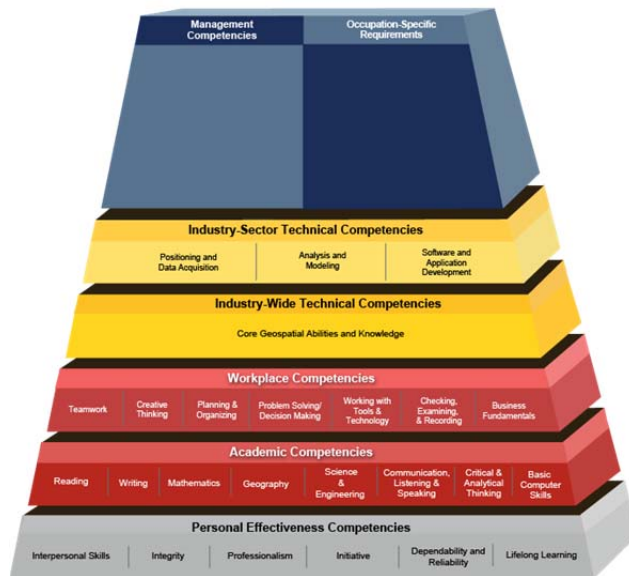# Inventory of Geospatial Workforce Competencies for GIS & Remote Sensing Occupations

By John Johnson
National GeoTech Center, April, 2012

Geospatial Technology Competency Model
Employment and Training Administration, U.S. Department of Labor,

Inventory of Geospatial Workforce Competencies
GIS & Remote Sensing Occupations

John Johnson
National GeoTech Center, April, 2012

Overview: The Inventory of Geospatial Workforce Competencies for GIS and Remote Sensing occupations is a compilation of twelve DACUM job and occupational analyses conducted in the United States between 1996 and 2011. It summarizes the work activities of 98 geospatial professionals along with related knowledge, skills and behaviors that they considered important for success in their jobs. Included are panels of GIS Technicians, Specialists, Analysts, Senior GIS Analysts and Remote Sensing Specialists who volunteered either one or two days their time to help systematically document their jobs. Details about these panels are included at the end of this report. Each panel participated in a job analysis workshop managed by certified DACUM facilitator using a standardized "DACUM" process. Collectively they identified a total of 890 job tasks and 576 knowledge, skills and behaviors considered important for workers in their jobs. These have been organized, grouped into categories and finally ranked according to the number of tasks in each category and the number of panels and panel members the categories represent. Finally, individual tasks are referenced according to their source panel, the year they were collected and whether the panel represented the GIS or Remote Sensing sector. This compilation is intended to serve as an objective, transparent inventory of industry based competencies for GIS and Remote Sensing occupations.

Table of Contents

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
JOB TASK CATEGORIES
April, 2012

TASK CATEGORIES	# of Tasks	DACUM Panels	Members
A MANAGE DATA			
A1 Define data requirements	11	7	64
A2 Acquire data	41	11	92
A3 Import/Export data	12	6	60
A4 Validate data	24	11	92
A5 Organize data	19	10	78
A6 Back-up/restore data	15	8	70
A7 Convert / reformat data	21	11	92
A8 Join & relate data	3	2	24
A9 Define feature behavior (topology, subtypes, domains)	5	4	42
A10 Develop data maintenance schedule	3	3	31
A11 Establish data custodianships	9	5	45
A12 Evaluate data	17	10	92
A13 Evaluate data sources	10	9	82
A14 Create data library	3	2	13
A15 Design/edit databases	17	8	66
A16 Create/maintain data dictionary	2	2	17
B GENERATE DATA			
B1 Collect field attribute data	8	7	68
B2 Conduct surveys & questionnaires	3	2	24
B3 Plan field missions	12	4	31
B4 Collect ground control points	9	4	27
B5 Post process GPS data	2	2	24
B6 Digitize data	8	7	59
B7 Geocode addresses	6	5	48
B8 Scan non-digital data	5	5	49
B9 Create/edit vector & attribute data	21	9	81
B10 Create/edit metadata	15	10	87
B11 Create photogrammetric data	3	1	8
B12 Create LIDAR based products	3	2	22
B13 COGO legal descriptions	3	3	35

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
JOB TASK CATEGORIES
April, 2012

	TASK CATEGORIES	# of Tasks	DACUM Panels	DACUM Members
C PROCESS DATA				
C1	Georeference data	14	8	76
C2	Conduct image classification	22	5	42
C3	Conduct image processing (Subset, clip, crop, mask)	4	3	19
C4	Mosaic/coregister images	4	3	19
C5	Sample/resample image data	4	3	19
C6	Conduct atmospheric / radiometric calibration	4	2	13
C7	Conduct image enhancement	5	3	24
C8	Conduct visual interpretation	6	5	34
C9	Reproject\transform data	3	2	16
C10	Orthorectify photogrammetric data	4	4	31
C11	Conduct geoprocessing	5	4	37
D ANALYZE DATA				
D1	Perform queries	6	4	36
D2	Conduct network analysis	7	4	44
D3	Conduct geostatistical analysis	10	8	70
D4	Proximity analysis	3	3	30
D5	Overlay analysis	4	3	28
D6	Quantative analysis	11	5	32
D7	Change detection	4	3	19
D8	Conduct view-shed analysis	2	2	18
D9	Feature extration\image segmentation	6	3	19
D10	Conduct resource and scenario analysis	5	2	14
D11	Model Surfaces	8	5	57
E MANAGE SOFTWARE & HARDWARE				
E1	Automate manual processes	14	7	55
E2	Determine software & hardware requirements	6	5	47
E3	Maintain hardware	7	3	29
E4	Optimize database performance	5	3	31
E5	Maintain software	12	7	58
E6	Maintain equipment & supplies	12	6	53
E7	Provide technical support	5	5	44
E8	Develop user guides	5	3	31

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
JOB TASK CATEGORIES
April, 2012

TASK CATEGORIES	# of Tasks	DACUM Panels	DACUM Members
F MANAGE PROJECTS			
F1 Coordinate project activities	11	5	42
F2 Clarify project scope & objectives	10	5	43
F3 Develop a project plan	4	2	13
F4 Identify project deliverables	3	2	18
F5 Define project study area	6	5	39
F6 Allocate project resources	6	3	26
F7 Evaluate project status	13	5	41
F8 Develop policy, standards & procedures	12	7	55
F9 Document/record methodology & procedures	12	8	76
F10 Prepare project budget	5	5	39
F11 Develop project timeline/schedule	8	7	56
F12 Priortize/streamline workflow	4	4	32
F13 Contribute to company's strategic plan	2	2	16
F14 Maintain Contracts	2	2	19
F15 Develop a disaster recovery plan	2	1	8
F16 Prepare cost estimates	6	4	39
F17 Write proposals & grant applications	5	4	27
F18 Participate in hiring personnel	5	4	27
F19 Evaluate project personnel	2	2	14
F20 Troubleshoot & make recommendations	4	2	11
G GENERATE PRODUCTS & SERVICES			
G1 Design & create maps	41	11	95
G2 Create animations & fly-throughs	5	4	31
G3 Create reports	13	10	84
G4 Create tables & charts	9	5	41
G5 Develop & make presentations	16	9	73
G6 Prepare documents & data	14	7	58
G7 Publish digital information	15	9	75
G8 Integrate data	5	3	19
G9 Develop software applications & web services	13	4	39

www.geotech.org   johnjohnson@gisws.com   5/17/12

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
JOB TASK CATEGORIES
April, 2012

TASK CATEGORIES	# of Tasks	DACUM Panels	DACUM Members
H PROFESSIONAL DEVELOPMENT			
H1 Communicate with others	11	7	67
H2 Network professionally	6	4	33
H3 Participate in conferences, seminars & workshops	17	10	80
H4 Prepare & conduct training	20	10	80
H5 Attend training	12	9	75
H6 Pursue advance degrees & certificates	4	4	27
H7 Acquire professional certification	6	6	51
H8 Promote / represent GIS	7	4	36
H9 Participate in professional outreach	6	4	33
H10 Review job related information	10	6	44
H11 Supervise/mentor others	6	5	44
H12 Write professional papers	3	3	21
H13 Self-evaluation & planning	4	3	26
H14 Participate in committees	3	2	13
H15 Research technology trends	5	5	38
Total	890	12	98

By: John Johnson, National Geotech Center, April, 2012

                           5/17/12

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
KNOWLEDGE, SKILLS & BEHAVIOR CATEGORIES
April, 2012

Ref #	KNOWLEDGE, SKILLS & BEHAVIOR CATEGORIES	# of K, S & A	DACUM	
			Panels	Members
X1	Cartography	19	10	86
X2	Communication: verbal/presentation/writing	38	12	103
X3	Computer basics	21	8	67
X4	Computer database	14	7	61
X5	Computer keyboarding	5	5	48
X6	Computer networks	7	4	39
X7	Computer programming	14	9	81
X8	Software	10	6	53
X9	Coordinate systems, projections	12	8	67
X10	Critical thinking	8	7	49
X11	Data models	6	4	39
X12	Data types, transfers & conversions	8	4	30
X13	Engineering drawings	4	3	29
X14	Equipment operation	5	3	25
X15	Geography	9	6	50
X16	Geoprocessing, modeling	10	5	51
X17	GPS, GNSS, surveying	15	7	51
X18	Industry applications	14	6	60
X19	Jargon, acronyms	4	3	32
X20	Land divisions, measurements	9	5	42
X21	Legal issues	3	2	20
X22	Map reading	6	6	53
X23	Mathematics, geometry	11	7	62
X24	Organizational	15	10	90
X25	Photogrammetry/Remote Sensing	23	9	75
X26	Queries & analysis	6	4	38
X27	Research	5	4	43
X28	Scale, resolution	6	6	56
X29	Spatial Thinking	5	4	36
X30	Standards (client, customer, industry)	12	6	57
X31	Time management	8	8	73
X32	Troubleshooting	6	6	57
X33	Units of measure/conversion	3	2	24
X34	Web development	3	1	5
X35	Adaptable, flexible	6	5	38
X36	Analytical	12	11	91
X37	Common sense	3	3	32
X38	Creative	4	4	31
X39	Detail orientated	14	12	103
X40	Diplomatic	2	2	20
X41	Dress Code, etiquette, hygine	3	2	17

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS
KNOWLEDGE, SKILLS & BEHAVIOR CATEGORIES
April, 2012

Ref #	KNOWLEDGE, SKILLS & BEHAVIOR CATEGORIES	# of K, S & A	DACUM Panels	Members
X42	Ethical / respectful	5	5	45
X43	Follow procedures	5	3	24
X44	Industrious, persistent	8	5	38
X45	Leadership	2	2	10
X46	Multi-tasking	6	6	49
X47	Cooperative	10	5	39
X48	Open minded	4	3	15
X49	Paitent	4	4	24
X50	Positive attitude	8	5	43
X51	Punctual / reliable	6	6	60
X52	Resourceful	4	4	30
X53	Self improvement	8	6	52
X54	Self motivated / independent	23	10	87
X55	Sense of humor	3	3	24
X56	Team Player	16	9	81
X57	Trustworthy, honesty, integrity	3	2	13
X58	Visionary	3	2	24
X59	Accept & receive criticism	2	2	16
X60	Work long hours	2	2	14
X61	Work under Pressure	4	2	16
X62	Focused	5	3	19
X63	Tenacity	2	2	11
X64	Resptful	2	2	16
X65	Inquisitive	3	2	13
X66	Proactive	3	3	21
X67	Visual	3	2	14
X68	Physics	2	2	14
X69	Accuracy & precision	4	3	28
X70	GIS	3	3	26
X71	Problem Solving	12	10	87
X72	Statistics, probability	12	9	73
X73	Other	11	6	46
Total		576	10	98

* See Panel Information

By: John Johnson, National Geotech Center, April, 2012

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty

A1 Define data requirements

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
					A MANAGE DATA
Determine data to be obtained	GIS	2002	AGK	5	Define project parameters
Define Data Needs	GIS	2009	ARC	8	Develop solutions
Determine data specifications (goals, collection requirements &	RS	2011	DEN	8	Develop Project Plan
Determine appropriate projections	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Determine coverages to be managed	GIS	1997	GHC	12	Database Design
Determine data needs / format	GIS	1997	GHC	12	Data Acquisition & Development
Determine future uses for completed project data / processes	GIS	1997	GHC	12	Project Management
Define data requirements (e.g. domains)	GIS	2009	GSC	12	Gather Data
Define data requirements (C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Determine resource needs	GIS	2002	TST	8	Manage Individual Assignments
Determine future uses for completed projects/databases	GIS	2002	TST	8	Manage Individual Assignments
11 tasks			7 panels	64 members	A MANAGE DATA

A2 Acquire data

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
					A MANAGE DATA
Obtain agronomic data (e.g. soil test, yield)	GIS	2002	AGK	5	Initiate GIS Projects
Obtain area of interest boundary data	GIS	2002	AGK	5	Initiate GIS Projects
Obtain base map data (e.g. roads, streams, political boundaries,	GIS	2002	AGK	5	Initiate GIS Projects
Obtain climate data (e.g. precipitation, wind, temperature)	GIS	2002	AGK	5	Initiate GIS Projects
Obtain imagery data (e.g. satellite, aerial)	GIS	2002	AGK	5	Initiate GIS Projects
Obtain land use data	GIS	2002	AGK	5	Initiate GIS Projects
Obtain terrain feature data (e.g. soil type, topography)	GIS	2002	AGK	5	Initiate GIS Projects
Coordinate data collection	GIS	2002	AGK	5	Define project parameters
Acquire Existing Data (aerial, RS, download)	GIS	2009	ARC	8	Develop Data
Procure New Data (aerial, lidar)	GIS	2009	ARC	8	Develop Data
Extract Data (mining)	GIS	2009	ARC	8	Develop Data
Order data (parameters: capture, task, archival, ancillary) *	RS	2011	DEN	8	E Acquire Data
Ingest data *	RS	2011	DEN	8	Produce Data
Respond to data requests *	RS	2011	DEN	8	Manage Data
Gather data for updates	GIS	1997	GHC	12	Maintain & Update Data
Adhere to policies for sharing and receiving data	GIS	1997	GHC	12	Information Sharing Data Exchange
Contact data originator for acquisition	GIS	1997	GHC	12	Data Acquisition & Development
Acquire Data	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Acquire existing data (e.g. digital, hard copy)	GIS	2009	GSC	12	Gather Data
Define data collection methods (e.g. GPS, air photo)	GIS	2009	GSC	12	Gather Data
Acquire existing geospatial data	GIS	2008	LLC	12	Collect / Create Data
Order data *	RS	2011	MIL	6	Acquire Data
Upload files *	RS	2011	MIL	6	Disseminate Results
Download data *	RS	2011	MIL	6	Acquire Data
Download data *	RS	2011	MIL	6	Acquire Data
Import data	RS	2011	MIL	6	Manage Data
Select data type(s) based on scope of work	RS	2011	MIL	6	Acquire Data
Query hardcopy resources (archives) *	RS	2011	MIL	6	Acquire Data
Query on-line resources (archives, private…) *	RS	2011	MIL	6	Acquire Data
Contract image acquisition with remote sensing data providers	RS	2009	SAC	5	Acquire Data
Download / decompress files	RS	2009	SAC	5	Acquire Data
Import image / data	RS	2009	SAC	5	Prepare Data
Select appropriate data	RS	2009	SAC	5	Acquire Data
Select appropriate data type based on platform/resolution (spect	RS	2009	SAC	5	Manage Projects
Select appropriate output format	RS	2009	SAC	5	Acquire Data

Task Category / Task	Sector	Year	DACUM Panels		Duty Category / Duty
			Panel	Panel Size	
Search web-based image providers	RS	2009	SAC	5	Acquire Data
Purchase new data	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Acquire data from originator	GIS	2002	TST	8	Acquire & Develop Data
Adhere to P&P for sharing and receiving data	GIS	2002	TST	8	Exchange & Share Data
Gather data for updates	GIS	2002	TST	8	Update & Manipulate Data
Assist in determining data needs/format	GIS	2002	TST	8	Acquire & Develop Data
41 tasks			11 panels	92 members	A MANAGE DATA

A3 Import/Export data   **A MANAGE DATA**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Import obtained data	GIS	2002	AGK	5	Process Spatial Data
Export application recommendation files	GIS	2002	AGK	5	Create Usable Products
Export data in transferable format	GIS	1997	GHC	12	Information Sharing Data Exchange
Import data into existing GIS	GIS	1997	GHC	12	Information Sharing Data Exchange
Integrate data from various sources into consistent format	GIS	1997	GHC	12	Data Acquisition & Development
Communicate with other database	GIS	1997	GHC	12	Database Design
Connect to external data sources (e.g. odbc, GIS servers)	GIS	2009	GSC	12	Gather Data
Export data structures	GIS	2008	LLC	12	Disseminate Data
Import CAD files (82%)	GIS	2008	LLC	12	Modify Data
Bulk load data and transfer formats.	GIS	1996	SMT	11	GIS Techniques
Import data into appropriate formats	GIS	2002	TST	8	Exchange & Share Data
Export data in transferable format	GIS	2002	TST	8	Exchange & Share Data
12 tasks			6 panels	60 members	A MANAGE DATA

A4 Validate data   **A MANAGE DATA**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Finalize data sets	GIS	2002	AGK	5	Analyze Processed Data
Validate agronomic data	GIS	2002	AGK	5	Process Spatial Data
Validate boundary data	GIS	2002	AGK	5	Process Spatial Data
Create Data Quality Control Plan (accuracy, integrity)	GIS	2009	ARC	8	Manage Data / Information
Assess absolute accuracy and precision	RS	2011	DEN	8	Assure Quality
Assess relative accuracy and precision	RS	2011	DEN	8	Assure Quality
Enforce topology	RS	2011	DEN	8	Assure Quality
Perform error trapping (systematic errors)	RS	2011	DEN	8	Assure Quality
Determine data consistencies	GIS	1997	GHC	12	Database Design
Verify that updates are error free	GIS	1997	GHC	12	Maintain & Update Data
Conduct Ground Truthing	GIS	2007	GRC	5	Manage Geographic Data Sets
Validate spatial data (e.g. topology, build, verification)	GIS	2009	GSC	12	Process Data
Validate tabular data	GIS	2009	GSC	12	Process Data
Validate data changes (multi-editor environ.) (91%) (Adv.)	GIS	2008	LLC	12	Maintain Data
Resolve data issues	RS	2011	MIL	6	Acquire Data
Conduct accuracy assessment	RS	2011	MIL	6	Analyze Data
Verify results of analysis using ground truth	RS	2011	MIL	6	Analyze Data
Validate analysis results	RS	2011	MIL	6	Analyze Data
Design validation sampling plan / methods	RS	2009	SAC	5	Validate & Ground – Truth Data
Assess positional accuracy (RMS)	RS	2009	SAC	5	Prepare Data
Compare image geometry with ground control to assure spatial a	RS	2009	SAC	5	Assess Accuracy
Assess output to determine if output is good.	GIS	1996	SMT	11	Computer Skills
Verify content and spatial accuracies	GIS	2002	TST	8	Acquire & Develop Data
Verify accuracy of imported data	GIS	2002	TST	8	Exchange & Share Data
24 tasks			11 panels	92 members	A MANAGE DATA

