

May 29, 2001

Strategic Plan  
for  
Geographic Information  
Systems (GIS) Implementation  
Region 7

Prepared by  
The Regional GIS Team

Draft  
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## **Introduction**

The Directorate established a team to review Region 7's needs for GIS technology and applications and recommend a course of action to improve its efficiency and use. The ARD for Southern Alaska and the Chief of IRM were the team sponsors. Geographic Information Systems (GIS) within the region have developed independently due to a lack of coordination and support. As a result, the data are fragmented, not easily accessed, located, or even known to exist by many users. In order to accomplish their assigned tasks, offices are forced to develop their own corporate data systems which is not only a tremendous duplication of effort between offices, but makes it difficult to integrate and share information.

The plan incorporates ideas from the Geographic Information Systems Plan, FY95-97 and the Refuge GIS Implementation Plan, 1997. The plan also responds directly to Fulfilling the Promise recommendation WH-9 - *Design or use existing database systems to store, analyze, and archive inventory and monitoring data to evaluate management practices on individual refuges, as well as link with System, flyway, and ecosystem databases*. To be consistent with the overall Service strategy for GIS implementation, the team reviewed the GIS Plans of Regions 1, 4 and 5. Each plan was slightly different, taking advantage of the unique characteristics for that particular region, but the main emphasis was a decentralized approach. Within the Service the aim is to get GIS tools and information into the hands of the users. National and regional activities center on coordination and database management.

The following recommendations are discussed in more detail in the plan. These are the steps needed to effectively coordinate GIS developments in Region 7, minimize duplication of effort, and maximize the potential for successful GIS implementation as a management tool. While implementation of this plan will establish a framework for long range regional GIS capabilities, the recommended actions have a life expectancy of 12-18 months. Technological changes are so rapid, that any recommendations beyond that time frame would be unrealistic.

## **Summary of Recommendations**

1. Fill a vacant position in IRM with a Regional GIS Coordinator position at the GS-12/13 level immediately to oversee the implementation of GIS within the region. This position is currently a GS-12, but the team recommends upgrading the position to a GS-12/13 which is consistent with the other regional plans.
2. Fill a vacant position in IRM with a GIS Database Administrator position at the GS-11/12 level immediately to develop and manage the regional spatial database and accompanying data dictionary. The Database Administrator will need a desktop system at a cost of \$5000.
3. Hire an Assistant GIS Database Administrator at the GS-7/9 level as a one year term

appointment. This position would be supervised by the Database Administrator.

4. A centralized regional spatial database of base information (Table 1) should be developed and distributed within 1 year of hiring the Database Administrator. Completion of this task will require acquisition of a SUN Enterprise 420 Workgroup UNIX server at an estimated cost of \$41,000. This server replaces the functionality of four 6-8 year old UNIX servers and provides adequate disk space to accommodate the current 100 gigabytes of data.
5. By December, 2000, upgrade the RO communication hub so that the connection of all network clients is at a speed equal to the network backbone. Estimated cost is \$12,000.
6. By October, 2001, purchase a new disk storage device to accommodate the identified GIS data layers that will be available within the next two years. Current prices are estimated at \$110,000.
7. Align the GS-11/12 Remote Sensing Specialist position in IRM with the program it has supported for the past 12 years, by moving the FTE from IRM to RW.
8. Align the GS-11/12 Programmer position in IRM with the program it has supported for the past 10 years by moving the FTE from IRM to Realty.
9. Hire four GIS Analyst at the GS-11/12 level to assist field stations and programs in developing and using GIS technology. Two GIS specialists would be stationed in Fairbanks to support the Northern Ecoregion and two in Anchorage to support the Southern Ecoregion and Regional Office programs.
10. Hire or train GIS specialists consistent with field needs for GIS.
11. Field stations interested in GIS capability should acquire the minimum GIS hardware/software recommendations at an estimated cost of \$16.5k (Table 3), providing they have a staff member identified to perform the function. Most field stations have already acquired the minimum recommended equipment.
12. Hire a GIS Systems Specialist in IRM at the GS-11/12 level to assist the field stations hardware/software system needs.
- 13.
14. Support for continued education and training are critical for successful implementation of GIS. A GIS professional needs to remain aware of new GIS developments, techniques, and trends. Managers are encouraged to take the NCTC class "GIS for Managers."

