1. Region 8 I&M Program: Introduction

1.1. Vision, Goals and Objectives

Vision

The Region 8 Inventory and Monitoring (I&M) Program, as a part of the regional biological program, identifies important natural resources on National Wildlife Refuge System (NWRS) lands in conjunction with refuge staff and provides information to evaluate management of these resources under the influence of climate change and other environmental stressors. Our basic philosophy is that inventory and monitoring information should support management decision making at multiple spatial scales, rather than stand alone with no clear relevance to management. The regional program steps down from the national Strategic Plan and Operational Blueprint.

National Wildlife Refuges (refuges) and Wetland Management Areas are the foundation of the I&M Program. We provide support to the field stations by identifying priority conservation and management issues and tracking the status and trends of abiotic and biotic factors needed to effectively manage refuge lands and waters. We provide technical guidance and expertise to stations to develop planning documents, monitoring protocols, databases, and data analysis strategies so that information is available and accessible to make the best management decisions. We also coordinate with internal and external partners, particularly Landscape Conservation Cooperatives (LCCs), to share information, enhance cooperation, and raise the quality of science and resource management across the landscape.

Goals

- Enable refuges to use inventory and monitoring to practice strategic habitat conservation.
- Build scientific capacity to strengthen the caliber of the natural resource program.
- Bridge the information gap between local refuges and landscape scale institutions by working with LCCs, the Natural Resources Program Center (NRPC, the national home of the I&M program) and other partners.

Objectives for FY2011

- Hire 5 staff members.
- Establish good communication with refuges: assist creation of Biological Advisory Council (BAC), plan needs assessment process for all refuges, monthly conference calls with biologists, regular webinars on scientific issues, request proposals for funding
- Organize, furnish and move into new offices with the California LCC staff and US Geological Survey staff on the campus of California State University, Sacramento (CSUS).
- Establish partnerships with LCCs and other internal and external partners.
- Assist the NRPC on national projects: test databases, respond to data calls, participate in national pilot projects
- Conduct regional pilot projects to determine how to cull and catalog refuge legacy documents.
- Orchestrate contractor/refuge cooperation to complete Hydorgeomorphic analyses (HGMs) contracted in FY 2010 for 7 refuges.
- Prepare plans to conduct Water Resource Inventories and Assessments (WRIAs) on refuges.
- Begin long term planning at regional and national levels.
1.2. Organization

The organizational structure developed by Region 8 mirrors the Addendum organization and structure (Figure 1) Organizational Chart for Region 8 I&M Program. We are currently re-evaluating the organizational structure shown in Figure 1. Other Regions have modified their organizational structure to meet specific regional needs.

Region 8 is a new region with a very small regional staff. The region had one Refuge Regional Biologist position (added in 2009) and no Refuge hydrologists prior to the development of the I&M program.

The majority of Region 8 I&M program staff are based at CSUS with the California LCC and US Geological Survey scientists. One I&M biologist (Orien Richmond) is stationed at Don Edwards San Francisco Bay NWR and the I&M Specialist (Giselle Block) works at the CSUS office and at the San Francisco Bay Joint Venture Office in Fairfax, California. The move from the Sacramento Regional office to CSUS occurred in February 2011. By mid-February, the first five I&M positions were operational in Region 8 (Appendix 1: Staff Profiles), and by mid-March 2011, a term administrative support position was in place. Future position additions will be considered based on funding and regional priorities.

1.3. Integration with the Regional Refuge Biological Program

The Regional Refuge Operations Division Chief, Carol Damberg, provides overall guidance and support for the Region 8 Biological Program, which currently consists of the Regional Biologist and I&M program staff. The Regional Refuge Biologist, Sallie Hejl, supports Refuge stations in the development and review of biological planning documents, and by assisting the I&M staff to review inventory and monitoring efforts locally, regionally and nationally.

1.4. Coordination with Partners

Regional I&M staff collaborates regularly with NWRS programs including Planning, Fire Management and Realty; and other U.S. Fish and Wildlife Service programs including the Partners and Coastal Program, Migratory Bird Management, Fisheries, Endangered Species, Contaminants and Region 1 Water Resources to ensure that I&M activities have multiple benefits in the Region, and to avoid duplication of effort.

The National I&M Strategic Plan and Operational Blueprint envision that the I&M program will work closely and seamlessly with LCCs that fall within Region 8 (Figure 2). In Region 8, we are carrying out this vision by co-locating our office (and most of our staff) with the California LCC and the US Geological Survey on the CSUS campus. Planning this move to new offices, and combining forces in terms of administrative support, information technology (IT) and technical expertise, was a major focus of all staff in FY 2011. We expect that this arrangement will be beneficial in many ways. One challenge of the I&M program is to move among geographical scales: we will be integrating biological issues and information from the individual refuge scale to regional, national and global scales. Working daily with the California LCC will allow us to move among these scales more easily, and to identify opportunities and efficiencies quickly. Having the resources of the university and the US Geological Survey close at hand will also benefit our program. One I&M staff member is designated as liaison to the California LCC, and at least two staff members will serve on LCC teams. We share information about partner proposals
for funding, so that projects of joint interest will be supported. We will establish linkages with other LCCs in the Region (North Pacific, Great Basin, and Desert) as they develop.

2. Public Interest Highlights

- **How will tidal marshes change or disappear in response to rising sea levels and extreme flood events, and how can we plan for these changes?**

Several refuges along the California coastline were established to protect and restore tidal marsh ecosystems for the benefit of many species, including migratory birds and federally listed species such as the light-footed clapper rail (*Rallus longirostris levipes*) and the salt marsh harvest mouse (*Reithrodontomys raviventris*). In the San Francisco Estuary alone, home to the San Francisco Bay National Wildlife Refuge (NWR) Complex, more than 80% of tidal marshes have been lost or degraded over the last century. Like many coastal environments, tidal marsh is highly vulnerable to climate change impacts such as rising sea levels, increase in the frequency and intensity of extreme flooding events, erosion, and changes in water quality. To better inform climate adaptation planning and decision-making at the refuge scale the Region 8 I&M program is collaborating with several partners (U.S. Geological Survey, California LCC, North Pacific LCC, National Estuarine Research Reserves) to improve our understanding of how tidal marsh will be impacted by climate change. The refuges involved in this project are San Diego Bay NWR, Seal Beach NWR, Tijuana Slough NWR, San Pablo Bay NWR, and Humboldt Bay NWR. The project goal is to develop models that depict how and where changes in tidal marsh will occur in response to rising sea levels and extreme flood events. Model inputs include site-specific data on marsh elevations (+/-3cm vertical accuracy), sediment dynamics, tide regimes, and vegetation. This project augments earlier work by the NWRS to model sea level rise for coastal refuges (the Sea Level Affecting Marshes Model (SLAMM)) by providing the finer-scale resolution needed to inform climate adaptation planning at the refuge scale.

- **How can we identify and rescue existing (legacy) scientific data stored at refuges, and make them available for analysis to inform management decisions?**

The Legacy Data Project / Refuge Information Catalog is a Region 8 project to catalog refuge information and survey data in an easily accessible on-line system. The project has benefited HGMs and WRIAs by providing a system to catalog datasets useful for the projects. Future projects such as management plans or environmental assessments will benefit from easy access to refuge baseline information. In addition the catalog provides a backup for documents that only exist at a refuge and is one method for decreasing the loss of knowledge as staff retire or move to a new refuge. Once the on-line system is available in 2012 the scanned documents will be available to staff and to others as appropriate. Region 8 has initiated legacy data projects at 11 refuges.

- **Does poor water quality inhibit conservation of fish and wildlife on refuges?**

Degraded water quality in national wildlife refuges can be a detriment to fish and wildlife and their habitats. However, often water quality information on refuges is outdated or non-existent, or contamination sources off-refuge that might impact refuge water quality are unidentified. The I&M program has made strides this year launching WRIA projects and Contaminant Assessment Process at 6 refuges. These projects quantify water quality problems on and off refuge lands, and identify needed improvements in inventory and monitoring of water quality on refuges needed to improve management of wetland and water management. These projects will also highlight the need for landscape level
management initiatives to improve water quality through best management practices and reduction in contamination sources.

- **Will climate change affect water supplies and timing of water availability on refuges?**

The face of refuge water resources and water supply could change in light of climate change through alteration of the timing of winter snows and spring rains, increases in the magnitude and frequency of storm events, and prolonged drier/hotter summers. The way that climate change will affect refuge water supply is largely unknown due to the complexity and variability of climate change projections, especially for changes in precipitation. This uncertainty makes long-term water management planning very difficult. Another challenge in this planning is inconsistent or minimum documentation about how refuge water resources fit in a larger basin or landscape scale context. However, the I&M program has made beneficial strides this year in planning and coordinating for the Water Resources Inventory and Assessment projects. These projects will help define a larger region of hydrologic influence for refuge lands and identify potential effects of climate change on water supply to assist with planning for more effective water quantity monitoring that facilitates adaptive management of water resources.

