Minnesota GIS/LIS SALARY/SKILLS SURVEY for GIS PROFESSIONALS
Fall 1998

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Background

Both the Minnesota GIS/LIS Consortium and the Minnesota Governor's Council on Geographic Information were created to facilitate the effective use geographic information and geographic information technology within Minnesota. They play complementary, but distinct roles. This overview briefly explains those roles and how the Council and Consortium work together.

ORGANIZATIONAL PROFILES

The Consortium is a professional, non-profit organization that seeks to foster communication, education and outreach within the Minnesota Geographic Information/Land Information community. Its primary focus is to serve its individual members through education. The Council is a more formal policy instrument for the executive branch of state government, with members appointed to represent a range of constituencies within Minnesota. The Council develops and recommends policies pertaining to the creation, management, use, and coordination of geographic information efforts within Minnesota.

	Council on Geographic Information	GIS/LIS Consortium
Main Function	Policy	Education
Legal Basis	Government body	Non-profit
Authorized by	Executive Order 99-6	Registered 501C3
Created	1991	1988
Membership	Appointed (n = 18) and ex-officio members (n=6)	**Voluntary (n = 2400)** **Membership by request or by attending annual conference**
Governed by	Voting members appointed by Director of Minnesota Planning	Board elected by members (n = 12)
Supported by	Office of Minnesota Planning	Volunteers
Current Working Committees	Executive, Standards, Data, Hydrography, Communications, Education (Volunteer committees are open to all with expertise)	**Conference Committee, Editorial Board of Newsletter, Web Site Development**
Web Site	www.lmic.state.mn.us/gc/gc.htm	www.mngislis.org

MAJOR ACTIVITIES

MN Governor's Council for Geographic Information

♦ Advise executive and legislative branches of state government

♦ Represent state interests to federal government

♦ Develop and promote statewide policies

♦ Develop and promote statewide standards

♦ Research critical issues and make policy recommendations

♦ Publish critical material

MN GIS/LIS Consortium

♦ Publish GIS/LIS News (three issues per year)

♦ Organize and conduct the annual conference

♦ Prepare surveys addressing issues concerning the GIS/LIS community

♦ Sponsor and/or conduct workshops and training

♦ Support research and education

♦ Provide services enhancing the GIS/LIS community

HOW THEY WORK TOGETHER

The GIS/LIS Consortium and the Minnesota Governor's Council on Geographic Information sponsor different activities, but work closely together to pursue their complementary missions. Many of the same people are involved with both organizations and knowledgeable members of the Consortium often serve on Council committees. The Consortium chair is an ex-officio member of the Council, and Consortium funds have supported Council activities. The two organizations work closely with each other to develop learning opportunities such as workshops and training support.

The primary distinction is that the GIS/LIS Consortium's focus is on providing services to the GIS/LIS user community, whereas the Governor's Council maintains a focus on policy. While the Governor's Council may establish standards, the Consortium helps get this information out to the user community. In short, the GIS/LIS Consortium engages in education and outreach, while the Governor's Council on Geographic Information concentrates on issues of standards and policy.

Survey Objectives

The Minnesota GIS/LIS Consortium and the Governor's Council Education Committee are currently trying to determine barriers to GIS implementation and develop strategies for bringing those barriers down. The organizations recognize this would benefit all levels of government as well as the private sector. One of the first steps necessary for accomplishing this task is to determine how different disciplines are using/implementing GIS, delineate user

levels within the discipline, identify skills sets needed for each user level, and investigate salary expectation for each skill level.

The Minnesota GIS/LIS Consortium sponsored a GIS Skills/Salary research with a primary objective of gathering specific data regarding GIS positions, skill sets and salaries. A secondary objective was to compare the Minnesota GIS community to GIS communities in other regions and the nation as a whole specifically in the area of salary. The following pages represent the data in a variety of ways including:

- Job sector
- Job title
- Skill requirements
- Educational requirements
- GIS experience
- Percent of time spent using GIS
- Salary ranges
- Most commonly used software

The results are intended to provide the GIS community in Minnesota and the surrounding region with a snapshot that identifies GIS positions, required skill sets and educational requirements for each position, and the salary expectation for each level.

