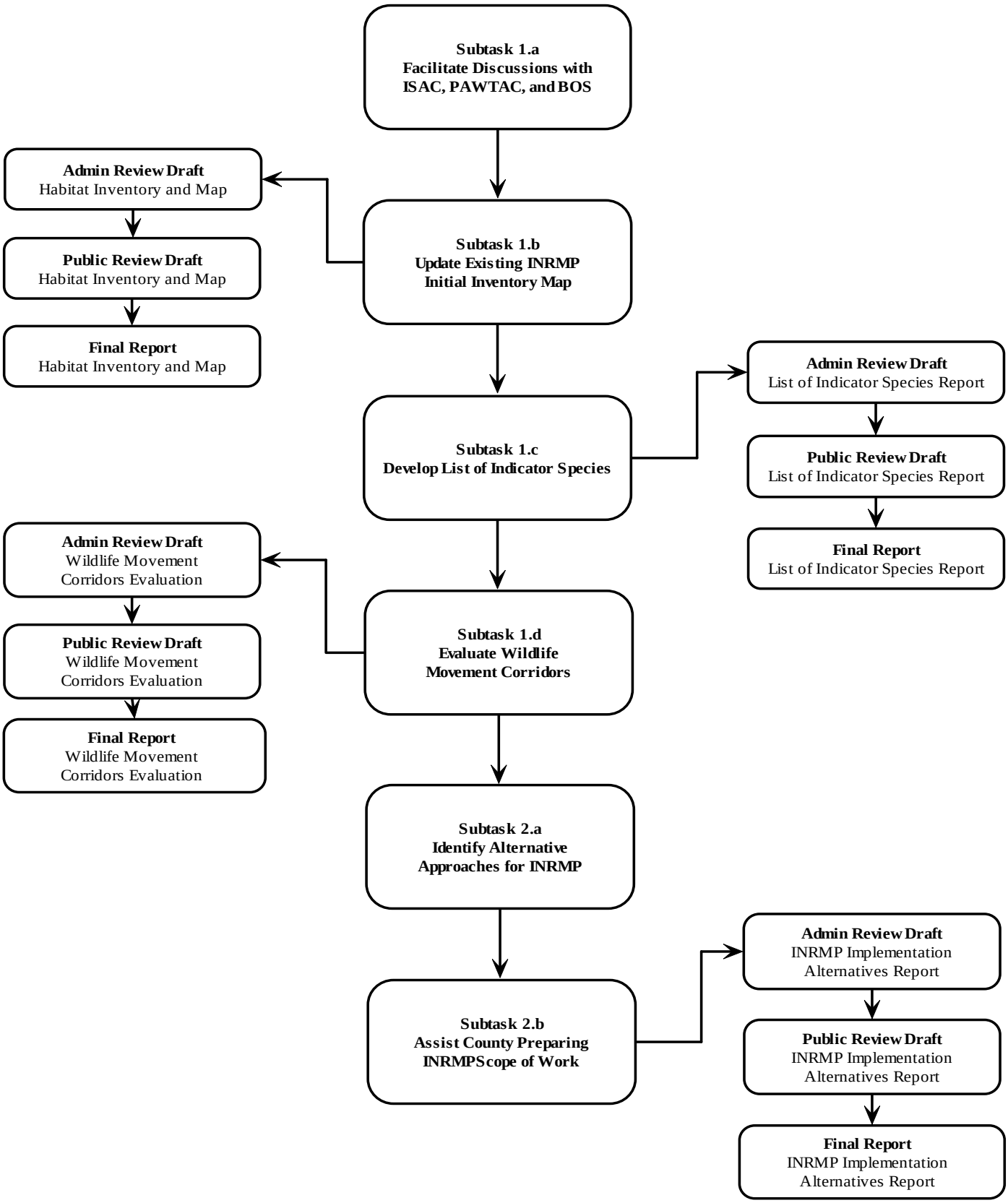
E. WORK PLAN

In 2004, the County adopted its General Plan. Mitigation measures included in the General Plan Environmental Impact Report (EIR) include Policy 7.4.2.8 and Implementation Measure CO-M, which are intended to protect natural resources and are the focus of this proposal. Other policies from the General Plan which are relevant to the effort to protect natural resources include 7.4.2.9 and Measure CO-U. The County is directed to identify important habitat and to establish a program for habitat preservation, effective management, monitoring and mitigation (i.e., an INRMP) within five years of the General Plan approval. This includes developing land conservation strategies that conserve and restore habitat connectivity to offset the effects of increased habitat loss and fragmentation elsewhere in the County. It also includes identifying habitat preservation areas, with preference for large continuous blocks of habitat and where possible, corridors to facilitate species movement among these blocks. These areas will then form a network of priority preservation lands in the County to provide proactive preservation planning at a landscape level so as to reduce future endangered species listings, human-wildlife conflicts, and make the County better equipped to deal with expected land-use and global climate change.

The tasks identified as being necessary to develop the INRMP in the May 8, 2009 Request for Proposals are listed below and Figure 2 identifies SEA's proposed work plan in flowchart form.

Figure 2: Proposed Work Plan



TASK 1 MAP IMPORTANT HABITAT AND CONNECTIVITY

According to General Plan Policy 7.4.2.8 (A), this part of the INRMP shall inventory and map the following important habitats in the County:

a. Habitats that support special-status species;
b. Aquatic environments including streams, rivers, and lakes;
c. Wetland and riparian habitat;
d. Important habitat for migratory deer herds; and
e. Large expanses of native vegetation.

In addition, the Policy states that the County should update the inventory every three years to identify the amount of important habitat protected, by habitat type, through County programs and the amount of important habitat removed because of new development during that period. The inventory and mapping effort shall be developed with the assistance of two County oversight groups, the PAWTAC and ISAC. Additional help will be sought from the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS). The inventory shall be maintained and updated by the County Planning Department and shall be publicly accessible.

Subtask 1.a Facilitate Discussions with PAWTAC, ISAC & Board of Supervisors