Task Category / Task	Sector	Year	DACUM Panels		Duty Category / Duty
			Panel	Panel Size	
A5 Organize data					**A MANAGE DATA**
Create directory structure	GIS	2002	AGK	5	Initiate GIS Projects
Create naming conventions	GIS	2002	AGK	5	Initiate GIS Projects
Organize Data Framework	GIS	2009	ARC	8	Manage Data / Information
Normalize Data	GIS	2009	ARC	8	Develop Data
Maintain geospatial database(s) *	RS	2011	DEN	8	Manage Data
Normalize data structure (e.g. schema)	GIS	2009	GSC	12	Process Data
Organize digital data (e.g. data library)	GIS	2009	GSC	12	Manage Data
Organize non-digital data	GIS	2009	GSC	12	Manage Data
Categorize data	GIS	2008	LLC	12	Modify Data
Establish file structure (Adv.)	GIS	2008	LLC	12	Maintain Data
Organize files according to Company procedures	GIS	2008	LLC	12	Perform Administrative Responsibilities
Organize data (rename, index volumes) *	RS	2011	MIL	6	Manage Data
Organize & archive validation data	RS	2009	SAC	5	Validate & Ground – Truth Data
Organize file structure (e.g. create directories, perform data & di	GIS	2005	SDM	11	Manage GIS Data
Organize work tasks.	GIS	1996	SMT	11	Organizational Skills
Organize written information (i.e., reports, resumes).	GIS	1996	SMT	11	Organizational Skills
Organize files.	GIS	1996	SMT	11	Organizational Skills
Assist other team members in organizing their work.	GIS	1996	SMT	11	Organizational Skills
Perform file management	GIS	2002	TST	8	Monitor Hardware/Software Environment
19 tasks			10 panels	78 members	A MANAGE DATA
A6 Back-up/restore data					**A MANAGE DATA**
Back-up finished project files	GIS	2002	AGK	5	Create Usable Products
Back-up raw data	GIS	2002	AGK	5	Initiate GIS Projects
Develop Back Up Plan	GIS	2009	ARC	8	Manage Data / Information
Implement Backup Plan	GIS	2009	ARC	8	Manage Data / Information
Create Archive Structure	GIS	2009	ARC	8	Manage Data / Information
Archive Data	GIS	2009	ARC	8	Manage Data / Information
Create backup (fail-over) *	RS	2011	DEN	8	Manage Data
Archive data *	RS	2011	DEN	8	Manage Data
Archive data	GIS	2009	GSC	12	Manage Data
Back-up Data	GIS	2008	LLC	12	Maintain Data
Backup / Restore data to / from local archive *	RS	2011	MIL	6	Manage Data
Backup / restore data to / from off-site archive	RS	2011	MIL	6	Manage Systems
Archive / retrieve data (E,C)	GIS	2005	SDM	11	Manage GIS Data
Backup / restore data (E,C)	GIS	2005	SDM	11	Manage GIS Data
Implement database backup procedures	GIS	2002	TST	8	Monitor Hardware/Software Environment
15 tasks			8 panels	70 members	A MANAGE DATA
A7 Convert / reformat data					**A MANAGE DATA**
Convert raw data into format of choice	GIS	2002	AGK	5	Process Spatial Data
Convert Data (AutoCAD, reformat, text)	GIS	2009	ARC	8	Develop Data
Convert Surveyor Coordinates (COGO)	GIS	2009	ARC	8	Develop Data
Translate Data Format	GIS	2009	ARC	8	Maintain Data
Format data (compression, interleave) *	RS	2011	DEN	8	Produce Data
Migrate data to new environment	RS	2011	DEN	8	Manage Data
Conversion of digital formats - data abstraction (cut, simplify, st	GIS	1997	GHC	12	Data Acquisition & Development
Convert Data Source (e.g. Auto-CAD)	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Perform data conversions	GIS	2009	GSC	12	Process Data
Convert data between formats (e.g. KML, XML, RSS) (Adv.)	GIS	2008	LLC	12	Modify Data

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty
Convert data format (raster/vector) *	RS	2011	MIL	6	Manage Data
Output LAS (Lidar) files	RS	2011	MIL	6	Process Data
Convert waveform data to points (LIDAR)	RS	2011	MIL	6	Process Data
Reformat data *	RS	2011	MIL	6	Manage Data
Convert rasters to vectors	RS	2009	SAC	5	Prepare Data
Convert vectors to rasters	RS	2009	SAC	5	Prepare Data
Reformat image / data type	RS	2009	SAC	5	Prepare Data
Export data (multiple formats)	RS	2009	SAC	5	Develop End Products
Convert between data formats (C)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Perform data conversions (between formats) (E, C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Convert data into consistent formats	GIS	2002	TST	8	Acquire & Develop Data
21 tasks			11 panels	92 members	A MANAGE DATA

A8 Join & relate data — A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Join tables (e.g. link, join, relate)	GIS	2009	GSC	12	Manage Data
Perform spatial join	GIS	2009	GSC	12	Manage Data
Join non-spatial data	GIS	2008	LLC	12	Modify Data
3 tasks			2 panels	24 members	A MANAGE DATA

A9 Define feature behavior (topology, subtypes, domains) — A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Create topology for related features (64%) (Adv.)	GIS	2008	LLC	12	Modify Data
Define feature behaviors (e.g. sub-types & domains) (C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Define feature relationships / behaviors (relate tables, relationsh	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Build topology	GIS	1996	SMT	11	GIS Techniques
Create Topology (clean, build)	GIS	2009	ARC	8	Develop Data
5 tasks			4 panels	42 members	A MANAGE DATA

A10 Develop data maintenance schedule — A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Develop a data maintenance schedule	GIS	1997	GHC	12	Maintain & Update Data
Develop data maintenance schedules	GIS	2005	SDM	11	Maintain GIS Data* (1)
Conform to data maintenance schedule	GIS	2002	TST	8	Update & Manipulate Data
3 tasks			3 panels	31 members	A MANAGE DATA

A11 Establish data custodianships — A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Administer security protocols	RS	2011	DEN	8	Manage hardware and software
Establish the data custodianships	GIS	1997	GHC	12	Maintain & Update Data
Assign access permissions	RS	2011	MIL	6	Manage Data
Stage data access	RS	2011	MIL	6	Manage Data
Assign data/database permissions	GIS	2005	SDM	11	Manage GIS Data
Establish data custodianship (C)	GIS	2005	SDM	11	Manage GIS Data
Implement Security Standards	GIS	2009	ARC	8	Manage Data / Information
Research Security Protocols	GIS	2009	ARC	8	Manage Data / Information
Assign Data Stewardship	GIS	2009	ARC	8	Maintain Data
9 tasks			5 panels	45 members	A MANAGE DATA

A12 Evaluate data — A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Choose data for analysis	GIS	2002	AGK	5	Analyze Processed Data
Evaluate Data Quality (spatial accuracy, currency)	GIS	2009	ARC	8	Maintain Data
Document Data GAPS	GIS	2009	ARC	8	Develop solutions
Perform quality control on data acquired	RS	2011	DEN	8	E Acquire Data
Perform image quality assessment	RS	2011	DEN	8	Assure Quality

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty
Evaluate data request feasibility	RS	2011	DEN	8	Develop Project Plan
Verify accuracy of imported data	GIS	1997	GHC	12	Information Sharing Data Exchange
Verify content and spatial accuracies	GIS	1997	GHC	12	Data Acquisition & Development
Ensure Data Quality (Quality Control, Quality Assurance)	GIS	2007	GRC	5	Manage Geographic Data Sets
Evaluate spatial data accuracy	GIS	2009	GSC	12	Process Data
Quality Assurance / Quality Control (Adv.) (Maintain data)	GIS	2008	LLC	12	Maintain Data
Determine data compatibility (e.g. projections) (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
QA/QC data (E,C) (Create/Acquire GIS Data)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
QA/QC data (E,C) (Maintain GIS Data)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Evaluate data in context of application.	GIS	1996	SMT	11	Principles of Geography
Evaluate data quality.	GIS	1996	SMT	11	GIS Techniques
Handle data types appropriately	GIS	2002	TST	8	Update & Manipulate Data
17 tasks			10 panels	92 members	A MANAGE DATA

A13 Evaluate data sources · · · · · A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Research data sources *	RS	2011	DEN	8	Develop Project Plan
Evaluate sources	GIS	1997	GHC	12	Data Acquisition & Development
Research Data Sources	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Identify data sources/resources	GIS	2009	GSC	12	Gather Data
Research existing geospatial data	GIS	2008	LLC	12	Collect / Create Data
Conduct background research	RS	2011	MIL	6	Project Planning
Identify data sources (needed & available)	RS	2011	MIL	6	Project Planning
Research available data (C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Evaluate data sources	GIS	2002	TST	8	Acquire & Develop Data
Identify Existing Data	GIS	2009	ARC	8	Develop solutions
10 tasks			9 panels	82 members	A MANAGE DATA

A14 Create data library · · · · · A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Maintain image library *	RS	2011	DEN	8	Manage Data
Inventory available imagery using web resources	RS	2009	SAC	5	Manage Projects
Inventory local knowledge of study area	RS	2009	SAC	5	Validate & Ground – Truth Data
3 tasks			2 panels	13 members	A MANAGE DATA

A15 Design/edit databases · · · · · A MANAGE DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Design Database Structures	GIS	2009	ARC	8	Manage Data / Information
Evaluate Existing Database Structures	GIS	2009	ARC	8	Manage Data / Information
Load Data into Database	GIS	2009	ARC	8	Maintain Data
Define Database Standards	GIS	2009	ARC	8	Develop Data
Create templates (databases, data attributes, work flow)	RS	2011	DEN	8	Develop Project Plan
Create geospatial database(s)	RS	2011	DEN	8	Manage Data
Setup file structure	RS	2011	DEN	8	Manage Data
Setup project environment	RS	2011	DEN	8	Produce Data
Define database fields	GIS	1997	GHC	12	Database Design
Define database tables	GIS	1997	GHC	12	Database Design
Determine key fields	GIS	1997	GHC	12	Database Design
Design Database Structure	GIS	2007	GRC	5	Create/Maintain/Manage Geographic Data Sets
Create Database Tables	GIS	2007	GRC	5	Manage Geographic Data Sets

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty
Create data storage structure (geodatabase, working directory, to	RS	2011	MIL	6	Manage Data
Create data / file structure	RS	2009	SAC	5	Acquire Data
Develop databases (e.g. define geometry & attributes)(C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Construct a data base	GIS	1996	SMT	11	Data Model/Data Base Skills
17 tasks			8 panels	66 members	A MANAGE DATA
A16 Create/maintain data dictionary					**A MANAGE DATA**
Create data dictionary	GIS	1997	GHC	12	Database Design
Maintain Data Dictionaries	GIS	2007	GRC	5	Create Technical Documentation
2 tasks			2 panels	17 members	A MANAGE DATA
B1 Collect field attribute data					**B GENERATE DATA**
Collect Field Data (GPS, photo, coordinates, attributes)	GIS	2009	ARC	8	Develop Data
Capture spatial & attribute data	GIS	1997	GHC	12	Data Acquisition & Development
Perform Data Entry (e.g. college GPSdata, collect field data)	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Collect data using GPS	GIS	2009	GSC	12	Gather Data
Electronically collect spatial data in the field (GPS, Traffic coun	GIS	2008	LLC	12	Collect / Create Data
Collect field attribute data (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Collect field location data via GPS (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Capture spatial and non-spatial data	GIS	2002	TST	8	Acquire & Develop Data
8 tasks			7 panels	68 members	B GENERATE DATA
B2 Conduct surveys & questionnaires					**B GENERATE DATA**
Collect data using field sheets	GIS	2009	GSC	12	Gather Data
Manually collect attribute data in the field (82%)	GIS	2008	LLC	12	Collect / Create Data
Administer questionnaires (27%)	GIS	2008	LLC	12	Collect / Create Data
3 tasks			2 panels	24 members	B GENERATE DATA
B3 Plan field missions					**B GENERATE DATA**
Establish (photogrametric) horizontal and vertical control (AGP	RS	2011	DEN	8	Acquire Data
Coordinate geodedic control prior to mapping	GIS	1997	GHC	12	Data Acquisition & Development
Adjust GNSS ground control network	RS	2011	MIL	6	Process Data
Verify sensor calibration	RS	2011	MIL	6	Analyze Data
Configure field equipment (GPS, magnetometer, sensor installat	RS	2011	MIL	6	Manage Systems
Calibrate Sensors	RS	2011	MIL	6	Manage Systems
Create airborne trajectory	RS	2011	MIL	6	Process Data
Create coverage index *	RS	2011	MIL	6	Acquire Data
Establish control networks	RS	2011	MIL	6	Acquire Data
Create sampling strategy	RS	2011	MIL	6	Project Planning
Obtain clearances (flight, ground permissions, customs)	RS	2011	MIL	6	Acquire Data
Develop field logistics (people, equipment, permissions)	RS	2009	SAC	5	Validate & Ground – Truth Data
12 tasks			4 panels	31 members	B GENERATE DATA
B4 Collect ground control points					**B GENERATE DATA**
Collect ground reference data *	RS	2011	DEN	8	E Acquire Data
Conduct field campaigns *	RS	2011	MIL	6	Acquire Data
Conduct Flight surveys	RS	2011	MIL	6	Acquire Data
Conduct ground truthing *	RS	2011	MIL	6	Acquire Data
Collect ground control points for imagery registration	RS	2009	SAC	5	Validate & Ground – Truth Data
Conduct rapid in-situ reconnaissance	RS	2009	SAC	5	Validate & Ground – Truth Data
Collect spectral signatures for imagery classification.	RS	2009	SAC	5	Validate & Ground – Truth Data

| Task Category / Task | Sector | Year | DACUM Panels | | Duty Category / Duty |
			Panel	Panel Size	
Collect training & accuracy data (field or sensor based)	RS	2009	SAC	5	Validate & Ground – Truth Data
Participate in geodetic control	GIS	2002	TST	8	Acquire & Develop Data
9 tasks			4 panels	27 members	B GENERATE DATA
B5 Post process GPS data					**B GENERATE DATA**
Post process GPS data (e.g. differential correction)	GIS	2009	GSC	12	Process Data
Post-process electronically collected field data (73%) (Adv.)	GIS	2008	LLC	12	Modify Data
2 tasks			2 panels	24 members	B GENERATE DATA
B6 Digitize data					**B GENERATE DATA**
Perform Data Entry (e.g. digitize geographic features, create Au	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
"Heads-up" digitize data	GIS	2009	GSC	12	Process Data
Digitize feature geometry	GIS	2008	LLC	12	Collect / Create Data
Digitize / vectorize data *	RS	2011	MIL	6	Process Data
Perform heads-up digitizing	RS	2009	SAC	5	Extract Information
Perform tablet digitization (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Perform "heads-up" (on-screen) digitization (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Digitize Data (heads-up, tracing)	GIS	2009	ARC	8	Develop Data
8 tasks			7 panels	59 members	B GENERATE DATA
B7 Geocode addresses					**B GENERATE DATA**
Perform Geo-coding	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Geocode addresses	GIS	2009	GSC	12	Process Data
Geocode (Adv)	GIS	2008	LLC	12	Collect / Create Data
Reverse geocode (82%) (Adv)	GIS	2008	LLC	12	Collect / Create Data
Geocode data (E, C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Geocode Data	GIS	2009	ARC	8	Develop Data
6 tasks			5 panels	48 members	B GENERATE DATA
B8 Scan non-digital data					**B GENERATE DATA**
Scan hard copy maps	GIS	2009	GSC	12	Gather Data
Scan non-digital data (91%)	GIS	2008	LLC	12	Collect / Create Data
Scan hard copy images (E, C)	GIS	2005	SDM	11	Create Image Data
Scan data *	RS	2011	MIL	6	Acquire Data
Scan Data	GIS	2009	ARC	8	Develop Data
5 tasks			5 panels	49 members	B GENERATE DATA
B9 Create/edit vector & attribute data					**B GENERATE DATA**
Match location points with attributes	GIS	2002	AGK	5	Process Spatial Data
Create Attribute Data	GIS	2009	ARC	8	Develop Data
Update Geometry	GIS	2009	ARC	8	Maintain Data
Update Attributes	GIS	2009	ARC	8	Maintain Data
Standardize Attributes	GIS	2009	ARC	8	Develop Data
Perform vector editing /clean up (build topology) *	RS	2011	DEN	8	Generate Products
Perform spatial and content updates	GIS	1997	GHC	12	Maintain & Update Data
Update Existing Data	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Edit attribute data	GIS	2009	GSC	12	Process Data
Edit spatial data	GIS	2009	GSC	12	Process Data
Post / reconcile edits (e.g. changes)	GIS	2009	GSC	12	Manage Data
Create features	GIS	2008	LLC	12	Collect / Create Data
Edit feature geometry	GIS	2008	LLC	12	Modify Data

		DACUM Panels		
Task Category / Task	Sector	Year	Panel	Panel Size	**Duty Category / Duty**
Enter data base information	GIS	2008	LLC	12	Collect / Create Data
Update non-spatial data attributes	GIS	2008	LLC	12	Modify Data
Update spatial data attributes	GIS	2008	LLC	12	Modify Data
Edit GIS data(e.g. add, delete, update) (E,C)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Populate GIS feature attributes (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Refresh/ replace layers (e.g. imagery, thematic layers) (C)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Create subset data	GIS	2002	TST	8	Update & Manipulate Data
Perform spatial and content updates	GIS	2002	TST	8	Update & Manipulate Data
21 tasks			9 panels	81 members	B GENERATE DATA