Hopefully this summary will provide a tool that can aid those who are responsible for the human resource piece of implementing GIS programs in their organization. It will also give GIS professionals an idea of the current situation of their peers and the types of opportunities available within the profession.

The Consortium realizes the GIS profession is in a state of growth and change. To help GIS professionals follow that change and identify emerging trends in GIS, the Consortium will continue to support this survey on a regular basis.

Methodology

The study incorporates three levels: national, regional, and local.

⇨ National - Several surveys have already been completed on the national level by groups such as GIS World, GeoSearch, and URISA. An Internet search of GIS positions that were advertised during the study period has gathered further information. This investigation compares the Minnesota GIS environment to the results of the previous national surveys. We identified nationwide characteristics of GIS positions such as differences in government versus the private sector, and similarities or dissimilarities in skill requirements and salary offerings among disciplines.

⇨ Regional – This level of the study focuses primarily on our local region. Much of the information has come from the surveys at the national level. In this level, we look at the regions and determine differences in salaries and identify the hottest states/regions for GIS jobs.

⇨ Local – Focusing on the local (Minnesota and immediate border areas) required a different form of research. Here again some of the data from the national and regional levels has been incorporated. The local survey was developed from direct contact with those in the local GIS community. The study has investigated what the existing skill levels are, the availability of qualified people to fill the positions (both locally and nationally), and the effect of location (instate versus outstate), discipline, or level of government.

Time frame

The scheduled time frame for the research portion of this project was May through September 1998. The summary of the research was developed November 1998 through February 1999.

National Comparison

The results of this portion of the survey compare some national trends in the GIS profession to those occurring in the local GIS community. The analysis includes results/comparisons from previous surveys as well as data obtained from an Internet search of GIS positions that were advertised during the study period. Three hundred fifty-one job advertisements were classified for location, job title, and job sector. Salary information was not summarized due to the fact a significant number of job advertisements did not disclose salary information.

What are the top states for GIS employment?
Based on information gathered at the national level, the top five states for GIS job availability are: California, Colorado, Texas, Florida, and Illinois. These five states make up 37% of the total job offerings found during the research.

What are the most commonly occurring positions?
The most commonly occurring position advertised at a national level was the GIS Technician. Many of the job advertisements (8%) included a job title other than those in the main categories. The most common GIS position in the Minnesota area was GIS Manager.

Position Held - National

Position Held - Minnesota
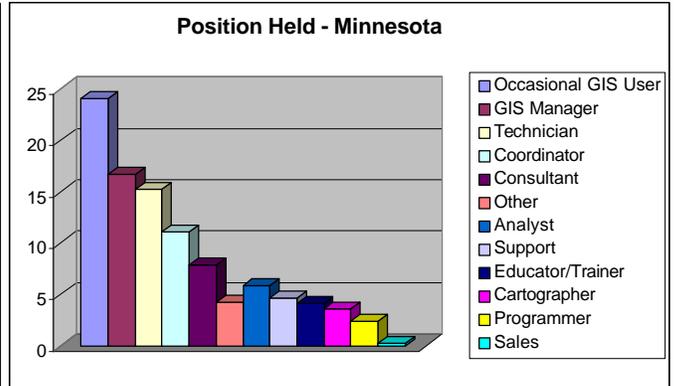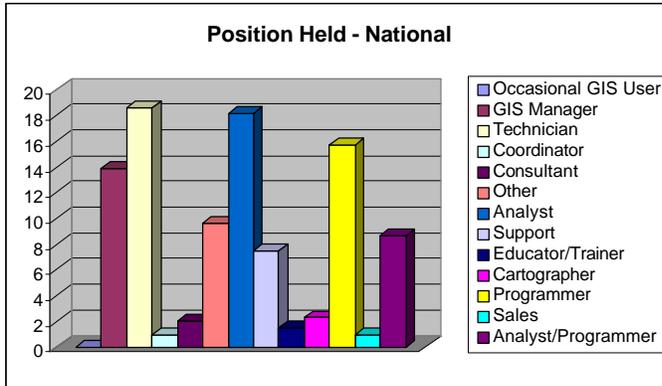
Incidents occurred out of 351 records
Occasional users were not tracked at the national level and Programmer/Analyst was not tracked in the Minnesota region