3. **Staffing**

Region 8 Biology and I&M Program staff members are listed below. Our organizational chart is Figure 1. Staff profiles are in Appendix 1.

- **Refuge Operations Division Chief**, Carol Damberg: program oversight and leadership (office: Regional Office)
- **Regional Biologist**, Sallie Hejl: habitat management reviews, Comprehensive Conservation Plan (CCP) and Habitat Management Plan (HMP) review and development, regional invasive species coordinator, and Great Basin and Desert LCC liaison (Office: Regional Office)

**I&M Staff**

- **I&M Coordinator**, Karen Laing: program leadership (Office: CSUS)
- **Data Manager**, Kaylene Keller: GIS and database development and organization (Office: CSUS)
- **I&M Specialist** (similar to Zone Biologist in some other regions), Giselle Block: field staff supervision, California LCC liaison, climate change, invasive species and habitat management planning (Office: CSUS & Joint Venture Office)
- **Hydrologist**, Rachel Esralew: WRIAs, HGMs and wetland assessments (Office: CSUS)
- **Wildlife Biologist**, Orien Richmond: hydrogeomorphic analysis (HGMs) and bird monitoring (Office: Don Edwards NWR)
- **Administrative Officer**, Rita Howard: office management (Office: CSUS; shared position with California LCC)
- **Vacancies** as listed on current organizational chart: **Data Manager, Botanist (2), Hydrologist, I&M Specialist/Zone Biologist, Wildlife Biologist**
- **Student Interns and Volunteers:**
  - Kelsey McDonald: Factsheets, refuge field support, legacy data.
  - Sharon Dulava: HGM, legacy data, field support
  - Brandi Tapia: GIS, legacy data

**Key Cooperators in FY2011**
4. Accomplishments - Activities and Products

4.1 Identify I&M priorities for the region

4.1.1 Status of station Habitat Management Plans
Region 8 refuges generally do not have HMPs, although some refuge complexes have annual planning processes or detailed CCPs that serve some functions of HMPs. The regional refuge biologist is planning the development of HMPs in the region, with close support from the I&M and Planning programs.

4.1.2 Status of station Inventory and Monitoring Plans
We tested the Planning and Review of Inventory and Monitoring on Refuges (PRIMR) database on four refuges in the Region. We worked with the NRPC on development and implementation of the draft I&M Policy and the PRIMR database to implement I&M plans. I&M plans are dependent upon well-executed CCPs and HMPs; we plan to complete HMPs and I&M plans together on a refuge by refuge basis.

4.1.3 Summary of inventory and monitoring priorities for the region
Program & Office Creation: Region 8 I&M program was truly launched in FY 2011. Although funds were first allocated for the program in FY 2010, these were obligated to equipment and to hydrogeomorphic (HGM) contracts that began in September 2010. The regional I&M coordinator was hired in August 2010, followed by the data manager, I&M specialist and biologist in November 2010, one hydrologist in February 2011, and an administrative officer in March 2011. Because the region was created only two years earlier, the existing regional staff supporting biology was small: it consisted of a new regional refuges biologist, and the chief of refuge operations. Assistance for water resources was available only from Region 1 staff in Portland, Oregon. Office space for the new staff did not exist. The priorities for the first half of FY 2011 were to hire staff as described above, and to organize, furnish and move into an office shared with the California LCC and the U.S. Geological Survey on the campus of CSUS. The Chief of Natural Resources spearheaded a new regional Biological Advisory Council, made up of biologists and managers from refuges, to develop a vision statement and long term (5-year) goals and objectives for the regional biological program, including inventory and monitoring.

Program Foundation: In FY 2011, Region 8 focused on planning, learning, communication, and data management (Tables 1 and 2). We leveraged funding and other support from partners whenever possible (Table 3).

We captured and organized existing information from refuges by combining information collection needs for three refuge specific projects: HGMs, WRIAs and our Legacy Data pilot project (Figure 3). We funded carefully selected inventory and monitoring projects on refuges (listed throughout Table 1 and separately in Table 4, Figure 4; budget in Table 2). We participated in a national pilot project on invasive plants, launched initiatives to standardize two bird monitoring protocols, and coordinated with the...
California LCC and other partners to launch a sea level rise monitoring and modeling project on three refuge complexes (Table 1). We evaluated monitoring activities on refuges requested or required by other USFWS Programs, such as Endangered Species, Migratory Bird Management, Fisheries or LCCs (Table 1). We assisted national efforts by leading the PRIMR database team and taking part in the Geospatially Referenced Archive System (GRAS) pilot project led by the NRPC (Table 1).

### 4.2 Abiotic Resources

**Hydrogeomorphic Assessment Projects (HGMs):** Region 8 priorities for abiotic resources in FY 2011 included support of 7 ongoing HGMs and 6 ongoing WRIAs (Figure 3). Staff supported HGM contractors by working with refuge staff to collect, scan and catalog needed documents and datasets, attending meetings at refuges with refuge staff and the contractors, and reviewing drafts of reports. We gained efficiency by collecting data for both HGMs and WRIAs together, and by also cataloging documents in the GRAS database as we worked. We also contracted with experts in water rights to examine how best to collect this complex and sensitive information for WRIAs. In addition to the HGM and WRIA projects, our hydrologist worked closely with the Region 1 Water Resources branch and individual refuges to identify and meet refuge needs; her ability to act as a liaison provided assistance to refuges that had not been aware such assistance was available.

### 4.3 Biotic Resources

**Vegetation Mapping:** The Region 8 I&M program provided funding and guidance to assist the Division of Planning to prioritize refuges for vegetation mapping, and subsequently with the development of a contract for conducting vegetation surveys. The surveys will be used in the development of a vegetation map for two priority refuges.

**Bird Monitoring:** We conducted two pilot projects with refuges and partners to support and improve ongoing bird monitoring efforts by promoting standardized protocols and up-to-date technology. The first project brought together agencies and others conducting surveys on secretive marsh birds in the San Francisco Bay area, and began to get agreement on using a national standardized protocol. The second project focused on bringing together participants in the midwinter waterfowl survey to standardize technology and methods.

### 4.4 Stressors

**Sea Level Rise:** As described under Public Interest Highlights above, we found partners in U.S. Geological Survey, California LCC, North Pacific LCC, and the National Estuarine Research Reserves to fund a project that will improve our understanding of how tidal marsh will be impacted by climate change. The project will develop models that depict how and where changes in tidal marsh will occur in response to rising sea levels and extreme flood events, providing the finer-scale resolution needed to inform climate adaptation planning at the refuge scale.

**Phenology:** In California the National Phenology Network is collaborating with the National Park Service to implement and test USA_NPN plant protocols and to test methods for engaging park staff and local communities in phenological monitoring. This is a collaborative effort between NPS, NPN, the National Ecological Observatory Network, UC Santa Barbara, and USGS. The role of the R8 I&M team is to evaluate the projects’ future applicability to Refuges in R8.
**Invasives:** We participated in several wider efforts related to invasive plant control. First, we participated in a national pilot program to develop invasive plant adaptive management process with the National Invasive Species Program, USGS and Utah State University. The pilot is funded by the national program. We are developing an invasive plant prioritization process, conducting an inventory of priority species, and modeling habitat relationships and spread (geospatial niche modeling) for the pilot refuge. Second, we participated in Early Detection and Rapid Response (EDRR) Networks for invasive plants. By keeping current on regional invasive species issues and control techniques, I&M staff will improve our ability to assist refuges. This is an initial step toward refuge participation with EDRR Networks. Finally, we collaborated with the California Invasive Plant Council and other federal and state partners to develop "Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (2011)".

Using the National Water Team WRIA draft as a base, our hydrologist developed a WRIA work plan that will create a clear process for determination of threats and needs for refuge water resources (water quantity and quality) by utilizing available scientific data on climate change, water consumption and availability, and water quality within refuges and in a region of hydrologic influence to refuges; this workplan also calls for feasible analysis of existing data to hypothesis stressors to refuge water resources to help better define these threats and needs. When WRIAs are completed for each field station, I&M will be better able to assist refuges with developing management plans that help to mitigate or address these threats and needs.