15. A GIS Review team will meet biannually to review, comment upon, monitor, and evaluate the progress on the Regional GIS/Database Annual Work Plan developed by the GIS Coordinator, Database Administrator and 4 technical specialists. The Review team will make recommendations to the Directorate biannually to ensure the Annual Work Plan is being appropriately implemented.

## **Discussion**

A GIS team reviewed Region 7's needs for GIS technology and applications to make recommendations for improving its efficiency and usability. The team consisted of Barbara Boyle, Arctic NWR; Sue Schulmeister, Kenai NWR; Tom Jennings, Subsistence; Nancy Norvell, Selawik NWR; John Brewer, Realty; Bob Platte, Migratory Birds; Sheila Kratzer, NWI; Doug Burn, Marine Mammals; Ken Rice, Planning; Dana Seagars, WAES; Philip Martin, NAES and Jerry Minick, IRM. The team sponsors were Glenn Elison, ARD for Southern Alaska and Steve Harrison, Chief IRM.

The team was charged with making recommendations concerning:

- Inventory of existing GIS data sets/coverages
- Data duplication avoidance
- Delivery of GIS needs to field stations
- Data dissemination to field stations and other users
- Consistent use of compatible software and hardware
- Regional standards for minimum software
- Regional standards for data set/coverage format
- Need for periodic review of the adequacy of FWS GIS hardware and software
- Centralized GIS data management
- Technical coordination and consultation
- IRM support needed
- Detailed cost estimates
- Need for standing GIS committee(s)
- Such additional issues as the team deems germane

The discussion that follows presents the results in an issue statement and recommended solution format. Position descriptions of recommended staff additions are described in Appendix 1.

### **Issue #1 - Coordination.**

The need for GIS coordination has been identified in past planning exercises. However, implementation of formal coordination of GIS activities in Region 7 has not been supported. The current Coordinator has been fulfilling the responsibilities of 2 positions - GIS Coordinator and Remote Sensing Specialist and has not been able to meet full expectations of either position.

The lack of coordination has led to considerable duplication of effort, inefficient use of staff time and resources and a lack of direction for GIS from a regional perspective. Various offices have acquired GIS hardware, software and personnel and are at different levels of functionality and competence.

### **Solution #1 - GIS Coordinator.**

Currently there is a vacant GS-11/12 position in IRM that should be filled as the Regional GIS Coordinator to oversee implementation of GIS within the Region. The Regional Coordinator would be responsible for coordinating GIS activities on a region-wide basis, coordinating projects that span more than one geographic area, developing data-sharing agreements with Federal, State, local and private agencies and representing GIS interests in Region 7 as the FWS National GIS Steering Committee Representative. This position is in keeping with the Service's philosophy that regional GIS activities focus on coordination.

### **Issue #2 - Data Management.**

Without the benefit of a centralized regional spatial database, offices have been forced to develop their own systems of baseline information. This has resulted not only in a tremendous duplication of effort and cost, but has made it difficult to integrate and share information between offices. In addition, the underlying hardware infrastructure that is currently supporting the GIS software and data library is in need of replacement. There are currently 4 UNIX machines that are 6-8 years old pressed into the role of application, process, and data servers. This is not only inefficient use of technology, but well beyond the accepted life expectancy of computer systems which is approximately 3 years. In addition, the disk storage devices on which the data are stored are so old that they are no longer under warranty. Disks typically have a warranty life time of 5 years. Though funds have been allocated for developing GIS technologies in individuals office, little money, if any, has been spent on upgrading the existing support infrastructure.

Currently the RO network is a multi-platform configuration comprised of UNIX, NT and PC computers. Functionally, this is to be expected since one system type cannot meet all levels of service. However, the connectivity between systems is in need of attention and upgrade.

In the past, the recommended solution for data transferral to GIS users has been via the internet; however, this is not a viable means of data distribution to users outside the regional office due to poor phone lines and slow data transfer rates.