The most prevalent GIS user in the Minnesota area was the Occasional User and in most cases was not classed as a GIS professional. Discounting that fact, the primary differences are in the Technician, Analyst and Programmer positions.

When comparing job sectors for GIS professionals you can see a much higher incidence of employment in the private sector was noted at the national level (63.2%) as compared to the results of the Minnesota survey.

Only 15.7% of respondents in the Minnesota survey indicated employment in the private sector while 34% indicated local government as their employer. Other national surveys (URISA, GEOSEARCH) indicated 59% were employed in local government.

A possible explanation for this might be the reluctance of the governmental sectors (particularly local government) to utilize the Internet for job offerings.

GIS Positions by Job Sector Nationally

GIS Positions by Job Sector in Minnesota
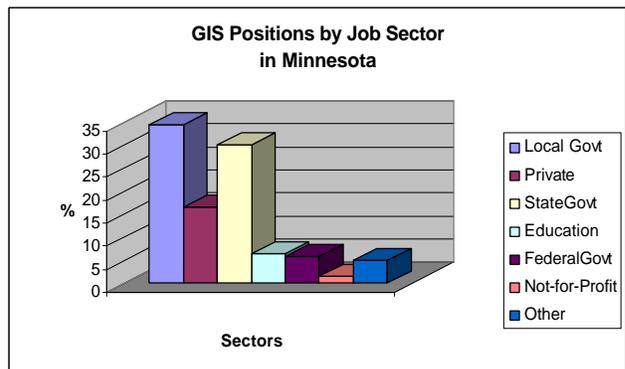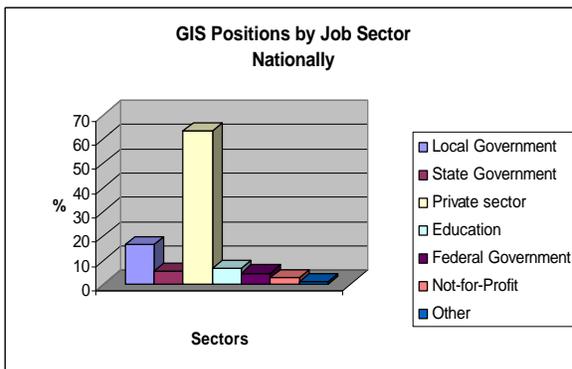
What are the disciplines with the highest numbers of GIS professionals?
Disciplines with Highest Rates of Occurrence:

Consulting = 23.5%   Environmental = 12.2%   Transportation = 5.9%

Since Consulting as a discipline tends to be focused in the private sector (based on MN GIS/LIS survey results), the higher incidence of the Private sector may be correlated to the significant numbers shown in the discipline of Consulting.