**4.5 Adaptive Management Projects**

Region 8 I&M staff acquired skills in adaptive management and structured decision making (SDM) by completing coursework in SDM and decision-analysis modeling, participating in a decision-making workshop sponsored by the California LCC, and attending work sessions of an adaptive management project in Region 3. We also participated in the invasive plant pilot program described above that utilizes an adaptive management approach.

**4.6 Data Management**

Region 8 focused a majority of its data management efforts on cataloging refuge data. We initiated the legacy data project to leverage the existing data collection effort from WRIA and HGM projects. The project was then expanded through a Cooperative Ecosystem Studies Unit (CESU) agreement with UC Davis to develop a pilot project to further develop methods for cataloging, assigning keywords, archiving data and mining documents for useful data. Further assistance was provided through the National I&M Legacy Data Pilot project which provided two technicians to test additional methods for data cataloging. R8 I&M also funded a refuge specific project to catalog legacy data and convert data into existing data structures. The project has resulted in over 1000 documents being scanned and added to the GRAS database. These documents represent information from 11 different refuges and are only the beginning of what is available at the 11 refuges (Figure 3). The project will continue in FY 2012 and will help Region 8 prioritize refuges for data mining projects, provide information on different methods for cataloging data and archive important unique information resources from refuges.
Region 8 I&M staff is also supporting the Regional GIS Coordinator on the development and deployment of Data Space. Data Space is a system that will allow the region and refuges to efficiently share GIS data.

Region 8 I&M staff supported the national office development of databases. We reviewed and tested the PRIMR database in support of the national office. The regional I&M coordinator serves as the lead for a national team developing guidance for this database. Our hydrologist reviewed the WRIA database in support of the National Water Team, and developed an interim data storage and management system for hydrologic data gathered through the WRIA and HGM process in anticipation of release of the national WRIA database in FY2012. Hydrologic data from 4 pilot WRIA refuges has been stored and managed in this interim data system.

4.7 Communication
Communication with Refuges

Our communication priority as a new team was to listen and learn from our refuges. In the course of various projects in FY 2011, I&M staff visited refuges at 13 of 14 refuge complexes. At most of these visits, I&M staff members gave presentations to refuge staff on the new I&M program. I&M staff members also participated in one refuge review, and made comments on CCPs as requested by the Planning program. With the assistance of talented student interns, we created fact sheets on our program targeted at refuges and our partners. The chief of refuge operations launched a new BAC composed of refuge managers and biologists. The BAC began strategic planning for a regional biological program including I&M, and is giving I&M guidance on a FY 2012 effort to conduct a needs assessment for all refuges. The regional refuges biologist and I&M team led monthly conference calls with refuge biologists, and I&M biologists offered webinars led by experts on science and management relevant to refuges. We organized a Request for Proposals from refuges on high priority I&M topics, allocating $510,000 directly to this effort, and leveraging other resources to respond to as many proposals as possible; we received 50 proposals. This process allowed us to quickly identify and support refuge needs.

Partnerships

- Our first partnership has been with the California LCC, with which we are co-located, along with the U.S. Geological Survey. In FY 2011, we organized speakers of shared interest that provided monthly webinars, and jointly funded a project on sea level rise on multiple refuges. We also participated on the LCC informatics team.
- Our hydrologist formed a close partnership with the Region 1 water resources branch (Branch), introducing several refuges to resources available at the Branch, and worked closely with the Branch on WRIAs and water rights issues. A strong partnership was also developed with the National Water team to further WRIA databases and guidance documents.
- We formed partnerships in the form of CESU grant agreements with 3 universities covering data management, invasive species, water resources, biometrician support and vegetation mapping.
- The I&M program partnered with the Contaminants program to complete contaminants portions of WRIAs, and has made plans for further joint projects.
- We supported 2 student interns at the CSUS, where we are located as cooperators.
5. **Budget Narrative and Budget**

Region 8 I&M allocated $510,342 directly to refuges for refuge specific, high priority I&M projects (Tables 2, 4). The investment in refuge specific projects supported inventory and monitoring priorities, and provided valuable information on refuge inventory and monitoring needs. In addition, we developed five CESU agreements and one contract for a total of $423,097 to support regional and refuge priority projects. The CESU agreements provided access to specific expertise to support our goals of cataloging refuge information, assessing water resources, and providing refuges with biometrician support and strategic invasive species planning.

We took every opportunity to combine forces and accomplish multiple goals efficiently. For example, funds from several individual refuge projects and one of the CESU agreements produced a pilot project to perfect the evaluation and cataloging of legacy data on refuges by trying different processes at different refuges. Additional contract labor was applied to the project from the NRPC’s national pilot effort. Our project gave our new staff an opportunity to become familiar with the history and needs of individual refuges, while also supporting refuge desires to organize their information, and the requirements of the national effort. This project had the added benefits of supporting HGM and WRIA information collection needs. Additional funds we received from national WRIA funds and the contaminants program provided additional support to water focused projects (Tables 2, 3).

The sea level rise project described under Public Interest Highlights and in Table 3 exemplified our efforts to gain value through partnerships. Networking by I&M staff facilitated funding from the NRPC, two LCCs, the Science Applications Division of the Service, and U.S. Geological Survey, in addition to contributions from our regional I&M program. This partnership allowed expansion of the project to more refuges than would have been possible with a single source of funding (Table 3).

In FY 2011, salary costs of $666,000 included all I&M staff, and 75% of the salaries of the regional refuge biologist and the refuge operations chief (Table 2). We also paid a regional overhead fee of $80,903. Hiring employees and setting up a new office required equipment and supply funding levels that will not need to be repeated. These one-time costs included PCS moves and background investigations; furniture and equipment for the new office; field equipment and supplies; and costs related to new vehicles.
### Tables

#### Table 1. Region 8 Inventory and Monitoring Activities FY 2011

<table>
<thead>
<tr>
<th>Blueprint Objectives and Tasks</th>
<th>Project or Theme; Status and Accomplishments</th>
<th>Products and Activities</th>
<th>I&amp;M Staff</th>
<th>Funding</th>
<th>Status</th>
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<tbody>
<tr>
<td>4.1.1. and 4.1.2. STATUS OF STATION HABITAT MANAGEMENT PLANS AND I&amp;M PLANS</td>
<td>Establishment of HMPs and IMPs in Region 8</td>
<td>Reviewed other region HMP process and products. Information will be used to guide development of R8 HMPs.</td>
<td>Hejl</td>
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<tr>
<td>4.1.3. IDENTIFY I&amp;M PRIORITIES</td>
<td>Strategic Planning</td>
<td>Developed Draft 5 Year Strategic Plan</td>
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<td>IP</td>
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<tr>
<td>Task A</td>
<td></td>
<td>Developed long-term (5 year) strategic plan for the Region 8 I&amp;M program.</td>
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<tr>
<td>Task B</td>
<td>Communication with Refuge leadership</td>
<td>Provided Refuge leadership with reports on I&amp;M activities and projects. Attended meetings, conference calls, contacted all project leaders, visited 13 of the 14 refuge complexes; provided presentations on I&amp;M program at field stations, meetings</td>
<td>Laing Richmond Block Esralew Keller</td>
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<td>Project or Theme; Status and Accomplishments</td>
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| 4.2 ABIOTIC RESOURCES         | Support Hydrogeomorphologic (HGM) assessment projects on Bitter Creek, Ruby Lake, Ellicott Slough, San Luis, Kern, Pixley, Modoc and Stone Lakes NWRs | - Coordinated 6 HGM kick-off meetings with refuge staff and HGM contractors (Stone Lakes NWR kick-off will be in FY 2012)  
- Developed a 2011-12 HGM Work Plan describing strategies for supporting the completion of 7 HGM reports, integrating HGM data gathering with other I&M projects (e.g., legacy data/data mining and WRIAs) and assessing the utility of the final HGM reports (Figure 3)  
- Scanned 128 annual narratives and entered them into GRAS database  
- Scanned 460 historical documents and entered them into GRAS database  
- Obtained and organized 61 GB of digital data from refuges  
- Participated in 1 National HGM Team call  
- Contractor completed 3 HGM status reports (Bitter Creek, Ellicott Slough and Ruby Lake)  
- Provided comment and review of 3 HGM status reports  
- Completed Pahranagat NWR HGM funded by non-I&M Refuge funds. | Richmond  
Block  
Esralew  
Dulava  
Tapia | I       | F  
IP      |
<table>
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<tr>
<th>Blueprint Objectives and Tasks</th>
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<th>Status</th>
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| 2A                            | WRIA ranking and schedule                    | - Selected 5 pilot refuges for WRIAs for completion (draft report) by FY2012, based on prioritization/ranking process focused on efficiency  
- Initiated WRIAs on 4 refuges (See Figure 3)  
- Developed 2011-2012 Workplan describing strategies for completing pilot WRIAs, prioritizing/ranking future WRIAs, and completing basic level inventories for all refuges in support of WRIAs  
- Developed a CESU agreement with University of California Davis to provide resources and expertise to complete WRIAs | Esralew | I | F IP |
| 2A                            | WRIA national project                        | - Participated in 7 National WRIA Team calls and 2 WRIA Assessment Sub-team calls  
- Provided comment and review on draft WRIA database schema and subsequent fact sheets, white papers, and documents produced by the National WRIA Team  
- Obtained $25,000 in support funding for WRIAs from National I&M/National Water Team | Esralew | I O | IP |
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<tr>
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|                               | Water Quality and Quantity                  | • Developed a contract with WestWater Research to conduct pilot study and proposal development for updating water rights information in support of WRIAs  
• Obtained $18,790 in funding from FWS Region 8 Environmental Contaminants for completion of a Contaminant Assessment Process (CAP) for Kern and Pixley Refuges. CAPs are 95% completed through the process of completing a WRIA, so this funding supports WRIA completion.  
• Active member of planning team for National Association of Service Hydrologists (NASH) Fall Workshop  
• Active member of the National Water Sub-Team: Standards of Procedure for collection and processing of water quality and water quantity data collected by Regional FWS Water Programs  
• Initiated communication with the Central Valley Project Improvement Act (CVPIA) Refuge Water Supply staff (USFWS, USBR) to share refuge water supply information and discuss common goals and objectives between programs  
• Worked actively with Environmental Contaminants in support of water quality data collection/analysis, accessibility of water quality data from EC research, addressing TMDL issues, and long-term strategy for development of a water quality monitoring network for refuges  
• Worked actively with the Region 1 and 8 Water Resources Branch to and to discuss coordination and communication of refuge water needs (water rights, status and trends, and water quantity data collection) network. | Esralew | I O | IP |