B10 Create/edit metadata — **B GENERATE DATA**

Task	Sector	Year	Panel	Panel Size	Duty
Update Metadata	GIS	2009	ARC	8	Maintain Data
Create Metadata	GIS	2009	ARC	8	Develop Data
Populate metadata *	RS	2011	DEN	8	Generate Products
Create metadata	GIS	1997	GHC	12	Data Acquisition & Development
Document spatial and content changes	GIS	1997	GHC	12	Document Data
Create and Update Meta Data	GIS	2007	GRC	5	Create Technical Documentation
Create / update metadata	GIS	2009	GSC	12	Manage Data
Create metadata	GIS	2008	LLC	12	Collect / Create Data
Update Metadata	GIS	2008	LLC	12	Maintain Data
Create metadata structure	RS	2011	MIL	6	Manage Data
Compile metadata	RS	2009	SAC	5	Develop End Products
Create metadata (E,C)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
Update metadata (E,C)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Create and maintain metadata	GIS	2002	TST	8	Document Data & Procedures
Initiate metadata process	GIS	2002	TST	8	Acquire & Develop Data
15 tasks			10 panels	87 members	B GENERATE DATA

B11 Create photogrammetric data — **B GENERATE DATA**

Task	Sector	Year	Panel	Panel Size	Duty
Perform stereo compilation*	RS	2011	DEN	8	Generate Products
Derive topographic products	RS	2011	DEN	8	Generate Products
Edit DEMs	RS	2011	DEN	8	Produce Data
3 tasks			1 panels	8 members	B GENERATE DATA

B12 Create LIDAR based products — **B GENERATE DATA**

Task	Sector	Year	Panel	Panel Size	Duty
Perform point cloud classification (automated macro filtering) *	RS	2011	DEN	8	Produce Data
Remove noise from raster / LIDAR data (spikes, bands, speckles)	RS	2011	MIL	6	Process Data
Create intensity image (LiDAR)	RS	2011	DEN	8	Produce Data
3 tasks			2 panels	22 members	B GENERATE DATA

B13 COGO legal descriptions — **B GENERATE DATA**

Task	Sector	Year	Panel	Panel Size	Duty
Digitize data using COGO (e.g. metes & bounds)	GIS	2009	GSC	12	Process Data
COGO (55%)	GIS	2008	LLC	12	Collect / Create Data
COGO legal descriptions (E)	GIS	2005	SDM	11	Create / Acquire GIS Data * (3)
3 tasks			3 panels	35 members	B GENERATE DATA

C1 Georeference data — **C PROCESS DATA**

Task	Sector	Year	Panel	Panel Size	Duty
Define Projection	GIS	2009	ARC	8	Develop Data
Rectify / Georeference Data	GIS	2009	ARC	8	Develop Data
Georeference data (GNSS, INS) *	RS	2011	DEN	8	Produce Data
Georeference imagery	GIS	1997	GHC	12	GIS & Remote Sensing Analysis

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
JOB TASKS BY CATEGORY
April, 2012

Task Category / Task		DACUM Panels			Duty Category / Duty
	Sector	Year	Panel	Panel Size	
Change data's spatial reference	GIS	2009	GSC	12	Process Data
Define data's spatial reference	GIS	2009	GSC	12	Process Data
Georeference data	GIS	2009	GSC	12	Process Data
Transform spatial data (e.g. reprojections)	GIS	2008	LLC	12	Modify Data
Rectify raster data (e.g. rubbersheeting)	GIS	2008	LLC	12	Modify Data
Georeference image / data	RS	2009	SAC	5	Prepare Data
Georeference digital imagery (C)	GIS	2005	SDM	11	Create Image Data
Rectify images (C)	GIS	2005	SDM	11	Create Image Data
Apply appropriate projections	GIS	2002	TST	8	Update & Manipulate Data
Georeference data	GIS	2002	TST	8	Update & Manipulate Data
14 tasks			*8 panels*	*76 members*	C PROCESS DATA

C2 Conduct image classification — C PROCESS DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Assess classification accuracy	RS	2011	DEN	8	Assure Quality
Assess attribution accuracy *	RS	2011	DEN	8	Assure Quality
Classify remote sensing data	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Create raster training sets	RS	2011	MIL	6	Analyze Data
Classify data	RS	2011	MIL	6	Analyze Data
Determine classification scheme	RS	2009	SAC	5	Extract Information
Evaluate & modify spectral signatures based on separability for	RS	2009	SAC	5	Extract Information
Define spectral signatures for classification	RS	2009	SAC	5	Extract Information
Convert unsupervised classes for spectral signatures for hybrid c	RS	2009	SAC	5	Extract Information
Conduct decision tree classification	RS	2009	SAC	5	Extract Information
Conduct sub-pixel classification (spectral mixture analysis)	RS	2009	SAC	5	Extract Information
Perform neural network classification	RS	2009	SAC	5	Extract Information
Perform supervised classification (single or multi-date image)	RS	2009	SAC	5	Extract Information
Perform unsupervised classification (single or multi-date image)	RS	2009	SAC	5	Extract Information
Evaluate classification accuracy (user, producers, overall / kappa	RS	2009	SAC	5	Assess Accuracy
Compare classification accuracy with standards	RS	2009	SAC	5	Assess Accuracy
Compare validation data with classification	RS	2009	SAC	5	Assess Accuracy
Create confusion matrix (contingency table)	RS	2009	SAC	5	Assess Accuracy
Refine classification (change inputs, iterate)	RS	2009	SAC	5	Extract Information
Reduce noise in classification	RS	2009	SAC	5	Develop End Products
Recode / reclassify image	RS	2009	SAC	5	Develop End Products
Perform image analysis (e.g. classification) (C)	GIS	2005	SDM	11	Create Image Data
22 tasks			*5 panels*	*42 members*	C PROCESS DATA

C3 Conduct image processing (Subset, clip, crop, mask) — C PROCESS DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Assemble spatial extent (mosaic, subset, tiling, mask)	RS	2011	DEN	8	Produce Data
Extract areas of interest (clip, subset, crop) *	RS	2011	MIL	6	Process Data
Subset image / data	RS	2009	SAC	5	Prepare Data
Mask unnecessary features	RS	2009	SAC	5	Prepare Data
4 tasks			*3 panels*	*19 members*	C PROCESS DATA

C4 Mosaic/coregister images — C PROCESS DATA

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Mosaic image / data	RS	2009	SAC	5	Prepare Data
Create mosaics *	RS	2011	MIL	6	Process Data
Conduct seam line generation and editing for mosaicking *	RS	2011	DEN	8	Produce Data
Co-register data (vertical registration) *	RS	2011	DEN	8	Produce Data
4 tasks			*3 panels*	*19 members*	C PROCESS DATA

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
C5 Sample/resample image data					**C PROCESS DATA**
Resample image / data	RS	2009	SAC	5	Prepare Data
Resample image data *	RS	2011	MIL	6	Process Data
Conduct data sampling	RS	2011	MIL	6	Analyze Data
Resample Data	GIS	2009	ARC	8	Develop Data
4 tasks			3 panels	19 members	C PROCESS DATA
C6 Conduct atmospheric / radiometric calibration					**C PROCESS DATA**
Perform atmospheric correction	RS	2009	SAC	5	Prepare Data
Perform radiometric correction	RS	2009	SAC	5	Prepare Data
Correct image defects	RS	2009	SAC	5	Prepare Data
Calibrate date (radiometric & geometric, atmospheric correction)	RS	2011	DEN	8	Produce Data
4 tasks			2 panels	13 members	C PROCESS DATA
C7 Conduct image enhancement					**C PROCESS DATA**
Perform image enhancement (pan sharpening, tonal balance, atmo	RS	2011	MIL	6	Process Data
Identify appropriate band combinations for display	RS	2009	SAC	5	Prepare Data
Enhance image contrast	RS	2009	SAC	5	Prepare Data
Enhance image for visual interpretation	RS	2011	DEN	8	Produce Data
Filter image (edge enhancement, smoothing)	RS	2009	SAC	5	Extract Information
5 tasks			3 panels	24 members	C PROCESS DATA
C8 Conduct visual interpretation					**C PROCESS DATA**
Conduct visual interpretation	RS	2009	SAC	5	Extract Information
Conduct visual interpretation	RS	2011	DEN	8	Generate Products
Interpret Imagery	GIS	2007	GRC	5	Conduct Data Analysis
Interpret Results (C)	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
Observe data anomalies	GIS	2002	AGK	5	Analyze Processed Data
Report data anomalies	GIS	2002	AGK	5	Analyze Processed Data
6 tasks			5 panels	34 members	C PROCESS DATA
C9 Reproject\transform data					**C PROCESS DATA**
Perform projection/datum transformation	RS	2009	SAC	5	Prepare Data
Reproject & transform data *	RS	2011	MIL	6	Process Data
Transform images (PCA, vegetation indices, band ratios)	RS	2009	SAC	5	Extract Information
3 tasks			2 panels	16 members	C PROCESS DATA
C10 Orthorectify photogrammetric data					**C PROCESS DATA**
Peform ortho-rectification *	RS	2011	DEN	8	Produce Data
Develop orthophotography	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Orthorectify /rectify data (raster, vector, geocorrect)	RS	2011	MIL	6	Process Data
Ortho-rectify image / data	RS	2009	SAC	5	Prepare Data
4 tasks			4 panels	31 members	C PROCESS DATA
C11 Conduct geoprocessing					**C PROCESS DATA**
Create Geoprocessing Plan	GIS	2009	ARC	8	Develop products
Geoprocess data (e.g. clip, buffer, union)	GIS	2008	LLC	12	Modify Data
Generalize vector data (smooth) *	RS	2011	MIL	6	Process Data
Conduct Geoprocessing (e.g. clip, buffering, overlay, run model	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
Pre-process Data (e.g. generalize, subset) (C)	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
5 tasks			4 panels	37 members	C PROCESS DATA

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
D1 Perform queries					**D ANALYZE DATA**
Perform spatial database queries	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Create Database Queries	GIS	2007	GRC	5	Manage Geographic Data Sets
Respond to Geographic Queries	GIS	2007	GRC	5	Conduct Data Analysis
Run Database Queries and Calculations	GIS	2007	GRC	5	Conduct Data Analysis
Perform data queries.	GIS	1996	SMT	11	Data Model/Data Base Skills
Perform basic spatial queries	GIS	2002	TST	8	Update & Manipulate Data
6 tasks			4 panels	36 members	D ANALYZE DATA
D2 Conduct network analysis					**D ANALYZE DATA**
Perform network analysis (dynamic segmentation)	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Identify least-cost path	GIS	2009	GSC	12	Analyze Data
Identify shortest route	GIS	2009	GSC	12	Analyze Data
Linear reference data	GIS	2009	GSC	12	Process Data
Model linear networks	GIS	2009	GSC	12	Analyze Data
Perform dynamic segmentation (18%) (Adv.)	GIS	2008	LLC	12	Collect / Create Data
Create Networls (routes)	GIS	2009	ARC	8	Develop Data
7 tasks			4 panels	44 members	D ANALYZE DATA
D3 Conduct geostatistical analysis					**D ANALYZE DATA**
Analyze data statistically	GIS	2002	AGK	5	Analyze Processed Data
Perform geostatistical analysis	RS	2011	DEN	8	Generate Products
Perform statistical analysis	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Generate statistical reports	GIS	2009	GSC	12	Analyze Data
Conduct trend analysis	RS	2011	MIL	6	Analyze Data
Perform regression analysis	RS	2009	SAC	5	Assess Accuracy
Generate statistics (e.g. descriptive, spatial) (C)	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
QA/QC Data (C) (Spatial/Non-Spatial Analysis)	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
Apply principles of computational geometry.	GIS	1996	SMT	11	GIS Techniques
Use random sampling techniques.	GIS	1996	SMT	11	Quality Control
10 tasks			8 panels	70 members	D ANALYZE DATA
D4 Proximity analysis					**D ANALYZE DATA**
Perform proximity analysis	RS	2011	MIL	6	Analyze Data
Perform proximity analysis	GIS	2009	GSC	12	Analyze Data
Perform buffer analysis	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
3 tasks			3 panels	30 members	D ANALYZE DATA
D5 Overlay analysis					**D ANALYZE DATA**
Combine data layers	GIS	2002	AGK	5	Analyze Processed Data
Compare data layers	GIS	2002	AGK	5	Analyze Processed Data
Perform vector/raster overlay analysis	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Perform overlay analysis.	GIS	1996	SMT	11	GIS Techniques
4 tasks			3 panels	28 members	D ANALYZE DATA
D6 Quantative analysis					**D ANALYZE DATA**
Calculate defined yield	GIS	2002	AGK	5	Process Spatial Data
Create recommendation equations	GIS	2002	AGK	5	Process Spatial Data
Interpolate defined yield	GIS	2002	AGK	5	Process Spatial Data

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
Interpolate point data	GIS	2002	AGK	5	Process Spatial Data
Extract Data	GIS	2009	ARC	8	Develop products
Conduct quantitative analysis on active sensor data	RS	2011	DEN	8	Generate Products
Conduct quantitative analysis on passive sensor data	RS	2011	DEN	8	Generate Products
Quantify features	RS	2011	MIL	6	Analyze Data
Tabulate area attributes *	RS	2011	MIL	6	Integrate Data
Summarize values in a grid (aggregate) *	RS	2011	MIL	6	Integrate Data
Quantify results (class statistics, landscape metrics)	RS	2009	SAC	5	Develop End Products
11 tasks			5 panels	32 members	D ANALYZE DATA
D7 Change detection					**D ANALYZE DATA**
Perform time series analysis	RS	2009	SAC	5	Extract Information
Perform change detection	RS	2011	DEN	8	Generate Products
Conduct change detection *	RS	2011	MIL	6	Analyze Data
Create a difference image (math tools)	RS	2011	MIL	6	Process Data
4 tasks			3 panels	19 members	D ANALYZE DATA
D8 Conduct view-shed analysis					**D ANALYZE DATA**
Conduct line of sight analysis *	RS	2011	MIL	6	Analyze Data
Perform view shed analysis	GIS	2009	GSC	12	Analyze Data
2 tasks			2 panels	18 members	D ANALYZE DATA
D9 Feature extration\image segmentation					**D ANALYZE DATA**
Perform vector (feature) extraction *	RS	2011	DEN	8	Generate Products
Extract features *	RS	2011	MIL	6	Analyze Data
Create ratio images (NDWI, NDVI, MSI, LAI, EVI, snow, tasse	RS	2011	MIL	6	Analyze Data
Perform object-based image analysis	RS	2009	SAC	5	Extract Information
Perform image segmentation	RS	2009	SAC	5	Extract Information
Conduct image subtraction (single bands or image transforms)	RS	2009	SAC	5	Extract Information
6 tasks			3 panels	19 members	D ANALYZE DATA
D10 Conduct resource and scenario analysis					**D ANALYZE DATA**
Perform mensuration *	RS	2011	DEN	8	Generate Products
Conduct cultural resource analysis	RS	2011	MIL	6	Analyze Data
Conduct wetlands analysis	RS	2011	MIL	6	Analyze Data
Conduct emergency response analysis	RS	2011	MIL	6	Analyze Data
Conduct fracture trace & lithology analysis	RS	2011	MIL	6	Analyze Data
5 tasks			2 panels	14 members	D ANALYZE DATA
D11 Model Surfaces					**D ANALYZE DATA**
Model land surface characteristics	RS	2011	MIL	6	Analyze Data
Develop a predictive planning model (urban sustainability mode	RS	2011	MIL	6	Analyze Data
Perform 3D modeling	RS	2011	DEN	8	Generate Products
Create surface models (TINs, DSMs, DTMs)	RS	2011	DEN	8	Generate Products
Create Surface Models (Point to Raster, TIN, Tessellation)	GIS	2009	ARC	8	Develop Data
Conduct slope analysis	GIS	2009	GSC	12	Analyze Data
Interpret topography (i.e., contour lines).	GIS	1996	SMT	11	Principles of Geography
Derive new data (e.g. generate contours from DEM, data genera	GIS	2009	GSC	12	Process Data
8 tasks			5 panels	57 members	D ANALYZE DATA

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
E1 Automate manual processes					**E MANAGE SOFTWARE & HARDWARE**
Run Third Party Models (Hazus, Hydro, Lucis)	GIS	2009	ARC	8	Develop solutions
Create Data Processing Procedures (automate)	GIS	2009	ARC	8	Maintain Data
Preprocess Data	GIS	2009	ARC	8	Maintain Data
Create Models	GIS	2009	ARC	8	Develop products
Create and run definition queries	RS	2011	DEN	8	Generate Products
Automate production (scripting, models, programming)	RS	2011	DEN	8	Generate Products
Automate Manual Processes	GIS	2007	GRC	5	Conduct Data Analysis
Automate Manual Processes (e.g. scripting, modal building)	GIS	2007	GRC	5	Create/Maintain/Manage Geographic Data Sets
Automate repetitive tasks (Adv.)	GIS	2008	LLC	12	Maintain Professional Development
Implement scripts (write, customize)	RS	2011	MIL	6	Process Data
Develop batch processing scripts	RS	2009	SAC	5	Extract Information
Create scripts (C)	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
Customize commercial software (C)	GIS	2005	SDM	11	Develop Software Applications
Create Models (e.g. process & scientific models, flow charts) (C	GIS	2005	SDM	11	Conduct Spatial / Non-Spatial Analysis (4) (Vecto
14 tasks			7 panels	55 members	E MANAGE SOFTWARE & HARDWARE
E2 Determine software & hardware requirements					**E MANAGE SOFTWARE & HARDWARE**
Determine hardware /software requirements/ constraints	GIS	1997	GHC	12	Data Acquisition & Development
Select database software according to: performance, usability, c	GIS	1997	GHC	12	Database Design
Provide Technology Recommendations	GIS	2007	GRC	5	Perform Related Technical Duties
Define user software needs (C)	GIS	2005	SDM	11	Develop Software Applications
Recommend new technologies	GIS	2002	TST	8	Monitor Hardware/Software Environment
Assess current technologies used in data collection.	GIS	1996	SMT	11	Data Collection Skills
6 tasks			5 panels	47 members	E MANAGE SOFTWARE & HARDWARE
E3 Maintain hardware					**E MANAGE SOFTWARE & HARDWARE**
Upgrade System Infrastructure	GIS	2009	ARC	8	Administer GIS Program
Procure Hardware	GIS	2009	ARC	8	Administer GIS Program
Maintain Hardware	GIS	2007	GRC	5	Manage Equipment and Supplies
Maintain field hardware (GNSS, sensors, planes)	RS	2011	DEN	8	Manage hardware and software
Maintain computer hardware	RS	2011	DEN	8	Manage hardware and software
Design System Architecture	GIS	2009	ARC	8	Administer GIS Program
Assess System Infrastructure	GIS	2009	ARC	8	Manage Data / Information
7 tasks			3 panels	29 members	E MANAGE SOFTWARE & HARDWARE
E4 Optimize database performance					**E MANAGE SOFTWARE & HARDWARE**
Optimize database structure (Adv.)	GIS	2008	LLC	12	Maintain Data
Optimize data file folders (Adv.)	GIS	2008	LLC	12	Maintain Data
Optimize data files (Adv.)	GIS	2008	LLC	12	Maintain Data
Conduct database performance tuning (e.g. compress, build stats	GIS	2005	SDM	11	Maintain GIS Data* (1)
Optimize workstation performance	GIS	2002	TST	8	Monitor Hardware/Software Environment
5 tasks			3 panels	31 members	E MANAGE SOFTWARE & HARDWARE
E5 Maintain software					**E MANAGE SOFTWARE & HARDWARE**
Support application	GIS	1997	GHC	12	Application Development
Update and maintain application	GIS	1997	GHC	12	Application Development
Maintain Software	GIS	2007	GRC	5	Manage Equipment and Supplies
Install Software (e.g. enhancements, service packs) (C)	GIS	2005	SDM	11	Provide Technical Support*
Comply with software licensing agreements	GIS	2002	TST	8	Monitor Hardware/Software Environment
Install software upgrades	GIS	2002	TST	8	Monitor Hardware/Software Environment