What are the top regions for GIS employment?
When comparing the results of the nation-wide Internet search for GIS positions, we compared job availability by region (based on regional classification by URISA). It is apparent the southern region has more GIS positions available. Two of the top five states (Texas, Florida) for available GIS jobs are located within that region.
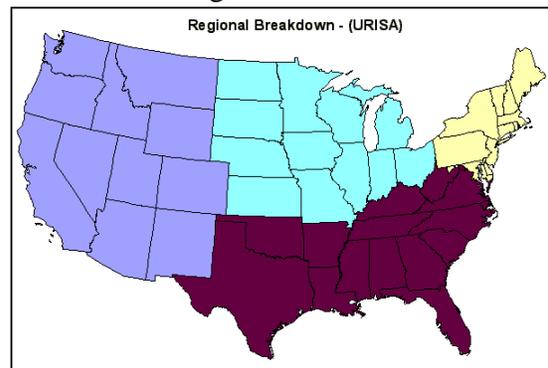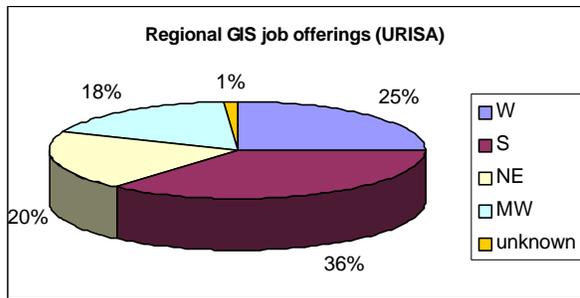
Unknown locations made up less than 1% of the total 351 records.

Regional Comparison

GIS jobs posted for the Midwest were compared to those GIS related positions currently held in the Minnesota area to determine where the growth areas in GIS positions were occurring. As you can see there is high demand for Technicians, Analysts, and Programmers in our region.
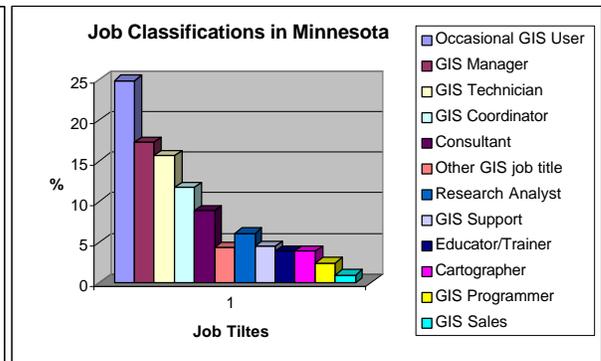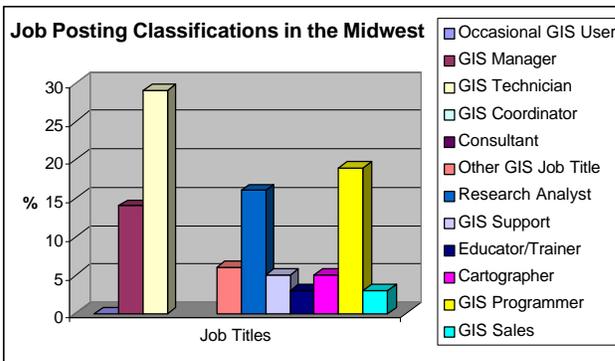
Does your salary stack up?

Salaries of local GIS professionals were researched and compared with results of other national surveys (URISA, Geo Search) to see if salaries paid to GIS Professionals in Minnesota are in line with other regions of the United States. As you can see from the results the salary ranges are in order with those in the rest of the Midwest region and closely follow those in the South.
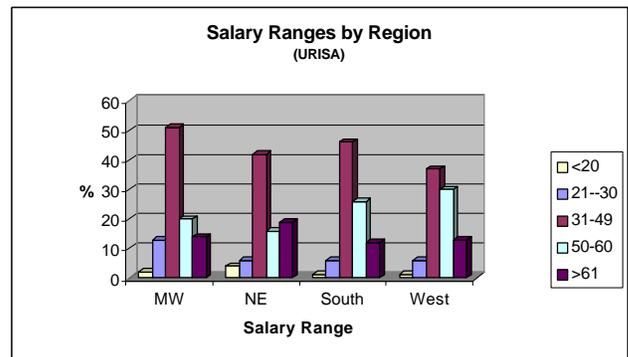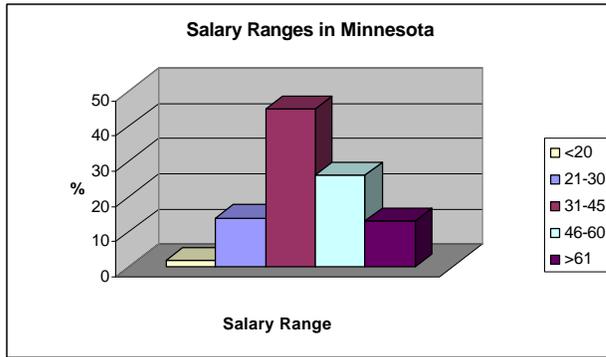
GIS in the Local Community