<p>|                               |                               | Funding |
|                               |                               | I&amp;M &amp;M |
|                               |                               | Refuges |
|                               |                               | Other |
|                               |                               | Status |
|                               |                               | P=Planned |
|                               |                               | F=Funded |
|                               |                               | IP=In progress |
|                               |                               | C=Completed |</p>
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<tr>
<td><strong>I&amp;M Funded Refuge Specific Projects</strong></td>
<td><strong>ASH MEADOWS NATIONAL WILDLIFE REFUGE</strong></td>
<td>Inventory and Monitoring of Water Quality (Refuge-wide) and Restoration Sites in Ash Meadows National Wildlife Refuge</td>
<td>Refuge Staff</td>
<td>I</td>
<td>F, IP</td>
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<td>Inventory of moisture and salt distribution in soils and sediments that support threatened and endangered plants in the Ash Meadows National Wildlife Refuge</td>
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<tr>
<td></td>
<td><strong>SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE</strong></td>
<td>Soil Characterization for Waterfowl Wetlands and Fields</td>
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### 3.3.1. BIOTIC RESOURCES: INVENTORIES

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<thead>
<tr>
<th>1E</th>
<th>Vegetation Mapping</th>
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<tr>
<td>Assist the Division of Planning to prioritize refuges for vegetation mapping, and subsequently with the development of a contract for conducting vegetation surveys. The surveys will be used in the development of a vegetation map for 2 priority refuges in FY11 and continued in FY12 for a third Refuge. Summarize available regional scale vegetation datasets for refuges.</td>
<td>Prioritized list of refuges for vegetation mapping assistance - FY11 priority refuges were Anaho Island, Ruby Lake and Stillwater. Mapping and ground truthing of two priority refuge vegetation maps - A CESU agreement with University of Nevada Reno was developed for the vegetation surveys. The surveys will be completed at Anaho Island and Ruby Lake. The results from the surveys will be used to develop the National Vegetation Classification System (NVCS) types used in the maps developed by the Planning Div. - Planning Div. will be a partner on the project and will complete the polygon development and attribution. - Anaho Island and Ruby Lake were funded with FY11 funds. Stillwater is scheduled to be funded in FY12. Vegetation Summary Report - There are many different regional scale vegetation datasets available for California and Nevada. Summary tables were developed for California Central Valley Refuges based on regional data (1874, 1945, 1960, 1990).</td>
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<tr>
<td>Blueprint Objectives and Tasks</td>
<td>Project or Theme; Status and Accomplishments</td>
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</table>
| 3.3.2. BIOTIC RESOURCES: MONITORING | Review bird monitoring efforts and tools | - Developed a database of 55 partner organizations that are involved in bird monitoring in Region 8  
- Identified 53 national and regional bird conservation plans that encompass refuges in Region 8  
- Identified 16 standardized bird monitoring protocols and entered them in GRAS  
- Participated in 3 National I&M Bird Team calls | Richmond | I | IP |
| 4C Improve existing bird monitoring efforts | Conduct pilot projects with Refuges and Refuge partners to support and improve ongoing bird monitoring efforts by promoting standardized protocols and up-to-date technology. | - Coordinated 3 meetings of San Francisco Bay partners to develop improved marsh bird monitoring protocol based on North American Marsh Bird Monitoring Protocols (Conway 2009)  
- Completed draft San Francisco Bay Marsh Bird Monitoring Protocol (pilot year 2012)  
- Coordinated a meeting of Central Valley and San Francisco Bay waterfowl biologists to develop strategies for improving the Mid-Winter Waterfowl Survey in San Francisco Bay  
- Tested GPS system for collecting detailed spatial information during Mid-Winter Survey | Richmond | I | IP |
| 4C Support ongoing biotic monitoring | Assist refuges with ongoing biotic monitoring and participate in national or regional monitoring programs. | - Assisted Refuges with ongoing biotic monitoring for the following taxa: amphibians, butterflies, endangered plants, secretive marsh birds, shorebirds, small mammals and vernal pool invertebrates.  
- Participated in national and regional bird monitoring efforts, including the Breeding Bird Survey (BBS), Mid-Winter Waterfowl Survey, Pacific Flyway Shorebird Survey and Tri-colored Blackbird Survey. | Richmond | I | IP |
<table>
<thead>
<tr>
<th>Blueprint Objectives and Tasks</th>
<th>Project or Theme; Status and Accomplishments</th>
<th>Products and Activities</th>
<th>I&amp;M Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;M Funded Refuge Specific Projects</td>
<td>ANAHO ISLAND NATIONAL WILDLIFE REFUGE</td>
<td>Assessing the relative importance of cui-ui (an endangered fish species) to American White Pelican reproductive success on Anaho Island NWR using recovered fish tags.</td>
<td>Refuge Staff</td>
</tr>
<tr>
<td>BITTER CREEK NATIONAL WILDLIFE REFUGE</td>
<td>Development of a Grazing Management Plan</td>
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<tr>
<td>DESERT NATIONAL WILDLIFE RANGE</td>
<td>Augmenting a Study on Survival and Habitat Requirements of Desert Bighorn Sheep in the Sheep Range of the Desert NWR</td>
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<tr>
<td>DON EDWARDS SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE</td>
<td>Synthesizing Legacy Waterbird Nesting Data to Inform Adaptive Management of Wetlands on the Don Edwards San Francisco Bay National Wildlife Refuge</td>
<td></td>
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<tr>
<td>FARALLON NATIONAL WILDLIFE REFUGE</td>
<td>Abundance and Distribution of Arboreal Salamanders (Aneides lugubris) on the Farallon Islands</td>
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<tr>
<td>HUMBOLDT BAY NATIONAL WILDLIFE REFUGE</td>
<td>Waterbird abundance in relation to vegetation characteristics and management regimes at Humboldt Bay National Wildlife Refuge</td>
<td></td>
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</tr>
<tr>
<td>TULE LAKE NATIONAL WILDLIFE REFUGE</td>
<td>Evaluating migratory wetland bird response to water delivery and habitat management alternatives on Tule Lake and Lower Klamath National Wildlife Refuges</td>
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<tr>
<td>Funding</td>
<td>I=M I&amp; Refuges R=Refuges O=Other</td>
<td>Status</td>
<td>P=Planned F=Funded IP=In progress C=Completed</td>
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<tr>
<th>Blueprint Objectives and Tasks</th>
<th>Project or Theme; Status and Accomplishments</th>
<th>Products and Activities</th>
<th>I&amp;M Staff</th>
<th>Funding</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>3.4. STRESSORS: CLIMATE CHANGE</td>
<td><strong>Coastal Sea Level Rise (SLR) Modeling</strong>&lt;br&gt;Identify and collaborate with national and regional working groups, LCCs, local, State, and Federal agencies and non-governmental organizations to evaluate the extent of SLR modeling efforts (e.g., SLAMM, SET), their usefulness to refuges, future needs, and potential alternatives.</td>
<td>Report on efforts to predict and measure SLR in Region 8: identification of current state of the technology, field data collection needs, and modeling needs.&lt;br&gt;SLAMM modeling (Sea level Affecting Marshes Model) is complete for all coastal refuges except Humboldt Bay NWR. SLAMM models provide insight into the magnitude of change but lack the resolution needed to inform management decisions at a local scale.&lt;br&gt;High resolution SLR modeling of coastal tidal marsh was coordinated for 3 coastal refuges in the San Diego NWR Complex through partnerships between the R8 I&amp;M Program, San Diego NWR Complex, USFWS Science Division, California LCC, USGS, and the National Estuarine Research Reserve. An additional $245K was attained for these projects.&lt;br&gt;Previous high resolutions SLR modeling of tidal marsh for San Pablo Bay NWR is being expanded into tidal mudflats and adjacent uplands under same partnerships above.&lt;br&gt;High resolution SLR modeling of a tidal marsh parcel at Humboldt Bay NWR was initiated. This project is a partnership between USGS, the North Pacific LCC, and Humboldt Bay NWR as a result of coordination between I&amp;M and several partners during spring 2011. An additional 28K was attained for this project from the North Pacific LCC.&lt;br&gt;A report summarizing these efforts will be completed in FY12012.</td>
<td>Block</td>
<td>I &amp; M Refuges Other</td>
<td>P=Planned F=Funded O=Other IP=In progress C=Completed</td>
</tr>
<tr>
<td>I&amp;M Funded Refuge Specific Projects</td>
<td><strong>HUMBOLDT BAY NATIONAL WILDLIFE REFUGE</strong>&lt;br&gt;Responding to climate change at a coastal refuge: synthesizing 25 years of historical ecological data and filling data gaps to steer management towards increased ecosystem resiliency.</td>
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</table>
### 4B Evaluate the CA Plant Phenology Project