Project Team members will attend and facilitate discussions at monthly meetings with the PAWTAC and ISAC. These discussions will include efforts to define "Important Habitat", "Large Expanses", and "Native Vegetation" as used in General Plan Policy 7.4.2.8. Team members will also attend public meetings, as necessary, with the County Board of Supervisors, the Agricultural Commission, the Planning Commission and the Parks and Recreation Commission, to include them in the discussions and update then in the project findings and schedule. For budgetary purposes, a total of 36 meetings have been included as a part of this proposal. Any additional meetings will be charged on a Time and Materials basis.

SEA will coordinate with staff to develop a protocol for communication between ISAC, PAWTAC, staff, and the Board of Supervisors to provide timely progress reports and to ensure the INRMP work program remains consistent with Board direction.

Subtask 1.b Update Existing INRMP Initial Inventory Map

The existing INRMP Initial Inventory map for El Dorado County displays information on existing important wildlife habitats for the entire County (March 26, 2008). The study area for the INRMP is now defined as the west side of the County below the 4,000-foot elevation contour. The map will be updated to reflect the study area as it is now defined.

The existing map displays the following data:

1. Special-status species point locations (California Natural Diversity Database (CNDDB)
2. Aquatic environments (El Dorado County)
3. Wetland and riparian habitat (U.S. Fish and Wildlife Service [USFWS] – National Wetlands Inventory)
4. Important deer habitat (CDFG)
5. California Red-legged frog critical habitat (USFWS)
6. Pine Hill Preserve areas (Bureau of Land Management)
7. Priority Conservation Areas from the Oak Woodland Management Plan (OWMP, EN2 Resources, Inc.)

8. Important Biological Corridors identified in the 2004 General Plan
9. Valley Oak Woodland (FRAP 2002)
10. Lands that are publicly owned, subject to conservation easements and designated Open Space or Natural Resource in the 2004 General Plan

General Plan Policy 7.4.2.8 specifically calls for the mapping of five types of habitats and environments for the Habitat Inventory (7.4.2.8). SEA will update the initial inventory map from the 2004 General Plan using the most current data available, including the CNDDB. ~~For example, the existing map has data from 2000 and the CNDDB is updated monthly, therefore, SEA will use the most current month's data to overlay on the map.~~ In addition, we will modify the map to display the data in the most effective way to convey the extent of habitats in the study area. ~~As an example, the current map uses point data to display the location of special-status species from the CNDDB; however, the CNDDB data also includes polygon data, which better approximates location of special-status species occurrences.~~