The local investigation was accomplished using a survey delivered to the GIS user community. The survey was composed of short multiple choice questions, which targeted such areas as job title, discipline, salary range, areas of expertise and so on. Current members of the GIS community were located using the Consortium mailing list and personal contacts. The survey was mailed to users and was also available online via the Internet. Response to the survey could be returned via mail, fax, email, or web page.

Local Survey Results

There were 453 total responses from 2264 mailings giving a 20% return.

Of those returns:	Mailed in	240	53%
	Online survey	213	47%

The following paragraphs describe the questions from the survey and the summarized responses that were developed as a result of the returned surveys. The percentages may not add up to 100 due to rounding.

1. **Which one of the following most closely describes your position?**

GIS Job Classifications

Occasional GIS User	24.9 %	Other GIS job title	4.4
GIS Manager	17.3	GIS Support	4.5
GIS Technician	15.7	Educator/Trainer	3.9
GIS Coordinator	11.8	Cartographer	3.9
Consultant	8.9	GIS Programmer	2.5
Research Analyst	6.1	GIS Sales	< 1

2. Please indicate the sector in which your employer functions? (your actual employer, not source of contracts)

Breakdown of Job Sector

Local Government	33.0 %	Education	6.2%
State Government	31.0	Federal Government	6.0%
Private Sector	16.8	Not-for-Profit	1.3%

3. What discipline(s) most closely match(es) the focus of your GIS usage? (please mark all that apply)

Community Development	249	Business GIS	88	Academic	43
Natural Resources	242	Human Services	70	Other	26
Consulting	101	Agriculture/Soils	63	Military	6
Utilities	93				

4. Please indicate the specialty role(s) within your discipline: (mark any/all major components of your job)

Role	#Resp.	Role	#Resp.
Data Conv./Integration	221	Spatial Modeling	126
Project Coordination	216	Needs Assessment	112
Data Development	199	Image Analysis	90
Production Mapping	182	Demographic Analysis	90
GIS Systems Support	162	Quality Assurance	80
Site Analysis	160	GIS Web Development	64
Application Dev.	149	Marketing/Sales	30
Training/Education	135		

5. What is your level of education?

Education levels attained:

High School	13	AA	34	some college	49
BS/BA	136	Post graduate work	71	MS/MA	127
Ph.D.	22				

6. What is the minimum level of education *required* for your position?

Although the summary of this question does not directly answer the question, we feel it important to indicate GIS professionals are **over educated** or at the required level for their position.

Education Level per Job:

Over	at Required	Lower	Unknown
203	203	20	13

7. Please indicate the curriculum of any degrees you have obtained:

Degree Fields:	Total	%	Degree Fields:	Total	%
Geography	139	31%	Environmental Science	30	7%
Natural Resources	76	17%	Surveying	28	6%
Engineering	58	13%	Business	27	6%
Geology	37	8%	Computer Science	18	4%
Planning	33	7%	Marketing	5	1%

8. **The hardcopy version mailed to consortium members differed slightly from the online version. Written version: How many years of GIS experience did you have *prior to obtaining* your current job?**

Years of GIS Experience prior to obtaining current job

Years	Total	Years	Total
<1	155	3-5	17
1-2	26	5-10	20
2-3	14	10+	8

This indicates much of a person's GIS experience is not gained through education, but by on the job experience. 65% of respondents have had less than one year of GIS training/experience prior to obtaining their current job.