			DACUM Panels		
Task Category / Task	**Sector**	**Year**	**Panel**	**Panel Size**	**Duty Category / Duty**
Maintain workstation security	GIS	2002	TST	8	Monitor Hardware/Software Environment
Recommend software upgrades	GIS	2002	TST	8	Monitor Hardware/Software Environment
Install/Upgrade Software (licensing)	GIS	2009	ARC	8	Administer GIS Program
Procure Software	GIS	2009	ARC	8	Administer GIS Program
Maintain software (licensing, install, update)	RS	2011	DEN	8	Manage hardware and software
Install/update software (configure license server, field equipmen	RS	2011	MIL	6	Manage Systems
12 tasks			7 panels	58 members	E MANAGE SOFTWARE & HARDWARE
E6 Maintain equipment & supplies					**E MANAGE SOFTWARE & HARDWARE**
Request equipment & supplies (e.g. hardware, software)	GIS	2002	AGK	5	Define project parameters
Maintain inventory of supplies	GIS	1997	GHC	12	Paper Mapping Design & Development
Maintain Plotters and Printers	GIS	2007	GRC	5	Manage Equipment and Supplies
Order Supplies	GIS	2007	GRC	5	Manage Equipment and Supplies
Schedule Equipment	GIS	2007	GRC	5	Manage Equipment and Supplies
Maintain GPS & field equipment (digital camera, laser range fin	GIS	2009	GSC	12	Manage Equipment
Maintain plotter / printer	GIS	2009	GSC	12	Manage Equipment
Maintain scanner	GIS	2009	GSC	12	Manage Equipment
Maintain Vehicle	GIS	2009	GSC	12	Manage Equipment
Maintain equipment/ supplies) (E,C)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Cooperate in using shared equipment	GIS	2002	TST	8	Monitor Hardware/Software Environment
Monitor supplies inventories	GIS	2002	TST	8	Monitor Hardware/Software Environment
12 tasks			6 panels	53 members	E MANAGE SOFTWARE & HARDWARE
E7 Provide technical support					**E MANAGE SOFTWARE & HARDWARE**
Provide Technical Support	GIS	2007	GRC	5	Perform Related Technical Duties
Provide technical support for users (Adv.)	GIS	2008	LLC	12	Disseminate Data
Resolve user technical problems (C)	GIS	2005	SDM	11	Provide Technical Support*
Troubleshoot hardware/software problems	GIS	2002	TST	8	Monitor Hardware/Software Environment
Provide Technical Support	GIS	2009	ARC	8	Administer GIS Program
5 tasks			5 panels	44 members	E MANAGE SOFTWARE & HARDWARE
E8 Develop user guides					**E MANAGE SOFTWARE & HARDWARE**
Develop training applications and course materials	GIS	1997	GHC	12	Training & Education
Develop users guides	GIS	1997	GHC	12	Training & Education
Build help files	GIS	2005	SDM	11	Develop Software Applications
Write Technical Guides (C)	GIS	2005	SDM	11	Provide Technical Support*
Create "read me" files	GIS	2002	TST	8	Exchange & Share Data
5 tasks			3 panels	31 members	E MANAGE SOFTWARE & HARDWARE
F1 Coordinate project activities					**F MANAGE PROJECTS**
Coordinate multiple projects and ongoing activities	GIS	1997	GHC	12	Project Management
Coordinate with Project Team	GIS	2007	GRC	5	Perform Project Management
Coordinate Projects with Stakeholders	GIS	2007	GRC	5	Perform Project Management
Coordinate work with Consultants	GIS	2007	GRC	5	Perform Project Management
Coordinate with Information Technology (IT)	GIS	2007	GRC	5	Perform Related Technical Duties
Coordinate project resources (staff, software, hardware)	RS	2011	MIL	6	Manage Projects
Coordinate with IT and R&D personnel (internal & external)	RS	2011	MIL	6	Manage Systems
Coordinate GIS projects (C)	GIS	2005	SDM	11	Perform Administrative Responsibilities

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
Coordinate multiple activities	GIS	2002	TST	8	Manage Individual Assignments
Maintain project resources	GIS	2002	TST	8	Manage Individual Assignments
Assure QA/QC	GIS	2002	TST	8	Manage Individual Assignments
11 tasks			5 panels	42 members	F MANAGE PROJECTS
F2 Clarify project scope & objectives					**F MANAGE PROJECTS**
Clarify Business Needs	GIS	2009	ARC	8	Develop solutions
Define Limitations & Constraints (dependencies)	GIS	2009	ARC	8	Develop solutions
Define Project Goal	GIS	2009	ARC	8	Develop solutions
Determine Stakeholders	GIS	2009	ARC	8	Develop solutions
Determine Analytical Approach	GIS	2009	ARC	8	Develop solutions
Determine scope of project	GIS	1997	GHC	12	Project Management
Develop project scope	GIS	2009	GSC	12	Manage Tasks
Prepare project scope & methodology	RS	2011	MIL	6	Project Planning
Clarify project scope / objectives with client	RS	2009	SAC	5	Manage Projects
Document project scope / objectives	RS	2009	SAC	5	Manage Projects
10 tasks			5 panels	43 members	F MANAGE PROJECTS
F3 Develop a project plan					**F MANAGE PROJECTS**
Develop Project Prototype	GIS	2009	ARC	8	Develop solutions
Test Project Prototype	GIS	2009	ARC	8	Develop solutions
Implement Analytical Approach	GIS	2009	ARC	8	Develop solutions
Develop Project Plan	GIS	2007	GRC	5	Perform Project Management
4 tasks			2 panels	13 members	F MANAGE PROJECTS
F4 Identify project deliverables					**F MANAGE PROJECTS**
Assist in defining deliverables (maps, reports,…)	GIS	1997	GHC	12	Database Design
Define deliverables	GIS	1997	GHC	12	Project Management
Identify project deliverables	RS	2011	MIL	6	Project Planning
3 tasks			2 panels	18 members	F MANAGE PROJECTS
F5 Define project study area					**F MANAGE PROJECTS**
Determine area of interest	RS	2011	DEN	8	Develop Project Plan
Identify study area	RS	2011	MIL	6	Project Planning
Define area & time period of interest	RS	2009	SAC	5	Manage Projects
Define Extent (footprint)	GIS	2009	ARC	8	Develop Data
Identify service area	GIS	2009	GSC	12	Analyze Data
Perform site selection	GIS	2009	GSC	12	Analyze Data
6 tasks			5 panels	39 members	F MANAGE PROJECTS
F6 Allocate project resources					**F MANAGE PROJECTS**
Allocate resources (time/people /$)	RS	2011	DEN	8	Manage Programs
Allocate internal / external resource needs (equipment, personne	GIS	1997	GHC	12	Project Management
Determine resource needs (equipment, personnel, data)	GIS	1997	GHC	12	Project Management
Identify needed resources (software, servers, personnel, equipme	RS	2011	MIL	6	Project Planning
Assign tasks to personnel	RS	2011	MIL	6	Manage Projects
Allocate server space	RS	2011	MIL	6	Manage Systems
6 tasks			3 panels	26 members	F MANAGE PROJECTS

			DACUM Panels		
Task Category / Task	**Sector**	**Year**	**Panel**	**Panel Size**	**Duty Category / Duty**
F7 Evaluate project status					**F MANAGE PROJECTS**
Assess Analytical Outcomes	GIS	2009	ARC	8	Develop solutions
Communicate Analytical Outcomes	GIS	2009	ARC	8	Develop solutions
Evaluate Program (ROI)	GIS	2009	ARC	8	Administer GIS Program
Evaluate project	RS	2011	DEN	8	Develop Project Plan
Verify project completeness	RS	2011	DEN	8	Assure Quality
Monitor project status	RS	2011	DEN	8	Develop Project Plan
Monitor project environment (troubleshoot, versioning)	RS	2011	DEN	8	Produce Data
Verify that project goals were met	GIS	1997	GHC	12	Project Management
Monitor project progress	GIS	1997	GHC	12	Project Management
Evaluate environmental conditions	RS	2009	SAC	5	Manage Projects
Monitor schedule and budget	RS	2009	SAC	5	Manage Projects
Optimize resources	GIS	2002	TST	8	Manage Individual Assignments
Meet project budget	GIS	2002	TST	8	Manage Individual Assignments
13 tasks			5 panels	41 members	F MANAGE PROJECTS
F8 Develop policy, standards & procedures					**F MANAGE PROJECTS**
Establish project standards (e.g. layout & format consistency)	GIS	2002	AGK	5	Define project parameters
Develop Technical Standards	GIS	2009	ARC	8	Administer GIS Program
Participate in Policy Development Process	GIS	2009	ARC	8	Administer GIS Program
Develop (Cross-Org.) Standards	GIS	2009	ARC	8	Promote GIS
Apply Legal Requirements	GIS	2009	ARC	8	Manage Data / Information
Develop policy for sharing data	GIS	1997	GHC	12	Information Sharing Data Exchange
Prepare quality plan	RS	2011	MIL	6	Project Planning
Devise contingency plan (data, resources,gaps)	RS	2011	MIL	6	Project Planning
Define methodology & workflow (classification scheme)	RS	2009	SAC	5	Manage Projects
Develop GIS procedures (e.g. to update data)	GIS	2005	SDM	11	Maintain GIS Data* (1)
Assess documentation needs	GIS	2002	TST	8	Document Data & Procedures
Develop procedural guides	GIS	2002	TST	8	Document Data & Procedures
12 tasks			7 panels	55 members	F MANAGE PROJECTS
F9 Document/record methodology & procedures					**F MANAGE PROJECTS**
Document procedures	RS	2011	DEN	8	Manage Programs
Produce in-house standardized data documentation	GIS	1997	GHC	12	Document Data
Conform to policy and standards	GIS	1997	GHC	12	Project Management
Document Project Results	GIS	2007	GRC	5	Create Technical Documentation
Document operating procedures	GIS	2009	GSC	12	Manage Tasks
Complete Company documentation	GIS	2008	LLC	12	Perform Administrative Responsibilities
Document what you have done for next person.	GIS	1996	SMT	11	Quality Control
Maintain project documentation	GIS	2002	TST	8	Manage Individual Assignments
Conform to policies and standards	GIS	2002	TST	8	Manage Individual Assignments
Create documentation	GIS	2002	TST	8	Document Data & Procedures
Comply with company P&P	GIS	2002	TST	8	Monitor Hardware/Software Environment
Document Data Processing Procedures	GIS	2009	ARC	8	Manage Data / Information
12 tasks			8 panels	76 members	F MANAGE PROJECTS
F10 Prepare project budget					**F MANAGE PROJECTS**
Create Fiscal Plan (budget)	GIS	2009	ARC	8	Administer GIS Program
Develop project budget (resources, $, time, people)	RS	2011	DEN	8	Develop Project Plan
Budget project	GIS	1997	GHC	12	Project Management

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
Prepare budget	RS	2011	MIL	6	Project Planning
Create project budget (staffing, cost factor, timeline, site visit)	RS	2009	SAC	5	Manage Projects
5 tasks			5 panels	39 members	F MANAGE PROJECTS
F11 Develop project timeline/schedule					**F MANAGE PROJECTS**
Determine project timeline	GIS	2002	AGK	5	Define project parameters
Develop project timetables	GIS	1997	GHC	12	Project Management
Estimate Task Schedule	GIS	2007	GRC	5	Perform Project Management
Develop project schedule	GIS	2009	GSC	12	Manage Tasks
Prepare schedule / timeline	RS	2011	MIL	6	Project Planning
Track project milestones (funding, costs)	RS	2011	MIL	6	Manage Projects
Conform to project timetables	GIS	2002	TST	8	Manage Individual Assignments
Develop Project Plan (schedules, budgets, work plans / flow, deliv	GIS	2009	ARC	8	Develop solutions
8 tasks			7 panels	56 members	F MANAGE PROJECTS
F12 Priortize/streamline workflow					**F MANAGE PROJECTS**
Streamline workflow (Increase efficiency)	RS	2011	DEN	8	Develop Project Plan
Prioritize Work Load	GIS	2007	GRC	5	Perform Related Technical Duties
Establish Work Flow Priorities	GIS	2009	ARC	8	Administer GIS Program
Make decisions to organize work priorities in light of unexpecte	GIS	1996	SMT	11	Organizational Skills
4 tasks			4 panels	32 members	F MANAGE PROJECTS
F13 Contribute to company's strategic plan					**F MANAGE PROJECTS**
Contribute to company's strategic plan	RS	2011	DEN	8	Manage Programs
Develop Strategic Plan (mission statement)	GIS	2009	ARC	8	Administer GIS Program
2 tasks			2 panels	16 members	F MANAGE PROJECTS
F14 Maintain Contracts					**F MANAGE PROJECTS**
Maintain contracts (E)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Comply with hardware maintenance agreements	GIS	2002	TST	8	Monitor Hardware/Software Environment
2 tasks			2 panels	19 members	F MANAGE PROJECTS
F15 Develop a disaster recovery plan					**F MANAGE PROJECTS**
Create a Disaster Recovery Plan	GIS	2009	ARC	8	Administer GIS Program
Implement Disaster / Recovery Plan	GIS	2009	ARC	8	Manage Data / Information
2 tasks			1 panels	8 members	F MANAGE PROJECTS
F16 Prepare cost estimates					**F MANAGE PROJECTS**
Assess project costs	GIS	1997	GHC	12	Project Management
Assess acquisition costs	GIS	1997	GHC	12	Data Acquisition & Development
Assess maintenance & update cost	GIS	1997	GHC	12	Maintain & Update Data
Prepare cost estimates (e.g. time, equipment) (C)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Obtain data acquisition cost quotes	GIS	2002	TST	8	Acquire & Develop Data
Identify Project Costs	GIS	2009	ARC	8	Develop solutions
6 tasks			4 panels	39 members	F MANAGE PROJECTS
F17 Write proposals & grant applications					**F MANAGE PROJECTS**
Write proposals	RS	2011	DEN	8	Manage Programs
Write funding proposals	RS	2009	SAC	5	Manage Projects
Write proposals & grant applic. to secure funding	RS	2011	MIL	6	Project Planning

Task Category / Task	Sector	Year	DACUM Panels		Duty Category / Duty
			Panel	Panel Size	
Write/Apply for Grants	GIS	2009	ARC	8	Administer GIS Program
Identify Funding Sources	GIS	2009	ARC	8	Administer GIS Program
5 tasks			4 panels	27 members	F MANAGE PROJECTS
F18 Participate in hiring personnel					**F MANAGE PROJECTS**
Participate in Hiring Process	GIS	2009	ARC	8	Administer GIS Program
Develop Job Descriptions	GIS	2009	ARC	8	Administer GIS Program
Contribute to the hiring procedures	RS	2011	DEN	8	Manage Programs
Participate in Hiring and Supervisory Activities	GIS	2007	GRC	5	Perform Related Technical Duties
Select project personnel	RS	2011	MIL	6	Manage Projects
5 tasks			4 panels	27 members	F MANAGE PROJECTS
F19 Evaluate project personnel					**F MANAGE PROJECTS**
Evaluate employees	RS	2011	DEN	8	Manage Programs
Evaluate staff performance (safety, interns)	RS	2011	MIL	6	Manage Projects
2 tasks			2 panels	14 members	F MANAGE PROJECTS
F20 Troubleshoot & make recommendations					**F MANAGE PROJECTS**
Troubleshoot problems	RS	2011	MIL	6	Manage Projects
Identify & implement process improvements	RS	2011	MIL	6	Manage Projects
Make project recommendations	GIS	2002	AGK	5	Create Usable Products
Produce application recommendation files	GIS	2002	AGK	5	Create Usable Products
4 tasks			2 panels	11 members	F MANAGE PROJECTS
G1 Design & create maps					**G GENERATE PRODUCTS & SERVICES**
Make project maps	GIS	2002	AGK	5	Create Usable Products
Create Cartographic Output	GIS	2009	ARC	8	Develop products
Define purpose and use of maps	GIS	1997	GHC	12	Paper Mapping Design & Development
Determine appropriate fonts and colors	GIS	1997	GHC	12	Paper Mapping Design & Development
Determine appropriate scale	GIS	1997	GHC	12	Paper Mapping Design & Development
Recognize cartographic conventions	GIS	1997	GHC	12	Paper Mapping Design & Development
Design layout	GIS	1997	GHC	12	Paper Mapping Design & Development
Select proper media/output device	GIS	1997	GHC	12	Paper Mapping Design & Development
Acknowledge contributors	GIS	1997	GHC	12	Paper Mapping Design & Development
Design Maps	GIS	2007	GRC	5	Fulfill Map/Data Requests
Design Cartographic Elements	GIS	2007	GRC	5	Fulfill Map/Data Requests
Create Maps	GIS	2007	GRC	5	Fulfill Map/Data Requests
Perform Graphic Design	GIS	2007	GRC	5	Fulfill Map/Data Requests
Plot Map	GIS	2007	GRC	5	Fulfill Map/Data Requests
Create reference maps (e.g. streets)	GIS	2009	GSC	12	Generate Deliverables
Create thematic maps (e.g. zoning)	GIS	2009	GSC	12	Generate Deliverables
Create interactive maps (82%) (Adv.)	GIS	2008	LLC	12	Disseminate Data
Create static maps	GIS	2008	LLC	12	Disseminate Data
Design map layouts	GIS	2008	LLC	12	Disseminate Data
Create map series templates	GIS	2008	LLC	12	Disseminate Data
Prepare exhibits (graphics, tables, charts, imagery, annotation)	RS	2011	MIL	6	Disseminate Results
Create Site Maps *	RS	2011	MIL	6	Acquire Data
Create cartographic maps *	RS	2011	MIL	6	Disseminate Results
Create site suitability maps	RS	2011	MIL	6	Analyze Data
Design maps	RS	2009	SAC	5	Develop End Products
Print large format maps	RS	2009	SAC	5	Develop End Products