Several additional data-sets may be used to more accurately display the range of habitat types in the study area. The latest vegetation data from the California Land Cover Mapping and Monitoring Program (LCMMP) provides vegetation data obtained from remotely sensed data, which is classified according to the California Wildlife Habitat Relationship (CWHR). This information is useful in determining where there are large expanses of native vegetation as required by the 2004 General Plan. SEA also is aware of recently-developed maps of historic vegetation types, possible future vegetation distributions (with climate change), and historic wildlife occurrences. In addition, to more accurately map where special-status plant species are likely to occur, Natural Resources Conservation Service (NRCS) soil data can be used to show the location of gabbro- and serpentine-derived soil types. Many rare plants are associated with these soil types. SEA ~~would~~ will research and evaluate additional existing data, including the 1991 EIP Rare Plant Study, the OWMP, and County GIS data, to include on the map as necessary.

Subtask 1.c Develop List of Indicator Species

The Project Team will develop a recommended list of Indicator Species to be utilized in identification of potential core habitat areas, corridors and linkages. For each Indicator Species, the Team will identify habitat relationships and discuss relevant characteristics such as distribution, status, dispersal and home range requirements.

Indicator species can represent particular structural and functional values of habitat, they can be species of particular management or regulatory concern (e.g., endangered species), or they can exert substantial influence on an ecosystem (e.g., mule deer). ~~The presence of indicator species can provide information about habitat quality and extent in an area. The combination of information about a suite of indicator species and structural information about habitat (quality and threats) is often sufficient for conservation planning. We~~ SEA will describe a combination of indicator species suitable for analyzing habitat quality, extent of usable habitat, connectivity, and habitat conservation. Because there can be a reciprocal relationship between choosing indicator species and finding sufficient data to evaluate their distribution and status, SEA will develop both a list of "best indicator species" and a list of "available indicator species".

~~Team member Dr. Fraser Shilling has developed the only connectivity analysis for the Sierra Nevada, which was based in part on actual occurrences, or GIS models of habitat, for indicator species. These species were chosen for their rarity (e.g., wolverine), keystone role (mule deer), or management status (e.g., California Spotted Owl). We also have extensive field research experience with the species most likely to play a key role as indicator species.~~

Habitat Relationships

Wildlife occupy specific habitat types, often indicated by particular assemblages of plant types. ~~Planning for conservation of wildlife species often depends on knowing two critical pieces of information: 1) the use of different habitat types by each of these species (some species can use more than one habitat type) and 2) the distribution and quality of the habitat types. These relationships are often modeled, although the modeling is not a perfect science, with both known and unknown limitations.~~ For each indicator species, SEA will describe the essential habitat relationships, including the ranked habitat preferences and the caveats and accuracy of these relationships. SEA will use the California Wildlife Habitat Relations (CWHR) model, which was developed by CDFG and other biologists. This model provides habitat associations for each vertebrate species in California, ranks habitats for their utility for species, and includes accuracy for the model's predictions. The primary output will be a map of the highest quality habitat areas for each species.

~~Dr. Shilling has used the CWHR modeling approach for the last decade as part of road system analyses, habitat reserve design, and connectivity analysis in El Dorado County and other parts of the Sierra Nevada.~~

Distribution/Status/Dispersal

~~El Dorado County is home to varied habitat types, from oak savannahs and woodlands in the West, to Alpine forests and barren areas to the East. All~~ Major vegetation types in the County have been mapped. ~~and for many, qualities of these habitats are known (e.g., crown cover). We~~ SEA will use this information in conjunction with ~~to describe the likely distribution of indicator species in the County. In addition, there have been~~ wildlife records collected ~~during the implementation of infrastructure,~~ for development, restoration, and other projects ~~. Although these don't indicate numbers of individual wildlife, this information can be used to indicate~~ to assist with identifying presence/absence of certain species.

