATURE

Roy W. Elliott

PROSPECTIVE CONTRACTOR'S TITLE

Vice President

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Dames and Moore