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty
Create map templates (C)	GIS	2005	SDM	11	Develop Software Applications
Create maps (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Create graphic items (e.g. logos, headers, posters, exhibits) (E,C	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Conceptualize scale.	GIS	1996	SMT	11	Principles of Geography
Calculate scale transformations.	GIS	1996	SMT	11	Cartographic Skills
Use appropriate symbology.	GIS	1996	SMT	11	Cartographic Skills
Resolve spatial conflicts.	GIS	1996	SMT	11	Cartographic Skills
Interpret maps.	GIS	1996	SMT	11	Principles of Geography
Acknowledge contributors and copyrights	GIS	2002	TST	8	Develop & Design Map Displays
Adhere to purpose and use of maps	GIS	2002	TST	8	Develop & Design Map Displays
Apply cartographic conventions	GIS	2002	TST	8	Develop & Design Map Displays
Design layout	GIS	2002	TST	8	Develop & Design Map Displays
Determine appropriate scale and projection	GIS	2002	TST	8	Develop & Design Map Displays
Determine appropriate symbology	GIS	2002	TST	8	Develop & Design Map Displays
Select proper media/output device	GIS	2002	TST	8	Develop & Design Map Displays
41 tasks			11 panels	95 members	*G GENERATE PRODUCTS & SERVICES*

G2 Create animations & fly-throughs — **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Create animations	RS	2009	SAC	5	Develop End Products
Create video fly through	RS	2011	MIL	6	Analyze Data
Create 3D / stereo images *	RS	2011	MIL	6	Integrate Data
Create fly-throughs	RS	2011	DEN	8	Generate Products
Create animation (e.g. 3D, 4D)	GIS	2009	GSC	12	Generate Deliverables
5 tasks			4 panels	31 members	*G GENERATE PRODUCTS & SERVICES*

G3 Create reports — **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Generate field reports e.g. budget, input quantities	GIS	2002	AGK	5	Create Usable Products
Create Reports	GIS	2009	ARC	8	Develop products
Report Results	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Create Database Reports	GIS	2007	GRC	5	Manage Geographic Data Sets
Create data analysis reports (e.g. tables, charts)	GIS	2009	GSC	12	Generate Deliverables
Create project status report	GIS	2009	GSC	12	Manage Tasks
Create reports (91%)	GIS	2008	LLC	12	Disseminate Data
Prepare progress reports	RS	2011	MIL	6	Manage Projects
Prepare written reports/ documentation	RS	2011	MIL	6	Disseminate Results
Create scientific reports	RS	2009	SAC	5	Develop End Products
Create analysis reports (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Write informational reports (e.g. progress, technical, procedura	GIS	2005	SDM	11	Perform Administrative Responsibilities
Report results	GIS	2002	TST	8	Update & Manipulate Data
13 tasks			10 panels	84 members	*G GENERATE PRODUCTS & SERVICES*

G4 Create tables & charts — **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Create Database Tables	GIS	2007	GRC	5	Create/Maintain Geographic Data Sets
Create Mail Lists	GIS	2007	GRC	5	Fulfill Map/Data Requests
Create charts (82%)	GIS	2008	LLC	12	Disseminate Data
Create charts (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Create tables (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Generate mailing labels (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Create charts	RS	2009	SAC	5	Develop End Products

			DACUM Panels		
Task Category / Task	**Sector**	**Year**	**Panel**	**Panel Size**	**Duty Category / Duty**
Create tables	RS	2009	SAC	5	Develop End Products
Create Spreadsheets	GIS	2009	ARC	8	Develop products
9 tasks			5 panels	41 members	G GENERATE PRODUCTS & SERVICES

G5 Develop & make presentations   **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Create project presentation(s)	GIS	2002	AGK	5	Create Usable Products
Present completed products	GIS	2002	AGK	5	Create Usable Products
Develop presentation graphics (graphs, power point) *	RS	2011	DEN	8	Generate Products
Perform public speaking *	RS	2011	DEN	8	Develop Professionally
Provide information presentations for users	GIS	1997	GHC	12	Training & Education
Create Presentation Materials	GIS	2007	GRC	5	Participate in Training and Outreach
Give Informational Presentations	GIS	2007	GRC	5	Participate in Training and Outreach
Create Presentation Materials	GIS	2007	GRC	5	Fulfill Map/Data Requests
Develop presentations	GIS	2009	GSC	12	Generate Deliverables
Present project summary	GIS	2008	LLC	12	Disseminate Data
Give presentations at professional events (community colleges)	RS	2011	MIL	6	Professional Development
Present findings face to face	RS	2011	MIL	6	Disseminate Results
Present findings virtually	RS	2011	MIL	6	Disseminate Results
Conduct presentations	RS	2009	SAC	5	Pursue Professional Development & Outreach
Prepare presentations	RS	2009	SAC	5	Develop End Products
Provide information presentations	GIS	2002	TST	8	Pursue Professional Development
16 tasks			9 panels	73 members	G GENERATE PRODUCTS & SERVICES

G6 Prepare documents & data   **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Create Data CD	GIS	2009	ARC	8	Develop products
Create Technical Documents	GIS	2009	ARC	8	Develop products
Prepare Document for Publication (graphic design software)	GIS	2009	ARC	8	Develop products
Prepare deliverables (compile) *	RS	2011	DEN	8	Disseminate Products
Deliver Media (hard drive, DVD) *	RS	2011	DEN	8	Disseminate Products
Inform client of delivery	RS	2011	DEN	8	Disseminate Products
Disseminate documentation where appropriate	GIS	1997	GHC	12	Document Data
Load/Burn Data onto Media	GIS	2007	GRC	5	Fulfill Map/Data Requests
Deliver Maps and Data	GIS	2007	GRC	5	Fulfill Map/Data Requests
Publish final papers	RS	2011	MIL	6	Disseminate Results
Distribute data according to organizational policy (E,C)	GIS	2005	SDM	11	Manage GIS Data
Distribute hard copy products (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Produce deliverables	GIS	2002	TST	8	Manage Individual Assignments
Disseminate documentation	GIS	2002	TST	8	Document Data & Procedures
14 tasks			7 panels	58 members	G GENERATE PRODUCTS & SERVICES

G7 Publish digital information   **G GENERATE PRODUCTS & SERVICES**

Task	Sector	Year	Panel	Panel Size	Duty
Publish Data to Web	GIS	2009	ARC	8	Develop solutions
Publish Data Library	GIS	2009	ARC	8	Manage Data / Information
Ensure adequate security for product dissemination	RS	2011	DEN	8	Disseminate Products
Post deliverables to website or map service (wiki, cloud) *	RS	2011	DEN	8	Disseminate Products
Post deliverables to FTP and server *	RS	2011	DEN	8	Disseminate Products
Disseminate information through a web site	GIS	1997	GHC	12	Training & Education
Manage Web Content	GIS	2007	GRC	5	Perform Related Technical Duties
Publish Map Products	GIS	2007	GRC	5	Fulfill Map/Data Requests
Publish digital spatial information (CD, DVD)	GIS	2008	LLC	12	Disseminate Data
Publish spatial information on-line	GIS	2008	LLC	12	

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
Publish metadata	GIS	2008	LLC	12	Disseminate Data
Publish metadata *	RS	2011	MIL	6	Disseminate Results
Share data (web-FTP)	RS	2009	SAC	5	Develop End Products
Distribute digital products (E,C)	GIS	2005	SDM	11	Generate GIS Products* (2) (hard copy, electronic
Disseminate information via Internet	GIS	2002	TST	8	Exchange & Share Data
15 tasks			9 panels	75 members	G GENERATE PRODUCTS & SERVICES

G8 Integrate data | | | | | **G GENERATE PRODUCTS & SERVICES**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Build mashups	RS	2011	DEN	8	Generate Products
Integrate non-spatial data *	RS	2011	DEN	8	Generate Products
Display maps and data on raster dataset *	RS	2011	MIL	6	Integrate Data
Link / hyperlink data *	RS	2011	MIL	6	Integrate Data
Combine image /data layers	RS	2009	SAC	5	Prepare Data
5 tasks			3 panels	19 members	G GENERATE PRODUCTS & SERVICES

G9 Develop software applications & web services | | | | | **G GENERATE PRODUCTS & SERVICES**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Develop Web Applications	GIS	2009	ARC	8	Develop products
Produce Web Services	GIS	2009	ARC	8	Develop products
Create Custom Application	GIS	2009	ARC	8	Develop products
Decommission services (website, links, hardware, files)	RS	2011	DEN	8	Manage hardware and software
Test application performance	GIS	1997	GHC	12	Application Development
Design application	GIS	1997	GHC	12	Application Development
Determine programming tools required to develop applications	GIS	1997	GHC	12	Application Development
Develop application to simplify and/or standardize procedures	GIS	1997	GHC	12	Application Development
Exercise quality control (Application Dev't)	GIS	1997	GHC	12	Application Development
Determine application design format (e.g. platform, language)	GIS	2005	SDM	11	Develop Software Applications
Develop software applications	GIS	2005	SDM	11	Develop Software Applications
QA/QC software applications (e.g. beta test) (C)	GIS	2005	SDM	11	Develop Software Applications
Enhance existing custom applications	GIS	2005	SDM	11	Develop Software Applications
13 tasks			4 panels	39 members	G GENERATE PRODUCTS & SERVICES

H1 Communicate with others | | | | | **H PROFESSIONAL DEVELOPMENT**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Interact with co-workers *	RS	2011	DEN	8	Manage Programs
Let users & data custodians know that updates are completed	GIS	1997	GHC	12	Maintain & Update Data
Communicate with peers	GIS	1997	GHC	12	GIS & Remote Sensing Analysis
Gather User Requirements	GIS	2007	GRC	5	Fulfill Map/Data Requests, Perform Proj. Mgmt.
Communicate with co-workers	GIS	2008	LLC	12	Perform Administrative Responsibilities
Interact with co-workers	GIS	2008	LLC	12	Maintain Professional Development
Correspond with others (e.g. email, mail, phone) (C)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Communicate quality control problems to other team members.	GIS	1996	SMT	11	Quality Control
Present ideas clearly and concisely.	GIS	1996	SMT	11	Communication Skills/Teamwork
Communicate with peers	GIS	2002	TST	8	Manage Individual Assignments
Inform data users and custodians of update completion	GIS	2002	TST	8	Update & Manipulate Data
11 tasks			7 panels	67 members	H PROFESSIONAL DEVELOPMENT

H2 Network professionally | | | | | **H PROFESSIONAL DEVELOPMENT**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Network with industry professionals	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Network with Peers	GIS	2009	ARC	8	Pursue Professional Development
Attend User Groups	GIS	2009	ARC	8	Pursue Professional Development
Network Internally about GIS	GIS	2009	ARC	8	Promote GIS

Task Category / Task	Sector	Year	DACUM Panels Panel	Panel Size	Duty Category / Duty
Network with other Professionals *	RS	2011	DEN	8	Develop Professionally
Network with other job related professionals	GIS	2008	LLC	12	Maintain Professional Development
6 tasks			4 panels	33 members	H PROFESSIONAL DEVELOPMENT

H3 Participate in conferences, seminars & workshops — **H PROFESSIONAL DEVELOPMENT**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Visit trade shows	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Participate in Professional Organizations	GIS	2009	ARC	8	Promote GIS
Participate in GIS Conferences	GIS	2009	ARC	8	Pursue Professional Development & Outreach
Attend Professional Conferences	GIS	2009	ARC	8	
Participate in conferences, seminars and workshops *	RS	2011	DEN	8	Develop Professionally
Participate in User Groups	GIS	2007	GRC	5	Participate in Training and Outreach
Participate in workshops & conferences	GIS	2009	GSC	12	Professional Development
Attend User Conferences	GIS	2008	LLC	12	Maintain Professional Development
Participate in job related workshops	GIS	2008	LLC	12	Maintain Professional Development
Present at User Conferences (55%) (Adv.)	GIS	2008	LLC	12	Maintain Professional Development
Participate in job related professional organizations	GIS	2008	LLC	12	Maintain Professional Development
Attend professional events *	RS	2011	MIL	6	Professional Development
Participate in workshops	RS	2009	SAC	5	Pursue Professional Development & Outreach
Participate in conferences	RS	2009	SAC	5	Pursue Professional Development & Outreach
Participate in professional conferences (e.g. oral, poster submiss	GIS	2005	SDM	11	Pursue Professional Development
Participate in GIS user groups (E,C)	GIS	2005	SDM	11	Pursue Professional Development
Participate in professional organizations	GIS	2002	TST	8	Pursue Professional Development
17 tasks			10 panels	80 members	H PROFESSIONAL DEVELOPMENT

H4 Prepare & conduct training — **H PROFESSIONAL DEVELOPMENT**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Train co-workers	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Train GIS Employees	GIS	2009	ARC	8	Administer GIS Program
Teach GIS	GIS	2009	ARC	8	Promote GIS
Develop Training Program	GIS	2009	ARC	8	Promote GIS
Train End Users	GIS	2009	ARC	8	Train End Users
Train client on product	RS	2011	DEN	8	Disseminate Products
Conduct training (job shadow) *	RS	2011	DEN	8	Develop Professionally
Assess level of user's knowledge and needs and train accordingl	GIS	1997	GHC	12	Training & Education
Establish and maintain remote training sites	GIS	1997	GHC	12	Training & Education
Provide post training support	GIS	1997	GHC	12	Training & Education
Organize Staff/Department Training	GIS	2007	GRC	5	Participate in Training and Outreach
Train Other Staff	GIS	2007	GRC	5	Participate in Training and Outreach
Cross-training (e.g. mentoring, coaching)	GIS	2009	GSC	12	Professional Development
Provide training	GIS	2009	GSC	12	Generate Deliverables
Conduct training (external/ internal)	RS	2011	MIL	6	Professional Development
Conduct workshops	RS	2009	SAC	5	Pursue Professional Development & Outreach
Produce training materials	RS	2009	SAC	5	Pursue Professional Development & Outreach
Cross-train within organization (C)	GIS	2005	SDM	11	Pursue Professional Development
Train GIS end-user(s) (C)	GIS	2005	SDM	11	Provide Technical Support*
Participate in peer training	GIS	2002	TST	8	Pursue Professional Development
20 tasks			10 panels	80 members	H PROFESSIONAL DEVELOPMENT

H5 Attend training — **H PROFESSIONAL DEVELOPMENT**

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
Seek additional training	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Evaluate personal performance	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Take GIS Classes (vendor training)	GIS	2009	ARC	8	Pursue Professional Development