### **Solution #2 - Regional Spatial Database.**

The highest priority identified by the GIS Team is the development and distribution of a regional spatial database with accompanying data dictionary to all GIS users within 1 year. This will require additional personnel, hardware, creating a data catalog and developing a means to distribute the database.

**Personnel:** The team recommends filling one of the vacant FTEs in IRM with a

Database Administrator position at the GS-11/12 level. It is logical that the position remain in IRM, since the product is of use across all programs and ecoregions. The main responsibility of this position would be to develop, manage, maintain and distribute the regional spatial database. The team also recommends hiring a one-year term appointment to assist the Database Administrator in inventorying existing data layers, processing these into standardized datasets and distributing the database to the GIS users. The need for this position would be reevaluated at the end of the term appointment.

**Hardware:** Implementation of Solution #2 also requires a 3 phased approach towards acquisition of adequate equipment (hardware) for data storage and distribution of the 53 gigabytes of baseline data layers (Appendix 2, Table 1) and anticipated 450 gigabytes of additional baseline data layers (Appendix2, Table 2). Of course, the team also recognizes with a phased approach that technologies often change by the time the final phase is ready for implementation. With this in mind, the team recommends that the Database Administrator and Systems Specialists evaluate emerging technologies as possible alternatives.

1) The team recommends immediately replacing 4 existing UNIX servers mentioned above with 1 SUN Enterprise 420 Workgroup server at a cost of \$41,000. This robust server would update the old technology and serve all users of the Region 7 Spatial Database Library. It would give the added value of providing adjunct processing for NT workstations. The server has a 109 GB of disk space that would provide a temporary home for the Region 7 Spatial Database Library until a permanent disk storage device could be purchased. The team also recommends purchasing a desktop system for the Database Administrator at a cost of \$5000.

2) The team recommends upgrading the RO communication hub at a cost of \$12,000 by December, 2000. This acquisition would upgrade the connection of all PC clients in the RO as well as Unix clients to a network speed equal to the backbone of the infrastructure. This would not only benefit the GIS community but all network users as well.

3) Current active spatial data files require 100GB of disk space. The need for another 450GB of disk within 2 years is expected due to increased demand for satellite land cover data, digital orthophoto quads, statewide shaded relief products and Image Derived Products (IDP) from National Technical Means (i.e., spy satellites). The current recommendation for the third phase, which should be completed by October, 2001, would be the acquisition of a

Network Attached Storage Device. This device would not only provide the necessary disk space, but is expandable for future endeavors (i.e., total replacement unnecessary). In addition, this device would solve connectivity issues associated with a multi-platform configuration of the UNIX, NT and PC machines.

**Data Catalog:** To facilitate locating existing data, to prevent duplicating efforts or to avoid purchasing the same data layer, a data catalog must be established. Once completed, the information in this document will be made available to all programs in the Region.

Associated metadata will detail the origins of the data. There will be subject matter experts identified on the given data sets. These people will have stewardship responsibilities for the data on the centralized database. That is to say, they insure that the base data sets are current, that quality control checks are met, make changes when necessary and act as point of contact for all questions. Only those names listed as subject matter experts should be allowed to modify the 'master' digital information. All others are limited to read access only, or manipulation of copies. Metadata will be sent to the Database Administrator.

**Data Distribution:** After processing and cleaning by the Assistant Database Administrator, the base data held in the regional office archives will be considered stable for the purpose of GIS analysis and ready for distribution. Within the RO the data base will be accessible via the network. Due to the varied capabilities at the individual field stations, several mediums, such as the internet, CDs or 8mm tapes, need to be explored for data transfer.

### **Issue #3 - Getting the technology into the hands of the user.**

Due to the hardware and software costs associated with GIS technology, implementation in the past focused on large technical centers. However, PC based GIS software has become more widely available, eliminating the need for large central computer systems to run a GIS. As well as changes in hardware/software technologies, there has been a change in philosophy regarding GIS support. Within the Service, the aim is to get GIS tools and information into the hands of the user. GIS technology has become such an integral part of natural resource management that in order to most effectively implement GIS, an office needs to be doing the work themselves. In the past, there was a limited number of experienced GIS specialists available, thereby hindering development of field GIS capabilities. However, nowadays, individuals are graduating from college with a strong GIS education component.