In California the National Phenology Network (NPN) is collaborating with the National Park Service to implement and test U.S.A. NPN plant protocols and to test methods for engaging park staff and local communities in phenological monitoring. This is a collaborative effort between NPS, NPN, the National Ecological Observatory Network, UC Santa Barbara, and USGS. The role of the R8 I&M team will be to evaluate the Projects’ future applicability to Refuges in R8.

**Products and Activities**

- Tracked the progress of the CA Phenology project in R8.
  - Pilot is being conducted at 6 NPS parks in CA
  - Attended a meeting where NPS botanists selected focal plant species and developed phenophase descriptions
  - Attended a workshop for the Golden Gate National Recreation Area during June 2011: overview of plant phenology and significance to climate change, training on use of the NPN protocol, and data management via the NPN Network internet portal. Sites for monitoring were identified
  - To date NPS units vary widely in the level of participation, resources, and program involvement (e.g., I&M, visitor services). Of concern by park managers is the usefulness of this data to current management. Final products expected in 2013

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### 3.4. STRESSORS: INVASIVE SPECIES

#### 3A Develop Invasive Plant Adaptive Management Process: Pilot Project

Conduct a pilot project in a Region 8 refuge in partnership with the National Invasive Species Program, USGS and Utah State University. The pilot is funded by the NRPC. We will develop an invasive plant prioritization process, conduct an inventory of priority species, and model habitat relationships and spread (geospatial niche modeling).

**Products and Activities**

- Participated in a national team examining methods for prioritizing and conducting invasive plant inventories on NWRs in four regions.
- Invasive plant assessment workshops and inventories began in May 2011 and are completed at Quivira NWR, Alligator River NWR, and Silvio O. Conte NFWR. The prioritization workshop for San Diego NWR occurred in September 2011 and inventory of priority species will occur during spring 2012.
- Risk occurrence modeling for 1-2 priority species at the refuge and larger landscape scale is underway for 3 of the 4 pilot refuges. Modeling will occur for the final pilot refuge (San Diego) during summer 2012.
- Established a CESU Agreement with Utah State University to develop tools for assessing invasive plant threats on refuge lands.
- A report summarizing FY2011 efforts will be prepared in FY2012

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## 3A Early Detection Networks

Identify and participate in Early Detection and Rapid Response (EDRR) Networks for invasive plants. EDRR increases the likelihood that localized invasive populations will be found, contained, and eradicated before they become widely established and cause environmental harm. EDRR can slow range expansion and avoid the need for costly long-term control efforts. By keeping current on regional invasive species issues and control techniques, I&M staff will improve our ability to assist refuges. This is an initial step toward refuge participation with EDRR Networks.

- Participated in the Bay Area Early Detection Network as a Steering Committee member – funding, products development and review, staff hiring.
- Provided review of CA Invasive Plant Council draft climate modeling tool for highly invasive plants in CA - “Statewide Risk Mapping for Early Detection in CA”.
- Partnered with the California LCC to support the 20th annual CA Invasive Plant Council Symposium. Provided registrations for refuge staff attendance.

## I&M Funded Refuge Specific Projects

### MODOC NATIONAL WILDLIFE REFUGE

- **Modoc NWR Invasive Weed Baseline Inventory**

## 3.5. ADAPTIVE MANAGEMENT PROJECTS

### 1F Initiate analysis of existing refuge I&M data to exemplify use of monitoring data to implement adaptive management in a Refuge habitat management program.

Initiate an adaptive management pilot: analysis of existing refuge I&M data that supports adaptive management. The pilot will focus on control of *Lepidium latifolium* in tidal marshes of San Pablo Bay.

- Initial analysis of pre- and post-treatment data
- Develop a CESU agreement to provide biometrician support for analysis of refuge data and design of monitoring activities.

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<td>Block Keller</td>
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</table>
### 3.6. DATA MANAGEMENT

#### Task A: Refuge Data Inventory Plan (RDIP)

Develop a plan outlining the steps involved in inventorying refuge resources and developing strategies for tracking the inventory data. This project will incorporate step-down plans for abiotic datasets, priority biological resources, invasive species, WRJA and HGM projects. It will contribute to the development of individual refuge Inventory and Monitoring Plans (IMPs). We will also begin to implement the RDIP by assembling information from Comprehensive Conservation Plans (CCPs), Habitat Management Plans (HMPs) and other priority sources.

First draft of RDIP
- Summary tables generated from identified datasets
  - Summary tables for Baileys Ecoregions, TNC Ecoregions, Critical Habitat, California Natural Diversity Database (CNDDB), and various CA vegetation datasets have been identified and summarized for each Refuge covered by the dataset.
  - Testing of the PRIMR database was conducted at Stone Lakes, Ellicot Slough, Antioch Dunes and San Pablo Bay Refuges
  - Gained valuable insight on data on refuges and will use this information for re-evaluation on the RDIP process.