Task Category / Task	Sector	Year	DACUM Panels Panel	DACUM Panels Panel Size	Duty Category / Duty
Attend Technical Workshops	GIS	2009	ARC	8	Pursue Professional Development
Attend training (classroom, on-line, on-the-job, job shadow) *	RS	2011	DEN	8	Develop Professionally
Attend training	GIS	2009	GSC	12	Professional Development
Complete job related classes (online / classroom)	GIS	2008	LLC	12	Maintain Professional Development
Attend training *	RS	2011	MIL	6	Professional Development
Develop personal skills & qualifications *	RS	2011	MIL	6	Professional Development
Attend on-line courses (podcast / webinars)	RS	2009	SAC	5	Pursue Professional Development & Outreach
Take advanced training courses (e.g. technical training & educat	GIS	2005	SDM	11	Pursue Professional Development
Maintain technical proficiency	GIS	2002	TST	8	Pursue Professional Development
12 tasks			9 panels	75 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
H6 Pursue advance degrees & certificates					**H PROFESSIONAL DEVELOPMENT**
Pursue advance degrees / certificates *	RS	2011	MIL	6	Professional Development
Pursue advanced degree *	RS	2011	DEN	8	Develop Professionally
Pursue advanced degrees	RS	2009	SAC	5	Pursue Professional Development & Outreach
Pursue Advanced Degree	GIS	2009	ARC	8	Pursue Professional Development
4 tasks			4 panels	27 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
H7 Acquire professional certification					**H PROFESSIONAL DEVELOPMENT**
Obtain professional certification (e.g. GISP, ASPRS)	GIS	2009	GSC	12	Professional Development
Acquire GIS Certification (45%)	GIS	2008	LLC	12	Maintain Professional Development
Acquire professional certification	RS	2011	MIL	6	Professional Development
Pursue professional certification *	RS	2011	DEN	8	Develop Professionally
Acquire professional certifications	RS	2009	SAC	5	Pursue Professional Development & Outreach
Pursue Professional Certification	GIS	2009	ARC	8	Pursue Professional Development
6 tasks			6 panels	51 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
H8 Promote / represent GIS					**H PROFESSIONAL DEVELOPMENT**
Promote GIS uses	GIS	1997	GHC	12	Training & Education
Educate and Promote GIS Capabilities	GIS	2007	GRC	5	Participate in Training and Outreach
Participate in public relations activities (E,C)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Represent GIS at meetings (e.g. committees, user groups, organi	GIS	2005	SDM	11	Perform Administrative Responsibilities
Participate in Regional GIS Cooperative	GIS	2009	ARC	8	Promote GIS
Host GIS Event (GIS Day)	GIS	2009	ARC	8	Promote GIS
Display Maps and Posters	GIS	2009	ARC	8	Promote GIS
7 tasks			4 panels	36 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
H9 Participate in professional outreach					**H PROFESSIONAL DEVELOPMENT**
Provide professional outreach *	RS	2011	DEN	8	Develop Professionally
Perform Community outreach	GIS	2008	LLC	12	Maintain Professional Development
Conduct community outreach	RS	2009	SAC	5	Pursue Professional Development & Outreach
Produce outreach materials (brochures etc.)	RS	2009	SAC	5	Pursue Professional Development & Outreach
Present at Events (High School, College, Conferences)	GIS	2009	ARC	8	Promote GIS
Conduct Community Outreach	GIS	2009	ARC	8	Promote GIS
6 tasks			4 panels	33 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	Panel	Panel Size	Duty Category / Duty
H10 Review job related information					**H PROFESSIONAL DEVELOPMENT**
Review industry publications	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Read Books, Manuals and Professional Journals	GIS	2009	ARC	8	Pursue Professional Development
Study Related Fields (IT, Science, GPS, Database)	GIS	2009	ARC	8	Pursue Professional Development
Use Online Documentation	GIS	2009	ARC	8	Pursue Professional Development
Subscribe to List-serves	GIS	2009	ARC	8	Pursue Professional Development
View job related information (e.g. blogs, news feeds, print publi	GIS	2008	LLC	12	Maintain Professional Development
Read professional literature	RS	2011	MIL	6	Professional Development
Read technical articles	RS	2009	SAC	5	Pursue Professional Development & Outreach
Research fields of application	RS	2009	SAC	5	Pursue Professional Development & Outreach
Read trade publications	GIS	2002	TST	8	Pursue Professional Development
10 tasks			6 panels	44 members	H PROFESSIONAL DEVELOPMENT
H11 Supervise/mentor others					**H PROFESSIONAL DEVELOPMENT**
Supervise interns (82%) (Adv.)	GIS	2008	LLC	12	Perform Administrative Responsibilities
Supervise Interns (C)	GIS	2005	SDM	11	Perform Administrative Responsibilities
Participate in mentoring program *	RS	2011	DEN	8	Develop Professionally
Mentor others	RS	2009	SAC	5	Pursue Professional Development & Outreach
Provide Professional Development (mentor, nurture)	GIS	2009	ARC	8	Administer GIS Program
Develop Internships	GIS	2009	ARC	8	Promote GIS
6 tasks			5 panels	44 members	H PROFESSIONAL DEVELOPMENT
H12 Write professional papers					**H PROFESSIONAL DEVELOPMENT**
Contribute to publications *	RS	2011	DEN	8	Develop Professionally
Write Papers	GIS	2009	ARC	8	Promote GIS
Publish journal articles	RS	2009	SAC	5	Pursue Professional Development & Outreach
3 tasks			3 panels	21 members	H PROFESSIONAL DEVELOPMENT
H13 Self-evaluation & planning					**H PROFESSIONAL DEVELOPMENT**
Inventory personnel skills	RS	2011	MIL	6	Manage Projects
Identify Gaps in Skills and Knowledge	GIS	2009	ARC	8	Pursue Professional Development
Set professional Goals	GIS	2009	ARC	8	Pursue Professional Development
Conduct self-assessment	GIS	2009	GSC	12	Professional Development
4 tasks			3 panels	26 members	H PROFESSIONAL DEVELOPMENT
H14 Participate in committees					**H PROFESSIONAL DEVELOPMENT**
Volunteer for Committee Assignments	GIS	2009	ARC	8	Promote GIS
Develop Steering Committee	GIS	2009	ARC	8	Administer GIS Program
Participate in review panels (on-line & in-person)	RS	2009	SAC	5	Pursue Professional Development & Outreach
3 tasks			2 panels	13 members	H PROFESSIONAL DEVELOPMENT

Task Category / Task	Sector	Year	DACUM Panels		Duty Category / Duty
			Panel	Panel Size	
H15 Research technology trends					**H PROFESSIONAL DEVELOPMENT**
Explore new process techniques	GIS	2002	AGK	5	Expand Professional Knowledge & Skills
Research Technology Trends	GIS	2009	ARC	8	Pursue Professional Development
Research technology *	RS	2011	DEN	8	Develop Project Plan
Research GIS Technology Trends	GIS	2007	GRC	5	Perform Related Technical Duties
Research current/emerging trends (e.g. publications, on-line)	GIS	2009	GSC	12	Professional Development
5 tasks			5 panels	38 members	H PROFESSIONAL DEVELOPMENT

TOTAL	**890 tasks**		**12 panels**	**98 members**	

AGK, AgroKnowledge, Cedar Rapids, IA - GIS Technician/Analyst - January 14-15, 2002   LLC, Lake Land College, Mattoon, IL - GIS Technician - November 19-20, 2008

ARC, American River College, Sacramento, CA - Senior GIS Analyst - June 4-5, 2009   DEN, Metro State College, Denver, CO - Remote Sensing Specialist - September 14-15, 2011

MIL, ASPRS National Conference, Milwaukee, WI - Remote Sensing Specialist - May 1-2, 2011   SAC, Mission College, Santa Clara, CA - Remote Sensing Specialist - August 20 - 21, 2009

GSC, Gainesville State College, Atlanta, GA - GIS Technician - January 16-17, 2009   SDM, San Diego Mesa College, San Diego, CA - GIS Technician - January 13-14, 2005

GHC, Grays Harbor College, Salem, OR - GIS Specialist - April 22, 1997   SMT, Southern Maine Technical College - GIS Technician - August 6, 1996

GRC, Green River Community College - GIS Technician - June 12, 2007   TST, Texas State Technical College, Waco, TX - GIS Technician - August 8, 2002

By: John Johnson, National GeoTech Center, 2012

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
X1 **Cartography**				
Cartography*			ARC	8
Graphic Software Operation	GIS	2009	ARC	8
Color management	GIS	2009	ARC	8
Printing Technology	GIS	2009	ARC	8
Cartographic principles	RS	2011	DEN	8
Graphic design	RS	2011	DEN	8
Visual enhancements of data	RS	2011	DEN	8
output formatting	RS	2011	DEN	8
Cartographic principles/theory	GIS	2007	GRC	5
Cartographic license	GIS	2009	GSC	12
Create map book	GIS	2009	GSC	12
Cartographic design	GIS	2008	LLC	12
Cartography	RS	2011	MIL	6
Cartography	RS	2009	SAC	5
Design	RS	2009	SAC	5
Cartographic Design	GIS	2005	SDM	11
Demonstrate map design and layout.	GIS	1996	SMT	11
Demonstrate graphic design skills.	GIS	1996	SMT	11
Cartography	GIS	2002	TST	8
19 knowledge, skills & behaviors			10 panels	86 members
X2 **Communication: verbal/presentation/writing**				
Communication skills (verbal & written)	GIS	2002	AGK	5
People skills (public relations, communication)	GIS	2002	AGK	5
Develop People Skills	GIS	2009	ARC	8
Public Speaking	GIS	2009	ARC	8
Listening	GIS	2009	ARC	8
Technical Writing	GIS	2009	ARC	8
Verbal Communication	GIS	2009	ARC	8
Writing	GIS	2009	ARC	8
Business communication	RS	2011	DEN	8
Presentation	RS	2011	DEN	8
Writing	RS	2011	DEN	8
Technical writing	RS	2011	DEN	8
Interviewing	RS	2011	DEN	8
Communication skills	GIS	1997	GHC	12
Communication skills -oral	GIS	2007	GRC	5
Communication skills -written, email	GIS	2007	GRC	5
People skills	GIS	2007	GRC	5
Verbal & written communication	GIS	2009	GSC	12
Graphing & reporting	GIS	2009	GSC	12
Verbal communication	GIS	2008	LLC	12
Communication	GIS	2008	LLC	12
Technical writing	GIS	2008	LLC	12
Verbal communication	RS	2011	MIL	6
Written communication	RS	2011	MIL	6
Communication, Writing, Presentation	RS	2009	SAC	5
Printing legibly	GIS	2005	SDM	11
Technical writing	GIS	2005	SDM	11
Oral Communication	GIS	2005	SDM	11
Presentation	GIS	2005	SDM	11
Demonstrate technical writing skills.	GIS	1996	SMT	11
Demonstrate oral communication skills (individual, group, team, client p	GIS	1996	SMT	11
Demonstrate active listening skills	GIS	1996	SMT	11
Demonstrate initiative in communicating ideas.	GIS	1996	SMT	11
Demonstrate negotiation skills.	GIS	1996	SMT	11
Demonstrate ability to research information.	GIS	1996	SMT	11
Communication skills (writing, reading)	GIS	2002	TST	8
Good written and verbal interpersonal communication skills	GIS	2002	TST	8
Business skills	GIS	2002	TST	8
38 knowledge, skills & behaviors			12 panels	103 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	DACUM Panels Size
X3 Computer basics				
Computer skills (above average)	GIS	2002	AGK	5
Basic Computer Skills	GIS	2009	ARC	8
Operating Systems, Computational Thinking	GIS	2009	ARC	8
Computational Thinking	GIS	2009	ARC	8
Operating systems	GIS	1997	GHC	12
Burn to disk	GIS	2009	GSC	12
FTP site	GIS	2009	GSC	12
File formats	RS	2011	MIL	6
Information Technology (IT)	RS	2011	MIL	6
Tech savvy	RS	2011	MIL	6
Navigating graphical user interface	RS	2009	SAC	5
Information Technology (IT)	RS	2009	SAC	5
Tech savvy	RS	2009	SAC	5
Demonstrate knowledge of basic computer concepts and terms.	GIS	1996	SMT	11
Use basic operating system commands	GIS	1996	SMT	11
Define and differentiate among computer terms related to networks	GIS	1996	SMT	11
Apply basic concepts of hardware storage.	GIS	1996	SMT	11
Demonstrate knowledge of graphical user interface environ-ment (i.e., V	GIS	1996	SMT	11
Use Internet, ftp, e mail, computer faxes.	GIS	1996	SMT	11
Computer skills	GIS	2002	TST	8
Internet skills, esp. data collection and attribution	GIS	2002	TST	8
21 knowledge, skills & behaviors			8 panels	67 members
X4 Computer database				
Database programs	GIS	2009	ARC	8
Computer Science-database design	GIS	1997	GHC	12
Computer Science-information management	GIS	1997	GHC	12
Digital file management	GIS	1997	GHC	12
Database development	GIS	2007	GRC	5
Database administration	GIS	2007	GRC	5
Experience with relational databases	GIS	2007	GRC	5
Data custodianship	GIS	2008	LLC	12
Database structure	GIS	2008	LLC	12
Managing very large data sets	RS	2009	SAC	5
Data exchange procedures	GIS	2005	SDM	11
Security restrictions on data	GIS	2005	SDM	11
Relational database design,	GIS	2002	TST	8
file management	GIS	2002	TST	8
14 knowledge, skills & behaviors			7 panels	61 members
X5 Computer keyboarding				
Data entry	GIS	2002	AGK	5
Typing	GIS	2009	GSC	12
Keyboarding	GIS	2008	LLC	12
Demonstrate keyboarding skills.	GIS	1996	SMT	11
Keyboarding	GIS	2009	ARC	8
5 knowledge, skills & behaviors			5 panels	48 members
X6 Computer networks				
Networking systems	GIS	1997	GHC	12
Windows networks	GIS	1997	GHC	12
Computer networking	GIS	1997	GHC	12
Computer, Network configuration	GIS	2005	SDM	11
Networks	GIS	2009	ARC	8
Server Administration	GIS	2009	ARC	8
Working in secure environment	RS	2011	DEN	8
7 knowledge, skills & behaviors			4 panels	39 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
X7 Computer programming				
Python SQLVisual Basic (VBA)	GIS	2009	ARC	8
Write Macros	GIS	2009	ARC	8
Familiar Programming Languages	GIS	2009	ARC	8
Automate Procedures	GIS	2009	ARC	8
HTML	RS	2011	DEN	8
Programming	RS	2011	DEN	8
Experience with computer programming concepts	GIS	2007	GRC	5
Basic scripting (SQL, VB, HTML, Python, ASP, CSS, Query)	GIS	2009	GSC	12
Programming	GIS	2008	LLC	12
Programming	RS	2011	MIL	6
Scripting	RS	2011	MIL	6
Programming languages (VBA)	GIS	2005	SDM	11
Apply basic programming princi-ples (SQL statements, Boolean logic, n	GIS	1996	SMT	11
programming	GIS	2002	TST	8
14 knowledge, skills & behaviors			9 panels	81 members
X8 Software				
Office Software	GIS	2009	ARC	8
Legacy technology	GIS	2009	GSC	12
Modify user interface	GIS	2009	GSC	12
Office software suite	RS	2011	MIL	6
Data/software licensing	RS	2009	SAC	5
Software	RS	2009	SAC	5
Software & hardware management	RS	2009	SAC	5
End user Web applications	GIS	2005	SDM	11
Use software applications.	GIS	1996	SMT	11
Use various platforms.	GIS	1996	SMT	11
10 knowledge, skills & behaviors			6 panels	53 members
X9 Coordinate systems, projections				
Coordinate Systems	GIS	2009	ARC	8
Coordinate systems	RS	2011	DEN	8
Datums	RS	2011	DEN	8
Map projections	RS	2011	DEN	8
map datum, geoid	GIS	2007	GRC	5
Coordinate systems	GIS	2007	GRC	5
projections	GIS	2007	GRC	5
Spatial projections	GIS	2009	GSC	12
Coordinate systems Projections	GIS	2008	LLC	12
Projections & coordinate systems	RS	2011	MIL	6
Datum transformations, Map projections	RS	2009	SAC	5
Recognize projections.	GIS	1996	SMT	11
12 knowledge, skills & behaviors			8 panels	67 members
X10 Critical thinking				
Critical thinking	GIS	2002	AGK	5
Critical thinking	GIS	2009	ARC	8
Critical thinking	RS	2011	DEN	8
"Think Outside the Box", "See the big picture"	GIS	2007	GRC	5
Critical thinking	GIS	2007	GRC	5
Critical thinking	GIS	2008	LLC	12
Critical thinking	RS	2011	MIL	6
Detective	RS	2009	SAC	5
8 knowledge, skills & behaviors			7 panels	49 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	DACUM Panels Size
X11 Data models				
Raster / Vector	GIS	2009	GSC	12
Recognize raster and vector models	GIS	1996	SMT	11
Differentiate between raster space and real space.	GIS	1996	SMT	11
Conceptualize model of reality.	GIS	1996	SMT	11
Raster and vector data	GIS	2002	TST	8
Raster / vector	RS	2011	DEN	8
6 knowledge, skills & behaviors			4 panels	39 members
X12 Data types, transfers & conversions				
Data transfer	GIS	2002	AGK	5
File transfer	GIS	2007	GRC	5
Adding data to a project (GIS, CAD)	GIS	2009	GSC	12
Export formats, properties; settings	GIS	2009	GSC	12
File types (SHP, GDB, Coverage, CAD, DGN, TXT, IMG, TIF, SID,	GIS	2009	GSC	12
Data sources	GIS	2009	GSC	12
Data collection and format conversion	GIS	2002	TST	8
Data manipulation (spatial, non-spatial)	GIS	2002	TST	8
8 knowledge, skills & behaviors			4 panels	30 members
X13 Engineering drawings				
Engineering-CAD	GIS	1997	GHC	12
Engineering-COGO	GIS	1997	GHC	12
Reading engineering-grade plans	GIS	2005	SDM	11
Computer Aided Design CAD	RS	2011	MIL	6
4 knowledge, skills & behaviors			3 panels	29 members
X14 Equipment operation				
Application equipment capabilities/limitations	GIS	2002	AGK	5
Technical operating	GIS	2002	AGK	5
Understanding of equipment interactions	GIS	2002	AGK	5
Plotter operation	GIS	2009	GSC	12
Plotter set-up	RS	2011	DEN	8
5 knowledge, skills & behaviors			3 panels	25 members
X15 Geography				
Geography-census	GIS	1997	GHC	12
Geography-transportation	GIS	1997	GHC	12
Geography-urban planning	GIS	1997	GHC	12
Geography-Cartography	GIS	1997	GHC	12
Geographic principles	GIS	2007	GRC	5
Apply principles of geography.	GIS	1996	SMT	11
Geography	GIS	2002	TST	8
Geographic principles	RS	2011	DEN	8
Geography	RS	2011	MIL	6
9 knowledge, skills & behaviors			6 panels	50 members
X16 Geoprocessing, modeling				
Geoprocessing	GIS	2009	ARC	8
Apply Weights	GIS	2009	ARC	8
Flow Chart	GIS	2009	ARC	8
Process work flow	RS	2011	DEN	8
Create TIN model	GIS	2009	GSC	12
Creating models	GIS	2009	GSC	12
Geoprocessing methods	GIS	2009	GSC	12
Contour mapping	GIS	2008	LLC	12
Evaluate a physical model.	GIS	1996	SMT	11
Explain how a data model works.	GIS	1996	SMT	11
10 knowledge, skills & behaviors			5 Panels	51 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
X17 GPS, GNSS, surveying				
GPS, Total Station	GIS	2009	ARC	8
Surveying Techniques	GIS	2009	ARC	8
Post Processing	GIS	2009	ARC	8
GNSS basics	RS	2011	DEN	8
Surveying basics	RS	2011	DEN	8
Global GPS system	GIS	2007	GRC	5
Basic survey principles	GIS	2007	GRC	5
GNSS	RS	2011	MIL	6
Principles of land surveying	RS	2011	MIL	6
Geodesy	RS	2011	MIL	6
GPS technology	RS	2009	SAC	5
Geodesy	RS	2009	SAC	5
Land surveying	GIS	2005	SDM	11
Global Positioning System (GPS)	GIS	2002	TST	8
basics of surveying	GIS	2002	TST	8
15 knowledge, skills & behaviors			7 panels	51 members
X18 Industry applications				
Biophysical properties	RS	2011	DEN	8
Fisheries	GIS	1997	GHC	12
Forestry basics/survey	GIS	1997	GHC	12
Geology	GIS	1997	GHC	12
Wildlife	GIS	1997	GHC	12
Engineering-survey	GIS	1997	GHC	12
Related Industries	GIS	2009	GSC	12
Variable Rate Technology (VRT)	GIS	2008	LLC	12
Drafting	GIS	2008	LLC	12
Application specific knowledge (forestry, agriculture, natural resources,	RS	2009	SAC	5
History & natural history of study site	RS	2009	SAC	5
Explain how GIS can be used in various real world applications	GIS	1996	SMT	11
Identify applications of GIS technology.	GIS	1996	SMT	11
Demonstrate fundamental drafting skills.	GIS	1996	SMT	11
14 knowledge, skills & behaviors			6 panels	60 members
X19 Jargon, acronyms				
Jargon	GIS	1997	GHC	12
Platform shop talk	GIS	1997	GHC	12
Industry jargon	GIS	2009	GSC	12
Technical terminology	GIS	2002	TST	8
4 knowledge, skills & behaviors			3 panels	32 members
X20 Land divisions, measurements				
Interpret legal descriptions	GIS	2007	GRC	5
Plats & deeds	GIS	2009	GSC	12
Land measurements	GIS	2008	LLC	12
Land descriptions	GIS	2008	LLC	12
Land divisions	GIS	2008	LLC	12
Legal descriptions	GIS	2008	LLC	12
Coordinate geometry (COGO)	GIS	2002	TST	8
Cadastral data	GIS	2002	TST	8
Measurement space (spectral)	RS	2009	SAC	5
9 knowledge, skills & behaviors			5 panels	42 members
X21 Legal issues				
Copyright laws	GIS	2008	LLC	12
OSHA requirements	GIS	2008	LLC	12
Legal Requirements	GIS	2009	ARC	8
3 knowledge, skills & behaviors			2 panels	20 members