~~Dr. Shilling has prior experience in the Sierra Nevada and other places in the world in digital mapping of actual occurrences and distributions, as well as likely distributions, for many of the likely indicator species.~~

~~Status~~

~~The actual presence and numbers of wildlife species is one of the most challenging pieces of information to collect for indicator species. It is also one of the most important, as species status correlates with habitat quality and threats and trends in status can act as a surrogate for improving or declining ecosystem status. One indicator of species status is their regulatory status. However, there is not always as much information about the status and changing status of species to equate legal status with biological status. We~~ SEA will also collect as much

information as is available for the indicator species regarding their biological, legal, and local status.

~~***Dispersal***~~
~~The ability of different species to disperse within and among habitat areas is often critical for their survival and well-being. Dispersal can be affected by both natural and artificial barriers and opportunities. For example, for small species, a large river may represent as effective a barrier as a freeway. In addition, some species may take advantage of highway structures (e.g., culverts) to opportunistically cross highways.~~ For each indicator species, SEA will describe their basic dispersal needs, local and regional barriers to dispersal, and information about their actual dispersal and potential dispersal pathways.

Home Range Requirements
Habitat type and quality can determine the actual use of individuals and pairs of wildlife species of the landscape. The size of the home range depends on a combination of the species, individual's reproductive stage, habitat quality, habitat type, and disturbances. The most probable home range size is known for many species occurring in El Dorado County, allowing for modeling the likely extent on the landscape of potential home range areas. Actual home range areas can be determined by tracking the movements of individual animals. SEA will describe the home range sizes, potential distributions in the County, and threats to home ranges for all major mammal species and certain birds of legal concern (e.g., spotted owl). For other taxonomic groups, there may not be enough known to discuss home range size.

Subtask 1.d Evaluate Wildlife Movement Corridors
The SEA Team will evaluate the need for north-south wildlife movement corridors and linkages, including identification of species with north-south migration patterns. The Team will analyze the barrier effect of Highway 50 and other major roadways in the project area (i.e., Motherlode Road). The Team will identify existing locations along Highway 50 that allow safe passage for terrestrial mammals. The Team will examine and discuss issues involved with retrofitting existing drainage structures and undercrossings to provide for discrete wildlife crossings, including an approximation of the cost, to allow the County to assess the feasibility of such an approach. Prior research studies, such as the 2002 Saving & Greenwood report and initial oak-corridor mapping conducted for the OWMP by EN2 Resources, Inc., will also be analyzed. Alternative locations for wildlife movement across Highway 50 (such as Weber Creek and areas east of Placerville), will be identified and examined as to the relative feasibility of those locations. General Plan Policy 7.4.2.8 (A) and the Oak Woodland Management Plan will be considered as part of this task.

~~Wildlife movement often follows natural corridors, such as riparian forests, from one important to another. Wildlife also move within zones of habitat types that they require for survival. In El Dorado County, this equates to north-south movement within belts of woodland habitat, or mixed conifer forest habitat, or other vegetation and climatic zones. Road and other development in the County has proceeded in both north-south and east-west orientations (as well as others) and can thus pose barriers to wildlife movement. One critical issue that mammals moving through El Dorado County face is traffic on Highway 50. This highway has sufficient traffic that only the fastest animals at certain times of the day will be able to successfully cross the surface~~

~~of the right-of-way. Other major roads also have enough traffic (e.g., Latrobe Rd) that wildlife are at risk of collisions with vehicles if they try to cross.~~

~~Caltrans has collected wildlife-vehicle collision data for Highway 50 and provided those data to Dr. Shilling as part of a collaborative study. These data reveal that deer are commonly killed on Highway 50 and primarily where traffic levels are moderate (10,000 to 20,000 vehicles per day), within a zone that stretches west of Placerville to Echo Summit. In addition, these collisions tend to occur in the foothill zone more commonly in the winter and summer and at higher elevations in the spring and fall. Similarly, SACOG has collected data on wildlife-vehicle collisions resulting in death, injury, and property damage and provided these data to Dr. Shilling. In the last 10 years, there have been 180 accidents caused by collisions with wildlife on Highway 50 in western El Dorado County, 32 of which resulted in death or injury. Interestingly, 126 of the collisions were between dusk and dawn and 54 were during daylight hours.~~