Catalog of CCP and HMP data according to RDIP
- CCP goals and Objectives have been entered into PRIMR for 26 of the 50 NWR and WMA sites in R8. 20 of the NWRS did not have final CCP documents. The 4 WMA did not have available management plans
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<th>Blueprint Objectives and Tasks</th>
<th>Project or Theme; Status and Accomplishments</th>
<th>Products and Activities</th>
<th>I&amp;M Staff</th>
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<tr>
<td>Legacy Data Project</td>
<td>Catalog existing Refuge data using the GRAS tool developed by the NRPC.</td>
<td>Used existing data gathering efforts to populate GRAS database. - Used HGM and WRIA efforts at Ruby Lake, Bitter Creek, Ellicot Slough, Stone Lakes, Kern, Pixley, Modoc, and Merced to test and capture Refuge data related to historic ecology and water resources. (See HGM and WRIA sections for further details) Developed a pilot project for testing methods of identification of refuge datasets, cataloging and developing long-term archival options - Developed CESU agreement with UC Davis to assist in development and implementation of pilot projects at Modoc and Stone Lakes Participated in National I&amp;M pilot project for the implementation of GRAS at Refuges - Captured 335 documents at Stillwater NWR (3 R8 staff and 2 National program technicians) - Continue project at Don Edwards NWR</td>
<td>Keller Esralew Richmond</td>
<td>I</td>
</tr>
<tr>
<td>I&amp;M Funded Refuge Specific Projects</td>
<td>SAN DIEGO NATIONAL WILDLIFE REFUGE</td>
<td>Digital Inventory and Accessibility of Legacy Data for the San Diego National Wildlife Refuge</td>
<td>Refuge Staff Keller</td>
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<td>Blueprint</td>
<td>Project or Theme; Status and Accomplishments</td>
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<tr>
<td><strong>1A</strong></td>
<td>Assemble Abiotic Data</td>
<td>First draft of the abiotic data collection plan for RDIP</td>
<td>Keller, Dulava McDonald Tapia</td>
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<td></td>
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<td>Catalog of identified datasets using GRAS database</td>
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<td>- Gathered over 600 references during HGM and WRIA visits to Refuges have been entered into the GRAS database.</td>
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<td></td>
<td>Generated Summary tables from identified datasets</td>
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<td></td>
<td></td>
<td>- Summary tables for National Hydrography Dataset, Irrigation Districts, Aquifers, CA flood districts, Reclamation Districts, USGS Quad Index and available LiDAR were identified and summarized for each Refuged covered by the dataset.</td>
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<td>Developed pilot WRIA data storage system (in advance of completion of national database) that intersects water quality, quantity, and water rights data from other state and federal databases as well as FWS databases (ECDMS, WISKI, WREN, Region 1 Project Directory) to improve access to complex hydrologic information from multiple sources that are critical to characterizing refuge water resources.</td>
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<tr>
<td><strong>DM3</strong></td>
<td>Database Development</td>
<td>Contributed to national data manager team projects</td>
<td>Keller</td>
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<td></td>
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<td>- Reviewed and Test PRIMR database</td>
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<td>- Reviewed, Tested and implemented GRAS database</td>
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<td>- Provided NRPC with feedback on database structure</td>
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<td><strong>DM5</strong></td>
<td>Refuge I&amp;M Reviews Database (PRIMR)</td>
<td>Population of PRIMR with information from one refuge as a pilot</td>
<td>Keller Laing</td>
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<td>- Populated PRIMR database with information from 26 CCPs</td>
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<td>- Tested database with Ellicot Slough, Antioch Dunes, San Pablo Bay and Stone Lakes NWR</td>
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<td>Comments to NRPC on PRIMR based on pilot</td>
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<td>- R8 is leading PRIMR Guidance Document Team’s review of domains and IMP content</td>
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<td>Blueprint Objectives and Tasks</td>
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| DM7                           | **I&M Data Standards and Governance teams**   | Contributed to national I&M Data Standards and Data Governance guidelines.  
- Active participation in the Legacy Data implementation sub-team. Provided information from R8 pilot project efforts. Worked with other team members to develop guidance for legacy data collection.  
Coordinated with Regional GIS coordinator on issues about data management and data sharing in the Region.  
- Participated in Regional data sharing efforts  
- Collected regional datasets to share with other regional staff using data sharing tools  
- Shared information about national I&M efforts with Regional coordinator. | Keller | I | IP |


### 3.7. COMMUNICATION

**General Task C**

**Establish dialogue with refuge staff**

Educate refuge staff about I&M program; include refuges in planning process; learn about refuge needs

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<thead>
<tr>
<th>Products and Activities</th>
<th>I&amp;M Staff</th>
<th>Funding</th>
<th>Status</th>
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<tbody>
<tr>
<td>Coordinated monthly conference calls with refuge biologists</td>
<td>Damberg</td>
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<tr>
<td>Provided information about I&amp;M program at Project Leader meetings and at field station visits</td>
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<td>Attended refuge staff presentations to educate I&amp;M staff about refuges</td>
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<tr>
<td>Queried Project Leaders re: how to be involved in I&amp;M planning</td>
<td>Richmond</td>
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<td>Developed Fact Sheet for R8 I&amp;M Program</td>
<td>Esralew</td>
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<td>Visited staff at refuges at 13 of 14 refuge complexes in the region</td>
<td>Keller</td>
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<tr>
<td>Participated in the development of the BAC</td>
<td>Hejl</td>
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<tr>
<td>Contributed to the development of the R8 Biological Program strategic plan.</td>
<td>McDonald</td>
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<tr>
<td>Two I&amp;M staff stationed at Don Edwards NWR</td>
<td>Dulava</td>
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<tr>
<td>Participated in the Stillwater NWR Refuge Review</td>
<td>Tapia</td>
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<td>Blueprint Objectives and Tasks</td>
<td>Project or Theme; Status and Accomplishments</td>
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<td>1F</td>
<td>Pilot “Bio Brown Bag Lunch” at Don Edwards San Francisco Bay Refuge</td>
<td>Five meetings at Don Edwards; broadcast invited speakers via webinar so that staff at other refuges can attend some sessions.</td>
<td>Richmond</td>
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</table>
|                               | Initiate a pilot biology discussion and speaker series at Don Edwards that will provide support to refuge biologists in designing monitoring and adaptive management studies, analyzing data and interpreting results. Coordinate invited speakers and discuss current and relevant scientific literature. | - 26-Jan-11; Speaker: Brian Alfaro, masters student at Cal State East Bay. Talk: “Perennial pepperweed (Lepidium latifolium) and its seasonal effects on ecotone marshland vegetation in South San Francisco Bay”  
- 23-Feb-11; Speaker: Phil Greer of Wetlands Research Associates; Talk: “2010 biological monitoring results for vernal pools at Pacific Commons”  
- 20-Apr-11; Speaker: David Thomson; Talk: “Strategies for restoring tidal marsh ecosystems in the South San Francisco Bay”  
- 29-Jun-11; Speaker: Cynthia Powell, California Invasive Plant Council; Talk: “Invasive plant species mapping project in California”  
- 14-Sep-11; Speaker: Brian Alfaro, masters student at Cal State East Bay; Talk: “Update on perennial pepperweed mapping project in South San Francisco Bay” | | |
| General Task C                | Partnerships                                   | Completed co-location of new offices with California LCC; developed draft agreement to define working relations  
Initiated joint project with California LCC  
- Sea level rise project  
Contributed to the California LCC Informatics Team  
- Participated in California LCC Informatics Team 2 day Workshop  
Worked with Great Basin and Desert LCCs as they develop (in FY 2011, these LCCs are still being formed). | Damberg Laing Block Richmond Esralew Keller Hejl | I | IP |
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<tr>
<th>Blueprint Objectives and Tasks</th>
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</table>
| DM9                            | **Partnerships**                            | Developed working agreements with USGS  
  - Developed agreement to co-locate with USGS and California LCC and collaborate on projects.  
  - Developed agreement for USGS IT services.  
Developed partnerships with Universities for collaboration and expertise necessary to support I&M projects in R8  
  - Developed 5 CESU agreements with 3 Universities. The topics covered include biostatistical analysis, legacy data and archiving, WRIA support, vegetation inventory and mapping, and invasive species inventory  
Developed working partnership with FWS Region 8 Environmental Contaminants about water quality data analysis for Refuges and field stations.  
Developed working partnership with FWS Region 1 / Region 8 Water Resources Branch for coordination and communication of refuge water needs.  
Began multiple partnerships to address migratory bird issues. (See 4.3) | Damberg Laing Block Richmond Esralew Keller Hejl | I | IP |
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<tr>
<td>DM9</td>
<td>Work with government agencies and non-profit partners to develop new secretive marsh bird monitoring protocol in San Francisco Bay</td>
<td>Met with representatives from the California Department of Fish and Game, East Bay Regional Parks District, Invasive Spartina Project, Point Reyes Observatory and U.S. Geological Survey over five months to develop a new secretive marsh bird survey protocol for San Francisco Bay</td>
<td>Richmond</td>
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Table 2: FY2011 Region 8 I&M Budget

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<thead>
<tr>
<th>FY 2011 Region 8 I&amp;M Budget</th>
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<tbody>
<tr>
<td>FY2011 Allocation</td>
<td>$1,918,965.00</td>
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<tr>
<td>National WRIA funds to R8</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>National Contaminants funds to R8</td>
<td>$18,790.00</td>
</tr>
<tr>
<td>Total funds available</td>
<td>$1,962,755.00</td>
</tr>
<tr>
<td>Salaries *</td>
<td>$666,288.00</td>
</tr>
<tr>
<td>PCS Moves, Background Checks</td>
<td>$113,345.00</td>
</tr>
<tr>
<td>Office and field equipment</td>
<td>$97,124.00</td>
</tr>
<tr>
<td>Supplies, vehicles, phones (est.)</td>
<td>$45,000.00</td>
</tr>
<tr>
<td>Regional overhead</td>
<td>$80,903.00</td>
</tr>
<tr>
<td>Refuge projects</td>
<td>$510,342.00</td>
</tr>
<tr>
<td>Contracts, agreements</td>
<td>$423,097.00</td>
</tr>
<tr>
<td><strong>Total funds spent</strong></td>
<td><strong>$1,936,099.00</strong></td>
</tr>
</tbody>
</table>

*Includes 75% of the salaries of the regional refuge biologist and the refuge operations chief
Table 3: Additional funds provided through partnerships