| | | | DACUM Panels | |
Knowledge, Skills & Behaviors	Sector	Year	Name	Size
X22 Map reading				
Map interpretation	GIS	2007	GRC	5
Map reading	GIS	2009	GSC	12
Cadastral	GIS	2008	LLC	12
Conceptualize images in 3 D.	GIS	1996	SMT	11
Good color sensitivity helpful	GIS	2002	TST	8
Visual interpretation	RS	2009	SAC	5
6 knowledge, skills & behaviors			6 panels	53 members
X23 Mathematics, geometry				
Algebra	GIS	2009	ARC	8
Map algebra	RS	2011	DEN	8
Trigonometry	RS	2011	DEN	8
Mathematics (geometry, statistics, trigonometry, algebra)	GIS	2009	GSC	12
Mathematics	GIS	2008	LLC	12
Math	RS	2011	MIL	6
Apply raster math tools	RS	2011	MIL	6
Math	RS	2009	SAC	5
Histograms	RS	2009	SAC	5
Geometry	GIS	2005	SDM	11
Mathematics	GIS	2005	SDM	11
11 knowledge, skills & behaviors			7 panels	62 members
X24 Organizational				
Organized	GIS	1997	GHC	12
Organized	GIS	2007	GRC	5
Organizational	GIS	2009	GSC	12
Organization	GIS	2008	LLC	12
Organizational	RS	2011	MIL	6
Organizational	RS	2009	SAC	5
File management	RS	2009	SAC	5
Organizational	GIS	2005	SDM	11
Organized	GIS	2005	SDM	11
Demonstrate neatness.	GIS	1996	SMT	11
Demonstrate file management skills	GIS	1996	SMT	11
Interpret and implement procedures methodically	GIS	1996	SMT	11
Demonstrate ability to maintain focus and be consistent	GIS	1996	SMT	11
Organizational skills	GIS	2002	TST	8
Organized	GIS	2009	ARC	8
15 knowledge, skills & behaviors			10 panels	90 members
X25 Photogrammetry/Remote Sensing				
Image processing	GIS	2009	ARC	8
Photogrammetry	GIS	2009	ARC	8
Sensor types & characteristics	RS	2011	DEN	8
GCPs – ground control points	RS	2011	DEN	8
Electromagnetic spectrum	RS	2011	DEN	8
Digital stereography	RS	2011	DEN	8
Geography-photogrammetry	GIS	1997	GHC	12
Geography-remote sensing	GIS	1997	GHC	12
Basic remote sensing theory	GIS	2007	GRC	5
Photogrammetry	GIS	2008	LLC	12
Remote sensing	GIS	2008	LLC	12
Thermal imaging	GIS	2008	LLC	12
Principles of image processing	RS	2011	MIL	6
Principles of remote sensing	RS	2011	MIL	6
LIDAR	RS	2011	MIL	6
Basic photogrammetry	RS	2011	MIL	6
Image processing	RS	2011	MIL	6
Familiarization with remote sensing data resources	RS	2009	SAC	5
Principles of sensor design for RS	RS	2009	SAC	5
Spectral signatures (reflectance)	RS	2009	SAC	5

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
Radiometric physics (principles for RS)	RS	2009	SAC	5
Photogrammetry	GIS	2005	SDM	11
Remote sensing	GIS	2002	TST	8
23 knowledge, skills & behaviors			9 panels	75 members
X26 Queries & analysis				
Interpolation	GIS	2009	GSC	12
Query (spatial/attribute)	GIS	2008	LLC	12
Data Analysis	GIS	2009	ARC	8
Spatial Analysis	GIS	2009	ARC	8
Trend Analysis	GIS	2009	ARC	8
Terrain analysis	RS	2011	MIL	6
6 knowledge, skills & behaviors			4 panels	38 members
X27 Research				
Research techniques	GIS	2008	LLC	12
Scientific methods	GIS	2008	LLC	12
Research technical support	GIS	1997	GHC	12
Demonstrate ability to research information.	GIS	1996	SMT	11
Web Research	GIS	2009	ARC	8
5 knowledge, skills & behaviors			4 panels	43 members
X28 Scale, resolution				
Scale	GIS	2007	GRC	5
Map scale	GIS	2009	GSC	12
Scale	GIS	2008	LLC	12
Demonstrate appropriate scale for message	GIS	1996	SMT	11
Scale	GIS	2009	ARC	8
Resolution (spatial, spectral, temporal, radiometric)	RS	2011	DEN	8
6 knowledge, skills & behaviors			6 panels	56 members
X29 Spatial Thinking				
Spatial awareness	GIS	2009	GSC	12
Demonstrate spatial intelligence.	GIS	1996	SMT	11
Recognize spatial inconsistencies.	GIS	1996	SMT	11
Spatial thinking	GIS	2009	ARC	8
Spatial aptitude	RS	2009	SAC	5
5 knowledge, skills & behaviors			4 panels	36 members
X30 Standards (client, customer, industry)				
Existing Standards,	GIS	2009	ARC	8
ASPRS standards	RS	2011	DEN	8
NMAP Standards	RS	2011	DEN	8
NSSDA standards	RS	2011	DEN	8
ISO standards/protocol	RS	2011	DEN	8
Understand national documentation standards	GIS	1997	GHC	12
technological standards	GIS	2007	GRC	5
Client/company standards	GIS	2009	GSC	12
GIS Industry standards	GIS	2009	GSC	12
Naming conventions	GIS	2009	GSC	12
"ISO 9000" standards	GIS	2008	LLC	12
Quality control & assurance procedures	GIS	2008	LLC	12
12 knowledge, skills & behaviors			6 panels	57 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	DACUM Panels Size
X31 Time management				
Time management	GIS	2002	AGK	5
Diversified task - time management	GIS	1997	GHC	12
Time management skills	GIS	2007	GRC	5
Time management	GIS	2009	GSC	12
Time management	GIS	2008	LLC	12
Time Management	GIS	2005	SDM	11
Time management skills	GIS	2002	TST	8
Time management	RS	2011	DEN	8
8 knowledge, skills & behaviors			8 panels	73 members
X32 Troubleshooting				
Troubleshooting	GIS	2002	AGK	5
Geography-navigation/trouble shooting	GIS	1997	GHC	12
Troubleshooting	GIS	2009	GSC	12
Troubleshooting	GIS	2008	LLC	12
Troubleshooting skills	GIS	2002	TST	8
Trouble-shooting	RS	2011	DEN	8
6 knowledge, skills & behaviors			6 panels	57 members
X33 Units of measure/conversion				
Unit conversions	GIS	2009	GSC	12
Units of measure	GIS	2009	GSC	12
Unit conversions	GIS	2008	LLC	12
3 knowledge, skills & behaviors			2 panels	24 members
X34 Web development				
Web development	GIS	2007	GRC	5
Web content management	GIS	2007	GRC	5
Relevant domain knowledge	GIS	2007	GRC	5
3 knowledge, skills & behaviors			1 panels	5 members
X35 Adaptable, flexible				
Adaptable, Flexible	GIS	2007	GRC	5
Adaptability	GIS	2005	SDM	11
Flexible	GIS	2009	ARC	8
Flexible	RS	2011	MIL	6
Willingness to change	RS	2011	MIL	6
Adaptable to change	RS	2011	DEN	8
6 knowledge, skills & behaviors			5 panels	38 members
X36 Analytical				
Analytical	GIS	2002	AGK	5
Analytical	GIS	1997	GHC	12
Analytical	GIS	2009	GSC	12
Logical, intelligent	GIS	2009	GSC	12
Analytical	GIS	2005	SDM	11
Interpret technical information (i.e., manuals and CD Rom)	GIS	1996	SMT	11
Analytical, detail oriented	GIS	2002	TST	8
Analytical	GIS	2009	ARC	8
Analytical	RS	2011	DEN	8
Analytical	RS	2011	MIL	6
Analytical thinker	GIS	2007	GRC	5
Analytical	RS	2009	SAC	5
12 knowledge, skills & behaviors			11 panels	91 members
X37 Common sense				
Common sense	GIS	2009	GSC	12
Common sense	GIS	2008	LLC	12
Common sense	RS	2011	DEN	8
3 knowledge, skills & behaviors			3 panels	32 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
X38 Creative				
Creativity	GIS	2009	GSC	12
Creativity	RS	2011	MIL	6
Creativity	RS	2009	SAC	5
Creative	GIS	2009	ARC	8
4 knowledge, skills & behaviors			4 panels	31 members
X39 Detail orientated				
Attentive to detail	GIS	2002	AGK	5
Observant	GIS	2002	AGK	5
Detail Oriented	GIS	2009	ARC	8
Detail Oriented	RS	2011	DEN	8
Attention to detail	RS	2011	DEN	8
Detail orientated	GIS	1997	GHC	12
Attention to detail	GIS	2007	GRC	5
Detail orientated	GIS	2009	GSC	12
Detail oriented	GIS	2008	LLC	12
Detail Oriented	RS	2011	MIL	6
Attention to detail	RS	2009	SAC	5
Detail-oriented	GIS	2005	SDM	11
Check work.	GIS	1996	SMT	11
Thoroughness	GIS	2002	TST	8
14 knowledge, skills & behaviors			12 panels	103 members
X40 Diplomatic				
Diplomatic, tactful	GIS	2009	GSC	12
Diplomatic	GIS	2009	ARC	8
2 knowledge, skills & behaviors			2 panels	20 members
X41 Dress Code, etiquette, hygine				
Hygienic	GIS	2007	GRC	5
Use appropriate office etiquette	GIS	2007	GRC	5
Dress code	GIS	2008	LLC	12
3 knowledge, skills & behaviors			2 panels	17 members
X42 Ethical / respectful				
Respectful of others	GIS	2007	GRC	5
Ethical	GIS	2009	GSC	12
Ethical behavior (integrity)	GIS	2008	LLC	12
Ethical	RS	2011	DEN	8
Ethical	GIS	2009	ARC	8
5 knowledge, skills & behaviors			5 panels	45 members
X43 Follow procedures				
follow procedures	GIS	2007	GRC	5
Recognize the importance of following procedures	GIS	1996	SMT	11
Follow technical procedures.	GIS	1996	SMT	11
Demonstrate data entry and digitizing skills.	GIS	1996	SMT	11
Understanding of copyright laws and standards	GIS	2002	TST	8
5 knowledge, skills & behaviors			3 panels	24 members
X44 Industrious, persistent				
Industrious	GIS	2002	AGK	5
Demonstrate ability to be persistent at collecting data	GIS	1996	SMT	11
Persistence	GIS	2002	TST	8
Persistent	GIS	2009	ARC	8
Dedicated	GIS	2009	ARC	8
Diligent	GIS	2009	ARC	8
Take initiative	RS	2011	MIL	6
Determined	RS	2011	MIL	6
8 knowledge, skills & behaviors			5 panels	38 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	DACUM Panels Size
X45 Leadership				
Leadership skills	GIS	2007	GRC	5
Take charge attitude	RS	2009	SAC	5
2 knowledge, skills & behaviors			2 panels	10 members
X46 Multi-tasking				
Ability to multi-task	GIS	2007	GRC	5
Multi-tasking	GIS	2009	GSC	12
Multi-tasking	GIS	2005	SDM	11
Able to multi-task, set work priorities	GIS	2002	TST	8
Multitasking	GIS	2009	ARC	8
Multitasking	RS	2009	SAC	5
6 knowledge, skills & behaviors			6 panels	49 members
X47 Cooperative				
Cooperative	GIS	2009	ARC	8
Cooperative	RS	2011	DEN	8
Group work	RS	2011	DEN	8
facilitation	RS	2011	DEN	8
Conflict resolution	RS	2011	DEN	8
Network with peers	GIS	2007	GRC	5
Participate outside of office (e.g. within user groups)	GIS	2007	GRC	5
Easy-going	GIS	2007	GRC	5
Work with others	RS	2011	MIL	6
Outgoing (friendly)	GIS	2008	LLC	12
10 knowledge, skills & behaviors			5 panels	39 members
X48 Open minded				
Open-minded	GIS	2002	AGK	5
Open-minded	GIS	2007	GRC	5
Open to new tasks, assignments, ideas	GIS	2007	GRC	5
Open-minded	RS	2009	SAC	5
4 knowledge, skills & behaviors			3 panels	15 members
X49 Paitent				
Patient	GIS	2002	AGK	5
Patient	GIS	2009	ARC	8
Patience	RS	2011	MIL	6
Patience	RS	2009	SAC	5
4 knowledge, skills & behaviors			4 panels	24 members
X50 Positive attitude				
Positive Attitude	GIS	2009	ARC	8
Attitude	GIS	1997	GHC	12
Positive attitude	GIS	1997	GHC	12
Can-do, positive attitude	GIS	2007	GRC	5
Positive attitude	GIS	2009	GSC	12
Enthusiastic	GIS	2009	GSC	12
Positive Attitude	RS	2011	MIL	6
Optimistic	RS	2011	MIL	6
8 knowledge, skills & behaviors			5 panels	43 members
X51 Punctual / reliable				
Consistent	GIS	2002	AGK	5
Reliable - punctual	GIS	1997	GHC	12
Punctuality	GIS	2009	GSC	12
Punctuality	GIS	2008	LLC	12
Punctual	GIS	2005	SDM	11
Punctual	GIS	2009	ARC	8
6 knowledge, skills & behaviors			6 panels	60 members

www.geotech.org   johnjohnson@gisws.com   5/17/12

			DACUM Panels	
Knowledge, Skills & Behaviors	**Sector**	**Year**	**Name**	**Size**
X52 Resourceful				
Resourcefulness	GIS	2005	SDM	11
Resourceful	GIS	2002	TST	8
Improvise / resourceful	RS	2011	MIL	6
Trouble shooter Jack of all trades	RS	2009	SAC	5
4 knowledge, skills & behaviors			4 panels	30 members
X53 Self improvement				
Continuing education	RS	2011	DEN	8
Ability to learn	GIS	2007	GRC	5
Self-improvement	GIS	2009	GSC	12
Willingness to learn	GIS	2009	GSC	12
Willingness to learn	RS	2011	MIL	6
Willingness to learn	RS	2009	SAC	5
Take initiative	RS	2009	SAC	5
Willingness to learn	GIS	2005	SDM	11
8 knowledge, skills & behaviors			6 panels	47 members
X54 Self motivated / independent				
Self-motivated	GIS	2009	ARC	8
Independent	GIS	2009	ARC	8
Take on Challenging Tasks	GIS	2009	ARC	8
Self-starter	RS	2011	DEN	8
Self-motivated	RS	2011	DEN	8
Self-quality control	RS	2011	DEN	8
Independent worker	GIS	1997	GHC	12
Motivated	GIS	1997	GHC	12
Self-starter	GIS	1997	GHC	12
Self-starter	GIS	2007	GRC	5
Self-initiated learner	GIS	2007	GRC	5
Can work independently	GIS	2007	GRC	5
Independent	GIS	2009	GSC	12
Self-motivated	GIS	2009	GSC	12
Self motivation	GIS	2008	LLC	12
Work independently	RS	2011	MIL	6
Self-starter	RS	2011	MIL	6
Work independently	RS	2009	SAC	5
Ability to work independently	GIS	2005	SDM	11
Self-disciplined	GIS	2005	SDM	11
Self-motivated	GIS	2005	SDM	11
Self-starter, independent worker	GIS	2002	TST	8
motivated	GIS	2002	TST	8
23 knowledge, skills & behaviors			10 panels	87 members
X55 Sense of humor				
Good sense of humor	GIS	2007	GRC	5
Sense of humor	GIS	2005	SDM	11
Sense of humor	RS	2011	DEN	8
3 knowledge, skills & behaviors			3 panels	24 members
X56 Team Player				
Team Player	GIS	2009	ARC	8
Willing to Ask For Help	GIS	2009	ARC	8
Team Player	RS	2011	DEN	8
Team player	RS	2011	DEN	8
Team player	GIS	1997	GHC	12
Team building	GIS	2007	GRC	5
Team participation	GIS	2007	GRC	5
Can work in team	GIS	2007	GRC	5
Interpersonal	GIS	2009	GSC	12
Networking	GIS	2009	GSC	12
Team player	GIS	2009	GSC	12