The Team will investigate the likelihood that wildlife can cross Highway 50 from the western County line to the 4,000 foot elevation on the eastern project area boundary. We will do this in two ways: 1) use existing maps and knowledge of habitat areas near or adjacent to the highway to map areas of likely concern and 2) field a small crew of UC Davis student-scientists to map (GPS) and describe (dimensions) all potential pathways for wildlife to opportunistically cross the Highway 50 right-of-way. We will also describe the factors that may constrain or enable wildlife crossing of major roads and Highway 50, in order to allow for a more general understanding of barriers and opportunities for crossing. ~~Existing structures can sometimes provide opportunities to expand the range of possibilities for wildlife to more safely (for them and people) cross highways.~~

~~Dr. Shilling is a co-author of the California Wildlife Crossing Manual (developed under contract with Caltrans), which describes in detail how to determine wildlife crossing potential of highways, as well as approaches to reduce conflict at that~~ crossing.

~~Structure Retrofit~~

~~One of the cheapest and sometimes most effective ways to improve wildlife movement through areas with busy roads and highways is to improve existing right-of-way crossing opportunities. There are several general concepts that can guide the placement and choice of type of enhanced crossing structure. These include: adjacent land-ownership status, adjacent habitat quality, type and dimensions of existing crossing structure, other uses of existing crossing structure. There are also aspects of the right-of-way that can be enhanced to reduce crossing in certain areas (through fencing) and increase it in others (access paths through median barriers). Finally, driver education and traffic management can reduce the likelihood that wildlife crossing results in collision. The following section describes possible retrofit recommendations that we will make to improve wildlife crossing on County highways and major roads.~~

~~1) Bridges over major roads may function as a crossing pathway for wildlife capable of perceiving and using these structures. Three issues associated with retrofit would be access to the bridge, traffic management on the bridge, and creation of a wildlife friendly walkway adjacent to the roadway.~~

~~2) Culverts provide one of the best crossing pathways for small and medium-sized wildlife species. They sometimes have a natural bottom, but if not can be retrofitted with a naturalized bottom or with a wildlife ledge that can be attached to the side of the tunnel.~~

~~3) Fencing is a useful and cost-effective way to stop wildlife crossing in certain areas and channel them toward better places to cross. In one study (Aresco, 2005), a wildlife biologist used a vinyl erosion control fence as a drift fence to encourage turtles, and other herpetofauna to use a culvert to move between water bodies on either side of 1 km of a busy highway. The fence was >99% effective for diverting turtles, resulting in thousands fewer deaths on the surface of the road. Variable mesh-size fencing can be used to divert wildlife of a wide range of sizes to appropriate crossing opportunities.~~

~~4) Median barriers are usually very effective crossing barriers. When wildlife attempt to cross highways and busy roads despite the presence of traffic, it is important to get them off the road surface as quickly as possible. Most animals cannot jump over a typical concrete median barrier and even those that can may not because of the unfamiliarity of the obstacle. Recognizing this, two main solutions have been developed. One is to offset barrier segments from each other at the ends, so as to create a space. Another approach is to use scuppers to allow small animals to penetrate through the barrier.~~

~~5) Traffic management has been effectively used to reduce vehicle speed and increase awareness of the likelihood of collision with wildlife in specific areas. One way this is accomplished is using wildlife detection systems to alert drivers to the presence of large wildlife on or near the roadway. There is a UC Berkeley study that is looking at how these systems could be cost-effectively used in California. Other ways are to alert people to likely presence of wildlife on or near the road, for specific roads and to reduce permitted speeds on roadways that have frequent collisions.~~

We will describe how and where ~~these~~ various types of crossing enhancement strategies could be used for major roads and highways in the County. We will include cost-ranges for the strategies, based upon costs elsewhere in California or the US.

~~Alternative Highway 50 Crossings~~

~~There are very few places where Highway 50 is completely permeable to wildlife movement. One critical lower-elevation area includes the two un-named tributary streams to Deer Creek that cross Highway 50 adjacent to Silva Valley Parkway. These vegetated crossings are probably important to species that can tolerate the El Dorado Hills residential neighborhoods in the vicinity to the north. A paved under-crossing that may be important is Bass Lake Road at Highway 50. Because of habitat to the north and south of the highway, this may be an important crossing. There are other possible opportunistic crossings between the western County line and Placerville, but Weber Creek is likely to be the most important one. The forested and scrub areas it connects provide the best lower/mid-elevation connection between the Cosumnes and American River watersheds.~~

SEA will evaluate the various Highway 50 crossing alternatives, starting at the western County line and extending to elevation 4,000 feet to the east. We will characterize each potential crossing's relative importance and feasibility for enhancement and maintenance.