### **Solution #3 - Local GIS Specialist.**

GIS should be implemented at those offices that have demonstrated a need, and at a scale appropriate for their needs. The applications and tools need to be in the hands of the users who

best understand the management and analysis tasks they need to accomplish with GIS. Any office demonstrating the need for full time GIS support, should hire a GIS specialist. Some field stations are hiring one-year term appointments hoping to convert them to permanent positions in the future if the need is verified. The GS level can vary, but offices should recognize that self reliance and independence can only be achieved with skilled individuals and implementation of an office GIS is a long term activity with workload likely to expand over time. For those offices who currently feel they have only a part time need, the team recommends several options: 1) sharing a term appointment with other offices, similar to the arrangement between Selawik NWR, Togiak NWR, and Innoko NWR; 2) working with the Ecoregion Technical Support Specialist; or 3) contracting on a project by project basis.

Field stations interested in GIS capability should acquire the minimum GIS hardware/software recommendations at an estimated cost of \$16.5k (Appendix 3, Table 3), providing they have a staff member identified to perform the function. Many field stations have already acquired the minimum recommended equipment.

In general, the Service is encouraging a decentralized approach to GIS implementation.

#### **Issue #4 - Technical Support.**

Staff working on GIS projects currently rely on personal contacts and informal networking when seeking help on specialized technical problems or for short term intensive “respond now” assignments. This is inefficient and pulls those consulted away from their regular work assignments in other programs. The region lacks a “help desk” of highly skilled GIS professionals whose primary role is to be available to problem solve or otherwise provide technical assistance for short term projects.

The team also recognizes that GIS implementation will occur in steps. Some stations currently do not demonstrate the need for full time positions to meet the GIS needs of those offices. In the interim, some level of technical support needs to be available to address these needs.

#### **Solution #4 - GIS Specialists for Technical Support.**

The GIS Team recommends hiring four GIS Specialists at the GS-9/11/12 level to assist field stations and programs in developing and using GIS technology. Two GIS Specialists would be stationed in Fairbanks to support the Northern Ecoregion and two in Anchorage to support the Southern Ecoregion and Regional Office programs. In order to minimize supervisory responsibilities for the GARDS, the positions should be placed under the PARDS of Refuges and Wildlife and Ecological Services/Fisheries. This would also ensure programmatic prioritization and accountability. These positions would work closely with the Ecoregion teams. Due to the specialized nature of their work, it is recommended that these positions be co-located where they can collaborate and share expertise in their technical field.

Other regions have called these technical shops, nodes. A node would be a major point of GIS

activity and support for GIS needs of all Service organizational units within an ecoregion. Such a facility would provide the technical expertise and specialized equipment for any GIS needs to any of the Service programs. These positions would also help to establish and support effective field station GIS programs. Due to the nature of the positions, individuals are expected to travel to the field stations and offices they are supporting.

These technical nodes are not to impede the progress of developing GIS capabilities at any field station that demonstrates the need. The Region should be encouraging a decentralized GIS. However, during this transitional period, these positions could provide short term project specific support for the offices that do not currently demonstrate a full time need or do not currently have the hardware/software capabilities. These positions would work closely with the Regional Refuge Biologist, the Ecosystem teams, IRM's ADP Branch and other program specialists to identify and resolve broad scope needs.

#### **Issue #5 - Remote Sensing Technology Needs.**

Due to the vastness and remoteness of most of the Region, utilizing photogrammetric and remote sensing methods for evaluation of fish and wildlife habitat is crucial. Landcover mapping, change detection, fire and fire fuels mapping are but a few of the information layers that can be derived from this technology. With the decreasing cost of imagery and the increasing spatial resolutions, the demand for this technology by resource managers is growing rapidly. Currently, one individual in IRM is trying to meet these demands. However, there are no formal arrangements for requesting this individual's assistance or for prioritizing current workloads. Consequently, many offices feel frustrated by this level of support.