<table>
<thead>
<tr>
<th>Project</th>
<th>Partners</th>
<th>Funds Leveraged</th>
<th>Funding Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal Sea Level Rise Modeling</td>
<td>California LCC, North Pacific LCC, USGS, USFWS Science Division (R8), Tijuana Slough National Estuarine Research Reserve, NRPC</td>
<td>$250,332</td>
<td>All funds used in Region 8: Seal Beach NWR, Tijuana Slough NWR, San Diego Bay NWR, San Pablo Bay NWR, Humboldt Bay NWR</td>
</tr>
<tr>
<td>NWRS Invasive Plant Pilot Study</td>
<td>NRPC, USFWS National Invasives Program</td>
<td>$260,000</td>
<td>One of four pilot sites in Region 8 (San Diego NWR)</td>
</tr>
<tr>
<td>Contaminant Assessment Process (CAP) for Kern and Pixley NWRs*</td>
<td>Region 8 Contaminants Program</td>
<td>$18,790</td>
<td>CAPs are 95% completed through WRIA, so this funding also supports WRIA completion.</td>
</tr>
<tr>
<td>WRIA Support*</td>
<td>National I&amp;M / National Water Team</td>
<td>$25,000</td>
<td>Provided additional funds for CESU agreement with UC Davis to support completion of WRIAs</td>
</tr>
</tbody>
</table>

*These funds were distributed through R8 I&M and so they are included in Table1.
<table>
<thead>
<tr>
<th>National Wildlife Refuge</th>
<th>Project Title</th>
<th>Award</th>
<th>Funding Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANAHO ISLAND NATIONAL WILDLIFE REFUGE</td>
<td>Assessing the relative importance of cui-ui (an endangered fish species) to American White Pelican reproductive success on Anaho Island NWR using recovered fish tags.</td>
<td>$35,000</td>
<td>FY11</td>
</tr>
<tr>
<td>ASH MEADOWS NATIONAL WILDLIFE REFUGE</td>
<td>Inventory and Monitoring of Water Quality (Refuge-wide) and Restoration Sites in Ash Meadows National Wildlife Refuge</td>
<td>$80,000</td>
<td>FY11</td>
</tr>
<tr>
<td>ASH MEADOWS NATIONAL WILDLIFE REFUGE</td>
<td>Inventory of moisture and salt distribution in soils and sediments that support threatened and endangered plants in the Ash Meadows National Wildlife Refuge</td>
<td>$29,900</td>
<td>FY11</td>
</tr>
<tr>
<td>DESERT NATIONAL WILDLIFE REFUGE</td>
<td>Augmenting a Study on Survival and Habitat Requirements of Desert Bighorn Sheep in the Sheep Range of the Desert NWR</td>
<td>$80,000</td>
<td>FY11</td>
</tr>
<tr>
<td>DESERT NATIONAL WILDLIFE REFUGE</td>
<td>Retrospective Analysis of Vegetation Change in the Desert National Wildlife Refuge: Informing Wildlife Management Plans and Climate Change Monitoring</td>
<td>$37,838</td>
<td>FY11</td>
</tr>
<tr>
<td>DON EDWARDS SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE</td>
<td>Historical Salt Pond Waterbird Survey Data: Baseline Information to Inform Adaptive Management of the South Bay Salt Pond Restoration Project and the Don Edwards San Francisco Bay National Wildlife Refuge</td>
<td>$15,400</td>
<td>FY11</td>
</tr>
<tr>
<td>FARALLON NATIONAL WILDLIFE REFUGE</td>
<td>Abundance and Distribution of Arboreal Salamanders (Aneides lugubris) on the Farallon Islands</td>
<td>$21,000</td>
<td>FY11</td>
</tr>
<tr>
<td>HUMBOLDT BAY NATIONAL WILDLIFE REFUGE</td>
<td>Responding to climate change at a coastal refuge: synthesizing 25 years of historical ecological data and filling data gaps to steer management towards increased ecosystem resiliency.</td>
<td>$40,000</td>
<td>FY11</td>
</tr>
<tr>
<td>HUMBOLDT BAY NATIONAL WILDLIFE REFUGE</td>
<td>Waterbird abundance in relation to vegetation characteristics and management regimes at Humboldt Bay National Wildlife Refuge</td>
<td>$14,294</td>
<td>FY11</td>
</tr>
<tr>
<td>KLAMATH MARSH NATIONAL WILDLIFE REFUGE</td>
<td>Evaluating migratory wetland bird response to water delivery and habitat management alternatives on Tule Lake and Lower Klamath National Wildlife Refuges</td>
<td>$58,330</td>
<td>FY11</td>
</tr>
<tr>
<td>MODOC NATIONAL WILDLIFE REFUGE</td>
<td>Modoc NWR Invasive Weed Baseline Inventory Proposal</td>
<td>$16,000</td>
<td>FY11</td>
</tr>
<tr>
<td>SAN DIEGO NATIONAL WILDLIFE REFUGE</td>
<td>Digital Inventory and Accessibility of Legacy Data for the San Diego National Wildlife Refuge</td>
<td>$40,000</td>
<td>FY11</td>
</tr>
<tr>
<td>SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE</td>
<td>Soil Characterization for Waterfowl Wetlands and Fields</td>
<td>$12,580</td>
<td>FY11</td>
</tr>
<tr>
<td>SACRAMENTO NATIONAL WILDLIFE REFUGE COMPLEX</td>
<td>Hopper Mountain Grasslands Management Plan</td>
<td>$30,000</td>
<td>FY11</td>
</tr>
</tbody>
</table>
Figure 1. Draft Organizational Chart for Region 8 NWRS Inventory and Monitoring Program
Figure 2: Region 8 National Wildlife Refuges and Landscape Conservation Cooperatives

Legend
- National Wildlife Refuges
- California LCC
- Desert LCC
- Great Basin LCC
- North Pacific LCC

[Map showing the locations of various refuges and LCCs across the region]
Figure 3: Region 8 Inventory & Monitoring Program Hydrogeomorphic Method Analysis, Water Resource Inventory & Assessments and Legacy Data 2011 - 2012

Legend
- HGM
- HGM / WRIA
- Legacy Data / HGM / WRIA
- Legacy Data
- Refuge Stations
Figure 4: Region 8 Inventory & Monitoring Program FY11 Funded Projects and Additional Funding Provided Through Leveraging Funds and Partnerships
Appendix 1

Appendix 1. Staff Profiles

Karen Laing

Position: Regional Coordinator, NWRS Inventory and Monitoring Program, Region 8

Location: 3020 State University Drive, East
Modoc Hall, Suite 2007
Sacramento, CA 95819

Phone: (916) 278-9425 (after 17 February 2011)

Email: Karen_laing@fws.gov

Education:
M.S. Animal Ecology, University of California, Davis, Davis, California
B.S. Biology, The Evergreen State College, Olympia, Washington
B.A. Art History, Stanford University, Stanford, California

Primary responsibilities/Activities: I lead the Region 8 NWRS I&M Program under the guidance of the Chief of Refuge Operations (Carol Damberg) and the Chief, Refuges (Marge Kolar), and in cooperation with our Regional Refuge Biologist (Sallie Hejl). I coordinate inventory and monitoring activities on national wildlife refuges in U.S. Fish and Wildlife Service Region 8, in cooperation with the Landscape Conservation Cooperatives and the national Inventory and Monitoring Program office. My position includes addressing biological monitoring and adaptive management needs at multiple spatial scales, and providing guidance and oversight regarding the use of standardized monitoring protocols and databases. I supervise inventory and monitoring scientists and administrative staff, and work cooperatively with Project Leaders and field inventory and monitoring biologists at field stations.