Online survey question #8 : How many years of GIS experience are required for your job?

Years of GIS Experience required for your job

Years	Total	Years	Total
<1	83	3-5	32
1-2	48	5-10	16
2-3	26	10+	4

These values may be skewed by the fact that the highest percentages (22.6%) of users are occasional users.
.

9. **How many years of GIS experience do you have overall?**

Years of GIS Experience Overall:

Less than 1 year:	57	3-5 years:	83
1-2 years:	67	5-10 years:	108
2-3 years:	70	More than 10:	63

Please note, this appears to be more indicative of GIS *exposure* rather than GIS experience.

10. **Please rank the degree of proficiency your job requires for the following software:**

UNIX ARC/INFO		ArcView		SmallWorld	
none	223	none	83	none	443
Some	102	Some	126	Some	2
Proficient	62	Proficient	131	Proficient	3
Very Proficient	64	Very Proficient	112	Very Proficient	4

PC ARC/INFO

none	342
Some	59
Proficient	36
Very Proficient	15

NT ARC/INFO

none	334
Some	51
Proficient	39
Very Proficient	28

ERDAS

none	411
Some	27
Proficient	11
Very Proficient	3

MicroStation

none	391
Some	33
Proficient	15
Very Proficient	13

CAD

none	294
Some	87
Proficient	42
Very Proficient	29

The results of this question indicates many GIS users are proficient with more than one software and most users are at least familiar with more than one GIS software.

11. How much of your time is spent utilizing GIS programs?

%Time	#Responses	% of Users	%Time	#Responses	% of Users
<10%	148	33%	40-60	60	13%
10-25	95	21%	60-80	45	10%
25-40	43	10%	80+	60	13%

These values may be affected by the fact that the highest percentage (22.6%), of users are occasional users.

12. Is programming/customization part of your job?

Yes   45%   No   55%

13. If so, how much of your job involves programming/customization?

%Time	#Responses	% of Users	%Time	#Responses	% of Users
<10%	341	75%	40-60	13	3%
10-25	65	14%	60-80	6	1%
25-40	21	5%	80+	4	<1%

14. If your job involves programming/customization, what degree of proficiency of the following language(s)/software does your job require?

AML

none	323
Some	69
Proficient	39
Very Proficient	21

Avenue

none	325
Some	56
Proficient	44
Very Proficient	27

Visual Basic

none	379
Some	54
Proficient	14
Very Proficient	5

MapObjects		**C++**		**EPPL**	
None	416	none	420	Very Proficient	3
Some	25	Some	25		
Proficient	8	Proficient	4		
Very Proficient	3	Very Proficient	3		

FORTRAN		**MapBasic**		**SML**	
Proficient	1	Some	2	Proficient	1
Very Proficient	2	Very Proficient	2	Very Proficient	2

15. What database management or spreadsheet program(s) does your job utilize?

Database/Spreadsheet Usage

Excel	295	Quattro	93	FoxPro	40	None	14
Access	270	Oracle	80	Lotus123	16	SDE	8
dBase	159	SQL	50	Paradox	15	SyBase	8

Others mentioned:
Applixware, Approach, AS/400, DataEase, DB2, Filemaker, Focus, INFO, Informix, MS Works, Panorama, Rbase, SAS, SmallWorld, SPF, SPSS

Many used multiple applications

16. What Operating System(s) does your job utilize? (please mark all that apply)

Operating Systems

WinNT	291	Win 3.1	22	Domain OS	2
Win95	278	VAX	10	OS/2	1
UNIX	170	DOS	6	Clix	1
Macintosh	22	AS/400	2	LINUX	1

- Most Common Operating Systems
  - Windows NT   63.7 %
  - Windows 95   61.2
  - UNIX   37.0

Many used multiple operating systems. This could indicate dual boot or multiple workstations.