#### **Solutions #5 - Move FTE from IRM to RW.**

For the past 12 years a remote sensing specialist has been on staff in IRM working primarily for various refuge field stations. This team recommends moving this FTE from IRM to RW. This will ensure a systematic approach to the mapping of landcover and wildlife habitat for lands within the Region. Given the limited expertise in the region, this individual should also be available to other programs, like Ecological Services or Migratory Birds, or to individuals working on ecosystem issues, on an advisory basis. This recommendation is based on the workload requests over the years. However, with the growing demand for remote sensing capabilities, workload requests should be evaluated within one year.

#### **Issue #6 - Realty Programming Needs.**

Currently Realty has been employing the services of the Regional Programmer in support of the Land Acquisition Program. Realty supports the position with salary and equipment, but does not have supervisory authority. This has been a concern in the past when the Programmer was pulled off on other assignments not related to the Realty efforts. Given the length of time for which Realty has been utilizing the position, a full time position in Realty is warranted.

**Solution #6 - Move FTE from IRM to Realty.**

The Team recommends aligning the GS-11/12 Programmer position in IRM with the program it has been supporting for 10 years by moving the FTE from IRM to Realty.

**Issue #7 - Lack of Communication.**

Currently, there are no formal channels of communications established for GIS practitioners in Region 7, only an informal working group without any support or authority. Communication must be established for users to be able to answer questions, garner advice, or help overcome problems in system operation and maintenance.

**Solution #7 - Information Exchange Avenues.**

There are numerous mechanisms for improving GIS communications, facilitating data sharing and supporting GIS-related education in Region 7.

- Compile a directory of users and develop a discussion list to facilitate communications, particularly with remote offices. The directory will list the people who are currently using GIS in the Region as well as the types of hardware and software they are using. The discussion list may be the most important communication support component within the regional GIS community. Since there are currently many users who are isolated, giving those people the ability to contact someone who may have experienced a similar problem will be critical to advancing the GIS capacity of each station.
- Regional GIS meetings would be open to all users, and held on a regularly scheduled basis for planning purposes. Varied techniques would be utilized to ensure widespread transfer of information, such as conference calling, email, web pages, and regular mail to suit each site/office/field station.
- The GIS User Community should meet semi-annually to discuss important GIS issues and problem-solving techniques within Region 7 and to help establish a better working relationship between offices.
- Continued education and training are critical for a GIS professional to remain aware of new GIS developments, techniques, and trends. The GIS Coordinator or Technical Support Specialists should assist in identifying specific training needs for each office. The GIS Coordinator could facilitate “in-house training” conducted by NCTC staff, ESRI specialists, or ERDAS specialists. The technical “nodes” in Anchorage and Fairbanks could be the training hubs.

**Issue #8 - Progress Assessment.**

Past efforts of building or reorganizing Regional GIS capabilities have not been successful because there was no built in periodic review and assessment of the program with approval from and accountability to the Directorate. Past GIS plans have also failed because shared costs have not been addressed by a GIS Steering Committee, composed of staff that actually have the ability to direct funds. The Region cannot maintain its “technological edge” if funds are not specifically allocated.

**Solution #8 - Prepare a Regional GIS/Database Annual Work Plan and evaluate progress on a biannual basis.**

The Plan should be prepared by the Regional GIS Coordinator, Database Administrator, and 4 technical specialists with review and oversight provided by a standing GIS Review Team representative of the programs. The purpose of the Plan will be to set the course of developing a fully functional Region wide GIS program including data acquisition. The Review Team will meet biannually to evaluate progress toward meeting the goals, objectives, and activities to be implemented by the Plan and forward its evaluation with recommendations for improvement to the Directorate for consideration.