Subtask 1.e Deliverables

- *Administrative Draft Important Habitat Inventory Report and Map*
- *Public Review Draft Important Habitat Inventory Report and Map*
- *Final Important Habitat Inventory Report and Map*

- *Administrative Draft Indicator Species Report*
- *Public Review Draft Indicator Species Report*
- *Final Indicator Species Report*

- *Administrative Draft Analysis of North-South Wildlife Movement Corridors Report*
- *Public Review Draft Analysis of North-South Wildlife Movement Corridors Report*
- *Final Analysis of North-South Wildlife Movement Corridors Report*

TASK 2 IDENTIFY ALTERNATIVE APPROACHES FOR PREPARATION OF THE INRMP

The purpose of the INRMP is to identify important habitat in the County and establish a program for effective habitat preservation and management. The policy goes on to state that the INRMP shall include the following components:

1. Habitat Inventory
2. Habitat Protection Strategy
3. Mitigation Assistance
4. Habitat Acquisition
5. Habitat Management
6. Habitat Monitoring
7. Public Participation
8. Funding

Subtask 2.a Identify Range of Alternatives for INRMP

The Project Team will identify a range of alternative approaches available to the County to complete the INRMP. Advantages and disadvantages of each alternative will be discussed along with their probable cost of implementation. This shall include accounts for the implementation cost of mitigation, including acquisition, monitoring, and management. This task shall also include a discussion on the methodology employed in other jurisdictions for similar conservation plans. By way of example, some of the methods to be discussed might include GIS-based computer modeling, a criteria-based program, and a Conceptual Conservation Plan approach.

~~There are a wide array of possible computer-based spatial modeling approaches that can be used to estimate connectivity, habitat quality, conservation priorities, and wildlife species needs. There are also conceptual conservation strategies commonly used in habitat conservation~~

~~planning that may require less computer-intensive analysis (e.g., Bay-Delta Conservation Plan), but have clear links to conservation goals.~~

~~Dr. Shilling has prior experience developing GIS-based models of important habitats for wildlife needs, structural and functional connectivity, and potential impacts of roads for private organizations and local, state, and federal agency clients. These models include: Ecosystem Management Decision Support, Least Cost Path & Corridor Analysis, PATCH, Patch Analyst (ESRI), FRAGSTATS, the Hawth's Tool Set, SITES/MARXAN, FunnConn, Criterium Decision Plus, and others. All of these approaches provide maps of provable accuracy that are also easy to understand, unlike some of the more esoteric, academic approaches (e.g., graph theory and circuit theory). These tools vary in their ease of use and the accuracy and utility of their outputs. In all cases, a moderate level of GIS expertise is required to ensure that the outputs are meaningful. In all cases, the modeler must have a clear question in mind. Finally, in all cases, the models have been successfully tested for accuracy and use in real-life planning.~~

The Project Team will coordinate with the consultants and staff working on the Pine Hill plant issues to ensure that the Pine Hill plant work will fit into the INRMP, but will not do extensive work on this issue. We will also be prepared to assist the County with evaluating potential policy changes and in preparing a General Plan Amendment, should that become necessary during this process.

Subtask 2.b Assist County Preparing INRMP Scope of Work

The Team will also assist the County in preparation of a revised Scope of Work in compliance with General Plan Policies 7.4.2.8. The revised Scope of Work will be based on the findings from the studies prepared as a result of this proposal and will identify all remaining tasks necessary to complete the INRMP. The INRMP will evaluate the extent to which resources are or can be protected on public lands as a first priority. Costs associated with preparing the Final INRMP shall also be provided.

Subtask 2.c Deliverables

- *Administrative Draft INRMP Implementation Alternatives Report*
- *Public Review Draft INRMP Implementation Alternatives Report*
- *Final INRMP Implementation Alternatives Report*

TASK 3 PROJECT SCHEDULE

A copy of the Project Schedule is included herein. As work progresses, this schedule will be updated on a monthly basis and shared with County staff and PAWTAC and ISAC members.