17. Does your job require Internet web-building skills for your GIS-related activities?

Web Development   Yes   31%   No   69%

18. **What other skills/experiences are required for your job?**

Skill	#Responses	Skill	#Responses
Writing	362	Personnel Mgmt	176
Project Mgmt	303	Teaching	153
Mathematics	215	Sales	27
Graphics	212	Public Speaking	26
Statistics	178		

19. **In what range would your yearly salary fall?**

Annual Salary

1000's	# of Responses	Percentage
<20	16	3%
21-30	62	14%
31-45	199	44%
46-60	116	35%
>61	51	11%

20. **Please indicate the Minnesota county in which you are currently employed:**

Fifty-three percent of responses listed the Metro area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Sherburne, Washington, and Wright) as their employment location.

Forty two percent of jobs are located in Hennepin or Ramsey Counties

Salary Comparison by Job Sector

Are you being paid the same as your peer in another job sector?
Information gathered from the local survey indicates for most positions there appears to be salary equity between most job sectors. However for some GIS positions, different job sectors pay different rates for the same position. Some of the differences in salary may be a result of salary ranges (the ranges offered in the survey question do not match the range for an individual salary) or the salary submitted reflects only where an individual is within his/her salary range not the actual salary range. The primary differences in pay occur in the Coordinator, Cartographer, and Programmer job classes.

Position – Sector #Responses	Most Common Salary	21-30k	31-45k	46-60k	>60k	Not provided
GIS Programmer (11)						
State Gov. (1)	31-45k	-	1	-	-	-
Local Gov. (5)	46-60k	-	1	4	-	-
Private (5)	31-45k	-	3	1	-	-

Position – Sector - #Responses	Most Common Salary	21-30k	31-45k	46-60k	>60k	Not provided
GIS Manager (78)						
Federal Gov. (3)	>60k	-	-	-	2	1
State Gov. (22)	46-60k	-	3	11	8	-
Local Gov. (36)	46-60k	2	10	15	9	
Private (17)	46-60k	-	2	7	6	2
GIS Coordinator (52)						
Federal Gov. (7)	31-45k	1	3	2	1	-
State Gov. (19)	45-60k	1	8	9	1	-
Local Gov. (19)	31-45k	6	8	4	-	1
Private (6)	-	3	3	-	-	-
GIS Technician (69)						
Federal Gov. (2)	-	1	1	-	-	-
State Gov. (12)	31-45k	4	8	-	-	-
Local Gov. (42)	31-45k	19	22	1	-	-
Private (11)	31-45k	4	7	-	-	-
GIS Research Analyst (26)						
Federal Gov. (2)	46-60k	-	-	2	-	-
State Gov. (16)	31-45k	3	8	4	1	-
Local Gov. (4)	31-45k	-	4	-	-	-
Private (4)	31-45k	-	3	-	-	1
GIS Consultant (36)						
Federal Gov. (1)	31-45k	-	1	-	-	-
State Gov. (4)	-	-	2	-	2	-
Local Gov. (7)	Wide Range	2	2	1	2	-
Private (24)	31-45k	4	12	2	6	-
GIS Support (22)						
State Gov. (10)	31-45k	2	5	3	-	-
Local Gov. (10)	31-45k	3	4	3	-	-
Private (2)	31-45k	-	2	-	-	-
Cartographer (17)						
Federal Gov. (2)	>45k	-	-	1	1	-
State Gov. (4)	-	2	2	-	-	-
Local Gov. (6)	-	3	3	-	-	-
Private (5)	31-45k	1	3	1	-	-
GIS Educator/Trainer (18)						
State Gov. (17)	46-60k	-	5	7	5	-
Private (1)	46-60k	-	-	1	-	-

Position Skill, Education, and Salary Descriptions

The following position descriptions were developed from responses to the questions of the local survey. Based on the answers to the questions we were able to summarize the education, skill levels, and salary scales for the positions identified here. These are only general summaries and individual position characteristics are not reflected.