**Issue #9 - ADP Support.**

GIS technology has become an integral part of day to day operations within the Service. In the past, the technology was limited to specialized equipment. Nowadays, the technology is fully implemented on the desktop and thus, should be treated as any other desktop product, such as Lotus Notes, Corel WordPerfect, or Excel. Currently, two FTEs in IRM have been dedicated towards Unix System and Windows NT support as well as network security and firewall development and maintenance. Due to their demanding workload, these individuals are not always available for GIS related assistance in a timely manner. This has resulted in GIS Specialists developing the expertise themselves (which is not always the best use of their time), work with ADP on a “squeeze you in basis” or a combination of both. In order to fully implement GIS, the team has identified the following ADP support needs: Unix and NT workstation installation and maintenance, network support for integrating all platforms (NT, Unix and Windows 95/98), technical support/troubleshooting, hardware acquisition recommendations and software installation.

**Solution #9 - GIS Systems Specialist.**

Implementation of GIS throughout the Region requires additional ADP support. A GIS Systems Specialist is recommended to supplement the work of the 2 FTEs currently in IRM. This position would be supervised by IRM but be collocated with the GIS Technical Specialists and GIS Coordinator. This position would provide support to the field offices and duties would include installing hardware, new software releases, and troubleshooting significant problems.

**Issue #10 - Backlog of existing data.**

There is a need to convert existing/archived data held by field offices, refuges and regional programs (e.g., MBM, MMM) into a uniform electronic format so it is available for region-wide use. However, the team recognizes this issue goes beyond the scope of this working group. GIS data are only an element of the backlog of information mentioned. This issue crosses over into project management and/or office management.

**Solution #10 - Needs Assessment.**

The team felt strongly that this at least be identified as a serious issue needing attention but offers no specific solution at this time. The Directorate may consider organizing another team to explore this issue further.



## **Position Descriptions**

### **GIS Coordinator**

The role of the GIS Coordinator is to provide external and internal coordination and Regional leadership on GIS issues. The position will be supervised by the Chief, IRM. The GIS Coordinator performs the following functions:

- Serves as a National GIS Steering Committee Representative
- Facilitates joint development of data with other agencies and organizations
- Oversees implementation of the spatial database
- Coordinates GIS educational and training opportunities for Region 7
- Develops and maintains relationships with other federal agencies
- Facilitates communication within the GIS community for Region 7 via web pages, discussion group/listserver and annual working group meetings
- Coordinates software upgrades and maintenance agreement
- Stays current with GIS technology changes
- Coordinates data requests from outside the agency
- Helps develop a regional policy on spatial data access and dissemination

### **Database Administrator**

The role of the Database Administrator is to develop, manage and maintain the regional spatial database. The position will be supervised by the Chief, IRM. The Database Administrator performs the following functions:

- Develops a centralized regional spatial database of baseline data layers with documentation and FGDC compliant metadata
- Develops the mechanisms to distribute the regional spatial database
- Develops and distributes a data dictionary and accompanying user guide
- Facilitates data exchange within and among Service offices
- Acquires non-FWS data and incorporate into regional database
- Database maintenance

### **Assistant Database Administrator**

The role of the Assistant Database Administrator is to provide support to the Database Administrator. The Assistant Database Administrator performs the following functions:

- Assists in inventorying existing data layers
- Assists in developing documentation and FGDC compliant metadata
- Assists in creating or modifying data layers that are to be included in the Regional Spatial database
- Creates CDs, 8mm tapes or other medium of the Regional Spatial Database and distributes them to all GIS users.

## **GIS Specialist**

The role of the GIS Specialist is to establish and support an effective field station GIS program. They serve a vital coordination role between field stations and the regional office. They provide the first level of technical support to field stations with GISs. The GIS Specialist plans with field stations how to successfully implement GIS on a long-term basis and how to best provide technical support. GIS Specialist coordinates local support arrangements and partnerships and become the data and information broker for the field stations.

- Assist the field stations and programs in planning, developing, and implementing full spectrum of GIS technology
- Provide technical support for regional office and field stations
- Provide project support for regional office and field stations
- Assist field stations with data development and integration (ie collecting and importing GPS data into GIS)
- Contribute to the GIS Web Page
- Participate in annual Region 7 GIS workshop

## **Local GIS Specialist**

At the field level, offices are expected to develop GIS implementation plans and support GIS through a commitment of staff, hardware and software acquisition. Field stations focus on GIS as a multi-disciplinary tool supported by and providing services to all field station divisions. Field stations identify GIS needs, plans and proposals.