Areas of Expertise:
Avian population dynamics
Conservation biology
Migratory Bird Treaty Act and Endangered Species Act implementation

Active Projects: Short and long term planning for the Region 8 I&M Program
Guiding the implementation of a new program with new staff in a new office

Selected Publications:


Sallie Hejl

Position: Regional Refuge Biologist, Region 8

Location:
1624 Hood Franklin Road
Elk Grove, CA 95757

Phone: (916) 943-6662

Email: Sallie_Hejl@fws.gov

Education:
PhD. Zoology. Northern Arizona University, Flagstaff, Arizona
M.A. Zoology, University of California, Davis, Davis, California
B.S. Environmental Education, University of California, Davis, Davis, California

Primary responsibilities/Activities: I lead the Region 8 NWRS Biological Program under the guidance of the Chief of Refuge Operations (Carol Damberg) and the Chief, Refuges (Marge Kolar) and in cooperation with Region 8’s Inventory and Monitoring Coordinator (Karen Laing). I provide biological expertise and support to Pacific Southwest refuges. This work includes developing and coordinating workshops and monthly phone calls for refuge biologists, providing input to Comprehensive Conservation Plan (CCP) development, leading habitat management reviews, and reviewing refuge documents such as CCP planning documents. I also serve as an active member of the National Refuge Biological Leadership Team (NRBLT), which promotes innovative resource management, cooperation, coordination, and consistency across regions in the collection, analysis, review, and application of biological information for management of the National Wildlife Refuge System. The team provides leadership in the science of resource management to meet NWRS commitments to address conservation of fish, wildlife, and plants and their habitats; ensure that the biological integrity, diversity, and environmental health of the System are maintained; and monitor the status and trends of fish, wildlife, and plants in each refuge. I am the Invasive Species Coordinator for Region 8, which entails keeping abreast of and sharing information on invasive species issues, reviewing grant proposals at regional and national levels, and working with refuges to develop strategic methods to combat invasive species. I also provide input to other USFWS programs, including reviewing listing decisions for endangered species and being a member of the Science Advisory Team for the California LCC.

Areas of Expertise:
Avian ecology
Wildlife-habitat relationships
Conservation biology

Active Projects: Conducting Habitat Management Reviews for Bitter Creek NWR, Blue Ridge NWR, and Hopper Mountain NWR

Selected Publications:


Kaylene E. Keller

**Position:** Ecologist / GIS and Data Manager (Inventory & Monitoring)

**Location:** 3020 State University Drive, East
Modoc Hall, Suite 2007
Sacramento, CA 95819

**Phone:** 916-278-9419

**Email:** Kaylene_Keller@fws.gov

**Education:**
Ph.D. Ecology, University of California, Davis
B.S. Environmental Biology and Management, University of California, Davis

**Primary responsibilities / Activities:**
Coordinate and develop GIS and data management tools for Region 8 Inventory and Monitoring Program. Develop spatial analysis to meet monitoring program goals. Coordinate inventory of data and implementation of data management plan.

**Areas of Expertise:**
Watershed analysis
GIS, spatial analysis, modeling
Data management
Decision analysis and adaptive management
Conservation Biology

**Active Projects:**
Capture and cataloging of Refuge legacy data
Vegetation Mapping
Testing available databases for the capture and storage of Refuge data
Identify data needs and recommend solutions to meet needs
Summarize available data and provide information to I&M program

**Selected Publications**
Giselle Block

Position: Inventory and Monitoring Specialist

Location:
Sacramento State University
Sacramento, CA

Phone: 916-531-6546

Email: Giselle_block@fws.gov

Education:
M.S. Wildlife and Fisheries Management – University of Arizona, Tucson
B.S. Biology – University of California, Berkeley

Primary responsibilities/Activities: My work will include building conservation partnerships at multiple scales to advance information exchange and translation, identify data gaps and needs, avoid duplication of efforts, and increase our capacity to gather and apply scientifically credible data that supports refuge management and contributes to conservation at larger spatial scales. I will be working with individual refuges to catalogue past and present inventory and monitoring information and identify needs (e.g., data, analysis, protocols) that will support adaptive management of refuge resources, especially relative to environmental stressors (e.g., fire, invasive species, climate change). Technical aspects of my duties will include use of conceptual models, structured decision making and other tools to identify critical I&M needs; assist refuges with development of I&M plans; developing and reviewing survey protocols and sampling designs; planning and delivering training, and assisting with I&M data collection and management, analysis, interpretation, and reporting.

Areas of Expertise:
Invasive species ecology and management
Wetland restoration and enhancement
Monitoring program development
Estuarine ecology
Small mammal ecology

Active Projects:
• Spatial ecology and control of Lepidium latifolium in tidal marsh environments; development of invasive plant early detection networks; invasive plant prioritization methods; ecology of the endangered salt marsh harvest mouse (Reithrodontomys raviventris); vulnerability of salt marsh harvest mice to extreme weather events as a result of climate change.

Selected Reports and Publications


Orien Richmond

Position:  Wildlife Biologist (Inventory and Monitoring)

Location:
Don Edwards San Francisco Bay National Wildlife Refuge
Newark, CA

Phone: (510) 792-0222 x144

Email: orien_richmond@fws.gov

Education:
Ph.D. Environmental Science, Policy & Management – University of California, Berkeley
M.S. Earth Systems – Stanford University, Stanford, California
B.S. Earth Systems – Stanford University, Stanford, California

Primary responsibilities/Activities:  My primary roles on the R8 I&M team are to lead the Bird Monitoring task and to co-lead the Hydrogeomorphic Analysis (HGM) task. For bird monitoring, I conduct reviews of existing bird monitoring programs and protocols, both within refuges and across other divisions and organizations, to identify gaps in knowledge, species of concern and potential partners. I also participate on the national I&M bird monitoring team, pilot databases for storing bird monitoring data and develop biological study proposals, survey designs and scopes-of-work. For the HGM task, I support our HGM contractor in collecting and storing data, test pilot databases for HGM-related abiotic and/or legacy data and participate on the national I&M HGM team. I provide leadership within the San Francisco Bay National Wildlife Refuge Complex regarding adaptive management by coordinating a monthly “Bio Brown Bag Lunch” series to support refuge biologists in designing monitoring studies, analyzing data and using results to inform management. In this role I review survey protocols and sampling designs, coordinate invited speakers and facilitate discussions of current and relevant scientific literature. Finally, I analyze existing monitoring datasets using quantitative models (e.g., occupancy models) to test scientific hypotheses about species-habitat relationships and species interactions (e.g., associations between small mammals and habitat characteristics, and competitive interactions between small mammal species).

Areas of Expertise:
Occupancy and wildlife-habitat relationship modeling
GIS and remote sensing
Conservation biology
Marsh birds

Active Projects:
(1) Identify and catalog bird monitoring programs and protocols and support/improve existing bird monitoring efforts in R8;
(2) Support data collection, test data storage tools and coordinate with contractors and refuges for 4 refuge hydrogeomorphic analyses (HGMs); and
(3) Lead and coordinate monthly “Bio Brown Bag Lunch” series to support adaptive management and facilitate communication between biologists and managers.
Selected Publications:


Rachel Esralew

Position: Hydrologist (Inventory and Monitoring)

Location:
California State University, Sacramento, California

Phone:

Email: Rachel_Esralew@fws.gov

Education:
M.S. Applied Geosciences/Hydrogeology – University of Pennsylvania, Philadelphia, Pennsylvania
B.S. Natural Resources Management, Environmental Geomatics (minor) – Rutgers University, New Brunswick, New Jersey

Primary responsibilities/Activities: I assist the Region 8 Refuge Inventory and Monitoring (I&M) Coordinator in coordination with Refuge Operations and the California Landscape Conservation Cooperative. I assist with acquiring, developing, and protecting Service water rights and water resources, and provide technical assistance to other Divisions and field stations related to hydraulics, hydrology, hydrogeology, and water quality. My duties focus on hydrologic aspects of the inventory and monitoring program, including development of water resources inventories and assessments for refuges, the application of structured decision making and adaptive management to resolve resource management problems related to water resources; assessment of current and future inventory and monitoring projects with respect to hydrologic information; and development and review of hydrologic monitoring data collection and management, analysis, interpretation, and reporting.

Areas of Expertise:
Hydrologic and climate trend analyses
Probabilistic hydrologic modeling
Surface water, groundwater, and water quality data collection and analysis
Geographic Information Systems (GIS)
Environmental flow assessments

Active Projects: Development, coordination, and completion of Water Resources Inventory and Assessments (WRIA) for Refuges in Region 8.
Selected Publications:


Rita Howard
Position: Administrative Officer
(Inventory and Monitoring)

Location:
California State University,
Sacramento

Phone: 916-278-9443

Email: rita_howard@fws.gov

Education:
B.A. Business Administration –
Grantham University, Kansas City, MO

Primary Responsibilities/Activities: I serve as the principal source of administrative expertise for the Refuge Inventory and Monitoring (I&M) Program. My responsibilities are to assist with budget issues, such as reimbursable agreements, cooperative agreements, grants, contributed funds, cross program funding, and multiple natural resource accounts. I have primary responsibility for administrative support activities such as budgetary and fiscal accounting, procurement, personnel, and various Automated Data Processing (ADP) Programs. I assist Refuge I&M staff in developing/reviewing preliminary contract specifications prior to forwarding to Contracting and General Services (CGS) Regional Office. I assist staff with travel arrangements and process travel vouchers. Additionally, I prepare reports dealing with property, training, energy, equipment, safety, travel and various other special reports as required.