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels	
			Name	Size
Team work	RS	2011	MIL	6
Team Player	GIS	2005	SDM	11
Demonstrate ability to work in a team as a member and/or leader	GIS	1996	SMT	11
Recognize roles of others in team and cooperate to get job done	GIS	1996	SMT	11
Team worker	GIS	2002	TST	8
16 knowledge, skills & behaviors			9 panels	81 members
X57 Trustworthy, honesty, integrity				
Trustworthy with confidential information	GIS	2002	AGK	5
Honesty	GIS	2002	TST	8
Integrity	GIS	2002	TST	8
3 knowledge, skills & behaviors			2 panels	13 members
X58 Visionary				
Divine - all knowing	GIS	1997	GHC	12
Abstract thinker (outside the box)	GIS	2009	GSC	12
Visionary	GIS	2009	GSC	12
3 knowledge, skills & behaviors			2 panels	24 members
X59 Accept & receive criticism				
Take Criticism	GIS	2009	ARC	8
Accept / provide constructive criticism	RS	2011	DEN	8
2 knowledge, skills & behaviors			2 panels	16 members
X60 Work long hours				
Work long hours	RS	2011	MIL	6
Long work hours	RS	2011	DEN	8
2 knowledge, skills & behaviors			2 panels	14 members
X61 Work under Pressure				
Manage Stress	GIS	2009	ARC	8
Work under Pressure	GIS	2009	ARC	8
Coping	RS	2011	DEN	8
Coping skills	RS	2011	DEN	8
4 knowledge, skills & behaviors			2 panels	16 members
X62 Focused				
Focus	GIS	2009	ARC	8
Tune out Distractions	GIS	2009	ARC	8
Work under Pressure	GIS	2009	ARC	8
Focused	RS	2011	MIL	6
Focused	RS	2009	SAC	5
5 knowledge, skills & behaviors			3 panels	19 members
X63 Tenacity				
Tenacity	RS	2011	MIL	6
Tenacity	RS	2009	SAC	5
2 knowledge, skills & behaviors			2 panels	11 members
X64 Resptful				
Resptful	GIS	2009	ARC	8
Mutual respect	RS	2011	DEN	8
2 knowledge, skills & behaviors			2 panels	16 members
X65 Inquisitive				
Inquisitive	RS	2011	DEN	8
Life-long learner	RS	2011	DEN	8
Teachable	RS	2009	SAC	5
3 knowledge, skills & behaviors			2 panels	13 members

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

Knowledge, Skills & Behaviors	Sector	Year	DACUM Panels Name	Size
X66 Proactive				
Proactive attitude	RS	2011	DEN	8
Ability to Anticipate Needs	GIS	2009	ARC	8
Take initiative	RS	2009	SAC	5
3 knowledge, skills & behaviors			3 panels	21 members
X67 Visual				
Non-color blind	RS	2011	DEN	8
Non-stereo blind	RS	2011	DEN	8
Ability to see in 3-D	RS	2011	MIL	6
3 knowledge, skills & behaviors			2 panels	14 members
X68 Physics				
Physics, introductory	RS	2011	DEN	8
Physics	RS	2011	MIL	6
2 knowledge, skills & behaviors			2 panels	14 members
X69 Accuracy & precision				
Accuracy & precision	GIS	2008	LLC	12
Precision (accuracy)	GIS	2009	ARC	8
Precision	RS	2011	DEN	8
Accuracy	RS	2011	DEN	8
4 knowledge, skills & behaviors			3 panels	28 members
X70 GIS				
Geography-competency in software	GIS	1997	GHC	12
GIS	RS	2011	MIL	6
GIS software	GIS	2002	TST	8
3 knowledge, skills & behaviors			3 panels	26 members
X71 Problem Solving				
Problem Solving	GIS	2009	ARC	8
Problem solving	RS	2011	DEN	8
Problem solving skills	GIS	1997	GHC	12
Problem solve	GIS	2007	GRC	5
Solution-orientated	GIS	2007	GRC	5
Problem solving	GIS	2009	GSC	12
Problem solving	GIS	2008	LLC	12
Problem solving	RS	2011	MIL	6
Problem solving	RS	2009	SAC	5
Recognize and define problem(s).	GIS	1996	SMT	11
Break problem into manageable parts.	GIS	1996	SMT	11
Problem solving skills	GIS	2002	TST	8
12 knowledge, skills & behaviors			10 panels	87 members
X72 Statistics, probability				
Statistics	GIS	2002	AGK	5
Statistics	GIS	2009	ARC	8
Statistics	RS	2011	DEN	8
Spatial Statistic	RS	2011	DEN	8
Statistics	GIS	1997	GHC	12
Statistics	GIS	2007	GRC	5
Statistics	RS	2011	MIL	6
Zonal statistics	RS	2011	MIL	6
Statistics	RS	2009	SAC	5
Probability	RS	2009	SAC	5
Statistics	GIS	2005	SDM	11
statistics	GIS	2002	TST	8
12 knowledge, skills & behaviors			9 panels	68 members

                           5/17/12

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
GIS & REMOTE SENSING OCCUPATIONS*
KNOWLEDGE, SKILLS & BEHAVIORS BY CATEGORY
April, 2012

			DACUM Panels	
Knowledge, Skills & Behaviors	**Sector**	**Year**	**Name**	**Size**
X73 Other				
Procurement Procedures	GIS	2009	ARC	8
Perfectionist	GIS	2009	ARC	8
Geocoding	GIS	2009	ARC	8
Professional development	RS	2011	DEN	8
Discretion	RS	2011	DEN	8
Concise	RS	2011	DEN	8
Risk taker	RS	2009	SAC	5
Teaching skills	GIS	2007	GRC	5
pride in work	GIS	2007	GRC	5
Professionalism	GIS	2008	LLC	12
maturity	GIS	2002	TST	8
11 knowledge, skills & behaviors			6 panels	46 members

AGK, AgroKnowledge, Cedar Rapids, IA - GIS Technician/Analyst - January 14-15, 2002
ARC, American River College, Sacramento, CA - Senior GIS Analyst - June 4-5, 2009
MIL, ASPRS National Conference, Milwaukee, WI - Remote Sensing Specialist - May 1-2, 2011
GSC, Gainesville State College, Atlanta, GA - GIS Technician - January 16-17, 2009
GHC, Grays Harbor College, Salem, OR - GIS Specialist - April 22, 1997
GRC, Green River Community College - GIS Technician - June 12, 2007
LLC, Lake Land College, Mattoon, IL - GIS Technician - November 19-20, 2008
DEN, Metro State College, Denver, CO - Remote Sensing Specialist - September 14-15, 2011
SAC, Mission College, Santa Clara, CA - Remote Sensing Specialist - August 20 - 21, 2009
SDM, San Diego Mesa College, San Diego, CA - GIS Technician - January 13-14, 2005
SMT, Southern Maine Technical College - GIS Technician - August 6, 1996
TSC, Texas State Technical College, Waco, TX - GIS Technician - August 8, 2002

John Johnson, National GeoTech Center, 2012

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
DACUM JOB ANALYSIS PANEL INFORMATION

Metro State College, (DEN), Denver, CO - Remote Sensing Specialist - September 14-15, 2011

Sanchit Agarwal	Director Technical Quality	Sanborn Mapping Inc., Colorado Springs, CO
Dawn R. Betz	Production Coordinator	Digital Globe, Longmont, CO
Mark Bowersox	Technical Application Engineer	ITT Visual Information Solutions, Boulder, CO
Travis Clemens	Project Manager	Senior Navigation Information Analyst, Jeppensen Air Navigation, Englewood, CO
Linda Meyer	Senior Geospatial Analyst	GeoEye, Commercial Production, Thornton, CO
Carol Mladinich	Research Physical Scientist	U.S. Geological Survey, Rocky Mountain Geographic Science Center, Lakewood, CO
Jan Van Sickle	Scientist and author	Van Sickle LLC, Denver, CO
Demetrio Zourarakis	Remote Sensing & GIS Analyst	Kentucky Division of Geographic Information, Commonwealth Office of Technology, Frankfort, KY
John Johnson	DACUM Facilitator	National GeoTech Center
Mark Lombardi	Recorder	Front Range Community College

ASPRS National Conference, (MIL), Milwaukee, WI - Remote Sensing Specialist - May 1-2, 2011

Dr. Indumathi Jeyachandran	Visiting Researcher	University of Utah, Santa Clara, CA
Thomas B. Jones	Principal	Terra-Scribe Solutions LLC, West Bend, WI
Erin Kees	Lidar Data Processor – Field Team Lead	GeoDigital International, Field Operations Group, Rochester, NY
George A. Riner	Research Tech I	Sonoma State University, Geography / Center for Interdisciplinary Geospatial Analysis, Rohnert Park, CA
Robin E. Rodgers	Physical Scientist	US Army Engineer Research & Development Center, Alexandria, VA
Mary Sitton	President, Imagery Analyst	CMS, Environmental Research, Inc, Aerial Photo Analysis, Linden, VA
John Johnson	DACUM Facilitator	National GeoTech Center
Ann Johnson	Recorder	National GeoTech Center
Jeannie Allen	Recorder	NASA

Mission College, (SAC), Santa Clara, CA - Remote Sensing Specialist - August 20 - 21, 2009

Charles Clancy	GIS/Remote Sensing & Geodesy Analyst	Chevron Energy Technology Company, San Ramon, CA
Lawrence Fox III	Emeritus Professor and Senior Advisor	Institute for Spatial Analysis, Humboldt State University, Arcata, CA
Kevin Koy	Manager	Geospatial Innovation Facility, U. C. Berkeley, Berkeley CA
Laura E. P. Rocchio	Senior Outreach Scientist	Science Systems Applications Inc., Los Angeles, CA
Cindy Schmidt	Research Scientist	San Jose State Foundation/NASA, NASA Ames Research Center, Moffett Field, CA
John Johnson	DACUM Facilitator	GIS Workshop
Chris Lewis	Recorder	iGETT
Chris Cruz	Recorder	West Valley College

American River College (ARC), Sacramento, CA - Senior GIS Analyst - June 4-5, 2009

David Hanson	Soil Scientist/GIS Specialist	U.S. Bureau of Reclamation, Sacramento CA
Kris Higgs	Research Program Specialist 1 (GIS)	Calif. Emergency Management Agency
Nathan Jennings	Senior GIS Analyst	City of Sacramento
Diane Mastalir	Sr. GIS Analyst	Wildlands, Inc., Rocklin, CA
Ramona Navarrete	GIS Analyst / Mid-Mgr	City of Folsom, CA
Patrick J. Parsons,	Research Analyst GIS II	Dept of Water Resources, Red Bluff, CA
Geney Terry	GIS Analyst II	County of El Dorado, Placerville, CA
Linda Wright	GIS Analyst II	County of El Dorado, Placerville, CA
John Johnson	DACUM Facilitator	GIS Workshop
Ann Johnson	Recorder	iGETT
Chris Lewis	Recorder	iGETT

Gainesville State College (GSC), Atlanta, GA - GIS Technician - January 16-17, 2009

Azar Khani	GIS Specialist III	Fulton County Government
Brannon Schnelle	GIS Analyst	Jordan, Jones & Goulding
Collin Horace	GIS Developer/Analyst	CH2MHILL
Donald I. M. Enderle	GIS Analyst	Photo Science Inc.
Dwight Lanier	GIS/Environmental Science Laboratory Co	Gainesville State College
Eric McRae	Director	Information Technology Outreach Services
Lisa Jackson	Information Analyst III	Center for GIS, Georgia Institute of Technology
Lisbeth Ruiz-Nunez	Regional Resource Info. Coordinator	US Forest Service
Mark Lane	GIS Manager	Hall County Government
Melanie Tabb	GIS Administrator	Gwinnett County
Ron Pate	Registered Land Surveyor	n/a
Tripp Corbin	Vice President GIS	Keck & Wood, Inc.
John Johnson	DACUM Facilitator	GISWS, Encinitas, CA
Carol Kraemer	Recorder	Gainesville State College
Georgia URISA	Validation Survey - 179 Respondents	Web-based survey conducted in March, 2009
National Science Foundation	Sponsor (Advance Technology Education)	

Lake Land College (LLC), Mattoon, IL - GIS Technician - November 19-20, 2008

Adam Pfister	GIS Analyst	Archer Daniels Midland Company
Brad McVay	GIS Specialist	Illinois Water Survey
Brooke Ferguson	former GIS Specialist	County Government
Curt Reynolds	GIS Specialist-Technical Manager III-GIS a	Illinois Department of Transportation
Doug Ratermann	Land Surveyor	Henry, Meisenheimer & Gende, Inc.
Jay Donnelly	GIS Coordinator/Technician	Clinton County GIS Office
Jill Zerrusen	n/a	Effingham County Tax Assessors Office
Kevin McReynolds	GIS Technician	Coles County Regional Planning Commission
Molly & Dennis Godar	Agriculture Consultants	n/a
Roger Reed	Programming-GIS Technician	USDA-Effingham County
Travis Schackmann	CAD/GIS Technician	EJ Water Cooperative
John Johnson	DACUM Facilitator	GISWS, Encinitas, CA
Kay Hanley	Recorder	Lake Land College
Illinois GIS Association	Validation Survey - 89 Respondents	Web-based survey conducted in April, 2009
National Science Foundation	Sponsor (Advance Technology Education)	

INVENTORY OF GEOSPATIAL WORKFORCE COMPETENCIES
DACUM JOB ANALYSIS PANEL INFORMATION

Green River Community College (GRC) - GIS Technician - June 12, 2007

Ann Boyd	Lead GIS Analyst	City of Bellevue, WA
Beth Carpenter	Engineering Technician	City of Sammamish Public Works, WA
Blane Moore	GIS Analyst	PACE Engineers Inc., Kirkland, WA
Glenn Brooks	Geographic Information Officer	Northwest Response, Woodinville, WA
Jennifer Recco	Planning Technician	City of Puyallup, WA
Erik Tingelstad	DACUM Facilitator	Highline Community College
Nancy Warren	DACUM Facilitator	Highline Community College

San Diego Mesa College (SDM), San Diego, CA - GIS Technician - January 13-14, 2005

Colleen Larsen	GIS/Mapping Specialist II	Engineering, Padre Dam Municipal Water District
David Hulten	GIS Technician	City of Encinitas
Dennis Larson	Senior GIS Technician	Technical Services, San Diego Association of Governments
Drew Dowling	GIS Analyst	SanGIS
Fred McCamic	GIS Analyst	Public Works, County of San Diego
Gina Durizzi	Principal Survey Aid/GIS Coordinator	Engineering Capital Projects, Field Division, City of San Diego
Jason McNeil	GIS Technician II	Information Services, City of Escondido
Lisa Canning	Senior Engineering Aide	Metropolitan Waste Water Division, City of San Diego
Melanie Casey	GIS Analyst	Planning and Land Use, County of San Diego
Nancy Ross	GIS Specialist	Management Information Services, City of Chula Vista
Sue Carnevale	Senior Regional Planner/GIS Analyst	Technical Services, San Diego Association of Governments
John Johnson	DACUM Facilitator	GISWS, Encinitas, CA
Sara Halstead	DACUM Co-facilitator	Employee Training Institute, San Diego, CA
San Diego Regional GIS Council	Validation Survey - 150 Respondents	Mail-in survey conducted April/May, 2005

Texas State Technical College (TST), Waco, TX - GIS Technician - August 8, 2002

J. Scott Sires	n/a	Independent Contractor, Richardson, TX
Lisa M. Zygo	n/a	Baylor University, Waco, TX
Maxey Sheppard	n/a	Sheppard Surveying, Abilene, TX
Melinda Polley	n/a	Freese & Nichols, Inc., Grand Prairie, TX
Robert Leathers	n/a	McLennan County 911, Waco, TX
Ronald Carrol	n/a	Ronald Carrol Surveyors, Temple, TX
Van Walker	n/a	Brazos River Authority, Waco, TX
Wayne Tschirhart	n/a	Guadalupe-Blanco River Authority, Seguin, TX
Michael Jones	DACUM Facilitator	IDEAS Center, Waco, TX
Diana Sphar	DACUM Facilitator	IDEAS Center, Waco, TX

AgroKnowledge (AGK), Cedar Rapids, IA - GIS Technician/Analyst - January 14-15, 2002

Aaron Schultz	GPS/GIS Specialist/Analysis	Ecolotree, Inc., North Liberty, IA
Greg Evans	GIS Lab Assistant	Jackson State Community College, Jackson, TN
Michael J. Burke	Vice-President of Operations	Ag Spectrum Co. & The Consulting Company (TCC) Dewitt, IA
Michael Sutton	Lab Technician	SST Development Group, Stillwater, OK
Nicole Koppes	GIS Mapping Specialist	The Consulting Co., Dewitt, IA
Dr. Gaines Miles	DACUM Facilitator	Purdue University
Janie Thomas	Team Leader	
National Science Foundation	Sponsor (Advance Technology Education)	

Grays Harbor College (GHC), Salem, OR - GIS Specialist - April 22, 1997

Andy Wilson	n/a	Rayonier, Inc
Angel Wallen	n/a	Grays Harbor College Central Services
David Condell	n/a	Washington Dept. of Fish & Wildlife
Doc Saul	n/a	Washington Dept. of Fish & Wildlife
Joan Perringer	n/a	Weyhauser Co.
Klas Tayor	n/a	North West Indian Fisheries Conservation
Kyle Bastrp	n/a	Grays Harbor College Central Services
Mark Scott	n/a	The Wellap Alliance
Michael Bishop	n/a	Pacific Co. Public Works Dept.
Mike Stevenson	n/a	Quinalult Dept. of Natural Resources
Robin Nelbac	n/a	Pacific Co. Public Works Dept.
Tlea Tichech	n/a	Grays Harbor Regional Planning Commission
Krista Madan	DACUM Facilitator	
Don Samuelson	Coordinator	
Fred Wood	Recorder	
National Science Foundation	Sponsor (Advance Technology Education)	

Southern Maine Technical College (SMT) - GIS Technician - August 6, 1996

Barry Tibbetts	Assessor/GIS Administrator	Town of Kennebunk, Me
Bruce Hyman	n/a	Wilbur Smith Associates, Portland, ME
Doug Flewelling	n/a	University of ME, Orono, ME
Greg Charest	n/a	US EPA New England, Boston, MA
Joel Zimmerman	n/a	New England Water Pollution Control Com., Wilmington, MA
Larry Harwood	GIS Coordinator	ME State Office of GIS, State House Sta#125, Augusta, ME
R. Michael White	Manager, AM/FM/GIS Services	James W. Sewall Company, Old Town, ME
Susan McMaster	DACUM Facilitator & Recorder	McMaster Training Associates, Dalzell, SC
Mary Jane Curran	Assistant Facilitator	Cape Code Community College, West Barnstable, MA
Wes Winterbottom	Assistant Facilitator	Gateway Community Technical College, West Hartford, CT
Robert E. Moore	Assistant Facilitator	New Hampshire Technical College, Stratham, NH
National Science Foundation	Sponsor (Advance Technology Education)	

Summary: 12 DACUM Panels, 98 panel members

By: John Johnson, DACUM Facilitator, National Geotech Center, March, 2012