The role of the field station in the FWS GIS Program is to provide access to resource data and provide analyses in support of field station management needs (ie refuge management, permit review, marine mammal stuff, etc)

Local GIS Specialists perform the following functions:

- Coordinate data collection and documentation
- Construct thematic data layers and develop databases
- Integrate, archive, and distribute data (data management)
- Perform GIS applications and analyses
- Advise and assist field station staff and partners with GIS applications and data

- development
- Facilitate and conduct training for field station staff and partners
- Contribute to the GIS Web Page
- Participate in annual Region 7 GIS workshop

### **GIS System Specialist**

The role of the GIS System Specialist is to provide hardware/software support to the field stations. The position is located in the IRM ADP branch. The specialist should have a medium level of knowledge of Sun Microsystems Unix workstations, Windows NT workstations and Windows95 workstations operating systems. The specialist should also have experience with installations of such things as internal devices, cards and memory.

Major responsibilities include:

- Installs new Windows NT workstations and/or peripherals shipped from the vendors to the refuge, including user accounts.
- Installs new Sun Microsystems' UNIX workstations and/or peripherals shipped from the vendors to the refuge.
- Installs ancillary freeware, disk partitions, pagefiles, network protocols.
- Installs printers/plotters, additional internal devices, and other peripheral devices.
- Install third party software (ie., Arc/Info, ArcView, Erdas Imagine, Antivirus) at the time of equipment installation and again when new versions are received.
- Upgrades existing workstations with new Service packs or recommended patches or driver updates.
- Helps resolve disk space problems. This includes uninstalling and reinstalling software and moving data to create more space in disk partitions.
- Helps resolve access control problems, granting rights to or denying rights to folders and files, local and shared.
- Helps troubleshoot and resolve computer and peripheral problems, for example, communication with new or existing printers and plotters, device and system errors in log files.
- Helps users with utility software such as creating tape archives for exchange or storage. Other examples are compression software, defragmenters, antivirus software and modem software.

### **Remote Sensing Specialist**

The role of the Remote Sensing Specialist, located within the Refuges and Wildlife Program, is to establish and support an effective remote sensing program for the Region. The position serves a vital coordination role between field stations and the regional office. The Remote

Sensing Specialist, in cooperation with partners, develops comprehensive plans for creating a statewide land cover data layer. The Remote Sensing Specialist coordinates local support arrangements and partnerships.

Remote Sensing Specialist performs the following functions:

- Plan, develop, and implement management strategies
- Will promote the latest trends in technology
- Contributes imagery and new information to the Regional web pages
- Provides technical guidance to regional office and field stations regarding remote sensing technologies and applications
- Participates in annual Region 7 GIS workshop

### **Realty Programming Specialist**

The Realty Programming Specialist supports the existing landstatus and acquisition prioritization software used by Realty to write CCP's. The Realty Programming Specialist designs the new landstatus corporate database and creates new database applications to replace the present landstatus applications as well as provide new capabilities. This Specialist will be working with the Database Administrator to incorporate the landstatus database into the regional database.

The Realty Programming Specialist performs these functions:

- Plan, design, code, and test a new landstatus database to replace the current database.
- Support the current database by altering code that is affected by new versions of application software.
- Research new technical alternatives that better report Realty's data.
- Recommend solutions to providing landstatus data to users.
- Research, build and maintain the landstatus corporate database definitions.
- Write applications for updating landstatus database.
- Recommend procedures for backing up the landstatus database.
- Coordinate inclusion of the landstatus database in the regional database.
- Participates in annual Region 7 GIS workshop

APPENDIX 2.