GIS Manager
⇨ Education - Minimum BS, MS+
⇨ Experience - 5+ years
⇨ Required - Project and personnel management, writing and oral communication, mathematics/statistics, and budgeting skills
- Thorough understanding of GIS concepts - not necessarily hands on skills
⇨ Typically request familiarity with GIS software, database spreadsheet, and Windows NT/95
⇨ Salary - 46-60K Many > 60K (Dependent on Qualifications)

GIS Coordinator
⇨ Primarily public, compares to GIS Consultant in private
⇨ Education - Primarily MS, minimum BS
⇨ Experience - 3-5 years
⇨ Required - Proficient or very proficient in ArcView
- Understanding of ARC/INFO, CAD
- Databases - Access, Excel   (dBase notable mention)
- Understanding of multiple Operating Systems WinNT ,Win95, UNIX, Win3.1
⇨ Desired - good communication (writing, oral, team)
- Programming
- Graphics - maps/presentation
⇨ Salary - 31-45, many 45-60k

GIS Technician
⇨ Education - BS -- Geography or Natural Resources
⇨ Experience 1-3 years
⇨ Required - strong understanding of hands on GIS especially data editing and conversion
- Strong skills in ArcView
- Good understanding of database
⇨ Desired – programming
- Good communication, graphics
⇨ Salary - mostly 31-45k, many in MN 21-30k

GIS Programmer
⇨ Education - BS - Geography or Computer Science
⇨ Experience 3-5 years
⇨ Required - Proficient or very proficient in ARC/INFO or ArcView
  ▪ EPPL, EPIC, MapInfo also mentioned
  ▪ Programming in AML, Avenue, HTML
⇨ Familiar with programming - Visual Basic, MapObjects
⇨ Understanding of Databases, primarily Access, Excel, dBase
⇨ Able to work in multiple environments
  ▪ WinNT (90%), Win95 (82%), UNIX (64%)
⇨ Desired - good communication, graphics skills
⇨ Salary - split between 31-45k and 46-60k

GIS Consultant
⇨ Mostly private sector, compares to GIS Coordinator in public
⇨ Education - Primarily MS in MN, BS minimum
⇨ Experience - 3-7 years
⇨ Required - proficient or very proficient in ArcView and ARC/INFO (CAD and MicroStation notable mentions)
  ▪ Databases - Access, Excel (dBase, Quattro)
  ▪ Understanding of multiple Operating Systems WinNT, Win95, UNIX
  ▪ Good communication (writing, oral, team)
  ▪ Graphics - maps/presentation
⇨ Desired - Programming - AML and Avenue (Visual Basic)
⇨ Salary 31-45k

Conclusion

A career in the field of GIS is a specialized and highly competitive. Based on the results of the survey GIS professionals are highly educated but experience is less of a commodity. In many cases those that are experienced often provide the function of project manger or coordinator and fill the technical GIS role. High percentages are gaining their skills on the job. The salaries of local GIS professionals follow regional and national trends from the perspective the highest number of GIS professionals receive salaries in the 30-50K range. The data also shows the highest numbers of GIS professionals are employed in positions requiring technical skills.

In the local GIS neighborhood, natural resources and community development are the two most popular disciplines for GIS positions. The government sector employs more GIS professionals in the local community with the largest percentage working in local government. The metropolitan area (9 counties surrounding Minneapolis/St. Paul) provides over half of the GIS positions in the Minnesota area.

As one might expect, most GIS professionals have a college degree with the highest percentage focusing in the science of geography. Along with a strong technical skills in the

various GIS software, employers are looking for a sound background in math and science as well as good communication (written and oral) and project management skills and experience.