**Table 1. List and Size of Major Base Data Layers Currently Available**

<u>Major Theme</u>	<u>Size (gigabytes)</u>
Management Boundaries	.15
Coastlines	.25
Digital Chart of the World	.15
Digital Elevation Models (DEMs)	10.7
Digital Raster Graphics (DRGs)	13.0
Hydrography	2.0
Landcover (processed MMS satellite images)	1.0
Landcover (processed TM satellite images)	1.0
Landnets (township,section, lat/long, utm grids)	.2
Landstatus	9.5
Shaded Reliefs (statewide)	4.0
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<b>Total</b>	<b>52.95</b>

**Table 2. List of Major Base Data Layers of Interest**

Bathymetry	3.0
Biological (distribution, nest sites, etc)	10.0
Digital Orthophoto Quads (DOQs)	400.0
Fire History Information	.25
Geological Information	1.0
Insect Infestation	.25
Landcover (30m statewide)	11.0
National Hydrography Dataset (NHD)	3.0
Oil and Gas Development	.4
Places (villages, towns, municipalities, boroughs)	.1
Timber	1.0
Transportation (airports, runways, railroads, etc.)	.1
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<b>Total</b>	<b>430.1</b>

**APPENDIX 3.**

**Table 3: GIS Hardware and Software Minimum Recommendations**

	<b>Fixed Costs</b>		<b>Yearly Recurring Costs</b>	
Hardware:	Windows NT workstation	\$ 4k	Hardware/software maintenance	\$1k
	- 550MHz Pentium III		Plotter Supplies	\$ .5k
	- 27Gigabyte Hard drive		CDs/Zip disks	\$ .5k
	- 256Megabyte RAM		Backup Tapes	\$ .5k
	- 21" Monitor		Hardware Upgrade (typically disks)	\$2k
	- Read/Write CD-ROM			
	- Internal Zip Drive			
	Color Plotter (HP 1055CM, 600 dpi)	\$ 9k		
	Color Printer (HP ColorPro CAD w/ Postscript)	\$ 1.5k	Training	\$3k
	Tape Backup (Exabyte Eliant 820)	\$ 1k	Travel	\$3k
Software:	ArcView 3.2	\$ 1k		
<b>Totals:</b>		<b>\$16.5k</b>		<b>\$10.5k</b>

**Table 4: GIS Hardware and Software High-end Recommendations**

	<b>Fixed Costs</b>		<b>Yearly Recurring Costs</b>	
Hardware:	Windows NT workstation	\$10k	Hardware/software maintenance	\$1k
	- 2 550MHz Pentium III		Plotter Supplies	\$ .5k
	- 27Gigabyte SCSI Hard drive		CDs/Zip disks	\$ .5k
	- 516Megabyte RAM		Backup Tapes	\$ .5k
	- 24" Monitor			
	- 32Megabyte SRAM - graphics		Hardware Upgrade (typically disks)	\$2k
	- Read-Write CD-ROM			
	- Internal Zip Drive			
	Color Plotter (HP2800, 36", 600dpi)	\$11k		
	Color Printer (HP ColorPro Cad)	\$ 1.5k	Training	\$3k
	Tape Backup (Exabyte Eliant 820)	\$ 1k	Travel	\$3k
Software:	ArcView 3.2	\$ 1k		
	ArcView Spatial Analyst	\$ 2k		
	Arc/Info 8	\$ 2.5k		
<b>Totals:</b>		<b>\$28k</b>		<b>\$10.5</b>

Options:

- Digitizer (24" x 36") - \$2
- Erdas Imagine Image Processing Software - \$3.5k
- ArcView Image Analyst, ArcView 3-D Analyst - \$2k/ea
- ArcPress - \$500
- Large format color plotter (HP3800, 54", 600dpi) - \$15,000

It is recognized that one solution may not be appropriate for all situations. Hardware/software configurations will vary depending on budget and staffing, ability to share resources, and identified needs. The above scenarios have been identified, but are not concrete, and flexibility is encouraged.

One general consideration is that systems become obsolete in a relatively short time frame. Offices must expect to replace, not upgrade, their current system within 3 years. Purchasing a high-end system does not guarantee extended life span but it may be necessary for critical GIS applications. When determining their needs, an office must weigh whether a high end system will pay for itself before it becomes obsolete versus purchasing a lower end machine to meet immediate needs.