
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Hydrologic Study Of Stangland, Tyler And Clear Lake Area

BPA project number: 20002

Contract renewal date (mm/yyyy): Multiple actions?

Business name of agency, institution or organization requesting funding

Stangland-Tyler Aquifer Study

Business acronym (if appropriate) STAGS

Proposal contact person or principal investigator:

Name James G. Miller

Mailing Address 14606 S. Stangland Rd

City, ST Zip Cheney, WA 99004

Phone 1-509-299-9085

Fax 1-509-747-2186

Email address jandj@cet.com

NPPC Program Measure Number(s) which this project addresses

SECTION 7; 7.6A; 7.6B; 7.6C; 7.6D; 7.7; 7.7B; 7.8B; 7.8F; 7.8H

FWS/NMFS Biological Opinion Number(s) which this project addresses

None

Other planning document references

None

Short description

This is a study of 40 square miles of the head waters of Crab Creek within Spokane County. The study will provide a base line for water quality and quantity within the Midwestern area of Spokane County.

Target species

Watershed

Section 2. Sorting and evaluation

Subbasin
Crab Creek

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input checked="" type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input checked="" type="checkbox"/> Watershed project evaluation	<input checked="" type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
	None

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
	None	

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
	None	

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Site Setup	a	Install Weirs & Weatherstations
2	1st yr Water Survey	b	1st yr water samples
3	2nd yr Water Survey	c	2nd yr water samples
4	3rd yr Water Survey	d	3rd yr water samples
5	Conclusion	e	Evaluate data and write report

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	9/1999	12/1999	None	x	63.1%
2	1/2000	12/2000	Water contamination	x	7.4%
3	1/2001	12/2001	Water contamination	x	8.1%
4	1/2002	12/2002	Water contamination	x	8.1%
5	1/2003	5/2003	None	x	13.3%
				Total	100.00%

Schedule constraints

The evaluation of water samples from the wells and Clear Lake could change the schedule if contamination is found. This study will try and identify sources of water contamination

Completion date

5/2003 Consideration should be given to operate this project for three or more years

Section 5. Budget

FY99 project budget (BPA obligated): \$00.00

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	Training, Weir Read, Weir Selec, Well Selec, etc	%25	42,560
Fringe benefits		%0	0
Supplies, materials, non-expendable property	Weather Stations, Well Sampling Systems, Water Meters, Well Survey, Electrical Measure Tape, etc	%20	34,850
Operations & maintenance	Well locations, water samples,	%12	20,151

	calibration of equipment		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Water level indicators for streams and the lake	%0	0
NEPA costs	None	%0	0
Construction-related support	Construction of weirs	%17	29,000
PIT tags	# of tags: None	%0	0
Travel	None	%0	0
Indirect costs	None	%0	0
Subcontractor	None	%0	0
Other	Legal Fees, Permits	%26	44,650
TOTAL BPA FY2000 BUDGET REQUEST			\$171,211

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
None		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$171,211

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$19,575	\$22,275	\$29,640	

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	None
<input type="checkbox"/>	
<input type="checkbox"/>	
<input type="checkbox"/>	

PART II - NARRATIVE

Section 7. Abstract

The intent of this study is to establish water quality and quantity baseline data within the midwestern area of Spokane County Washington on the headwaters of Crab Creek. This watershed study includes the runoff from Clear Lake and Rock Creek and wells in the Wanapum and Grand Ronde aquifers. Rural residential development is currently placing greater demand on the aquifers, particularly in the Tucker Prairie community and around Clear Lake. There is also an influx of new residences around the pioneer community of Tyler, Washington. All of these recent development is being established using private wells. The impact to water resources and wildlife is currently not being evaluated. There is no readily available information on the rate of rural residential development or information for determining the limits to this development as it relates to water resources.

Section 8. Project description

a. Technical and/or scientific background

The City and County of Spokane have considered and acquired lands in the study area for the disposal of solid wastes. The STAGS group is trying to establish baseline water quality and quantity data prior to further development. This part of the Crab Creek watershed has not been studied or researched by the County of Spokane or the Washington State Department of Ecology.

b. Rationale and significance to Regional Programs

The forty(40) square mile study area includes Clear Lake, its related marshes (Heron Pond) and wildlife habitats. Agencies of the State of Washington have determined that Clear Lake has been contaminated by domestic sewage wastes. Outflow waters from Clear Lake are the headwaters of Rock Creek, the eastern most tributary of Crab Creek. These waters are also connected to the Wanapum and Grande Ronde Aquifers. Sampling of surface and ground water for quality testing and flow measurements of surface runoff and ground water withdrawals for quantity estimates will establish baseline databases that would provide information for the scientific management of water resources.

c. Relationships to other projects

Water quality and quantity concerns downstream of the project area in Lincoln County Washington would gain hydraulic and hydrologic data from the headwaters of Crab Creek that are currently lacking. Spokane County has implemented Critical Aquifer Recharge Area Advisory Committee, BoCC Resolution Number 97-0990, to make recommendations aquifers within the county. On May 6, 1997 the Washington State Department of Transportation released a study on the Heron Pond Water Level, which is part of Clear Lake.

d. Project history (for ongoing projects)

This is a new project start as other public projects concerned with water resources have not extended into the study area proposed in this application.

e. Proposal objectives

This study will provide baseline water resources data useful to future development and land use decisions. Well draw down studies will indicate if water mining is currently occurring and/or show what capacity this area has for rural residential and irrigated agriculture development as it relates to potable water supplies and availability. The study will also demonstrate how viable a water resource Clear Lake is to all competing water uses.

A formal report of study findings and data including maps, well logs, water quantities and quality data, weir, well and weather station locations and a characterization of the weather within the study area will be part of the discussion.

f. Methods

1. Measure the precipitation within the project area. Install three weather stations that will measure precipitation, humidity, air temperature, and wind direction and speed. Precipitation occurs mostly in the form of snow so weather monitoring equipment will need to be operated in cold conditions. The weather data equipment must be reliable and as free as possible from human error.
2. Clear Lake is an important part of the study. This lake contributes to two aquifers, the Grand Ronde and Wanapum. Several water quality monitoring sites including wells, marshes, and the lake will be chosen for testing. Ground water is the primary source of potable water. The lake is the only alternative source of potable water for the project area.
3. Measure surface water runoff at selected locations. Place six trapezoidal (Cipolletti) weirs between Rock Creek and its tributaries. The weirs will be constructed locally and installed by the STAGS steering committee. Electronic water level recording equipment will be located at these weirs so a continuous water flow record can be established.
4. Measure ground water withdrawals. At the wells selected for monitoring, determine depth, depth to water and install a small diameter PVC pipe to obtain water levels monthly April to October and once during the winter. The number of wells selected will be one per square mile in the study area. Also obtain well logs for these wells and determine the aquifer that the well is withdrawing water from. From the water level data determine the direction of ground water flow. A totaling water meter will be installed on six of the wells to determine the volume of water withdrawn. Two of the wells will be fully instrumented for volume of water and instantaneous flow rates of withdrawal and surveyed to determine mean sea level elevation, latitude and longitude of the well head. The two fully instrumented wells will be tagged and used by the Washington State Department of Ecology for future years' studies.

5. Water samples will be taken from twelve wells initially. Water will be tested at a local lab for selected organic and inorganic compounds the first year. If metals, nitrates, fecal coliforms, or chlorides are detected in amounts outside EPA standards for potable water, additional wells will be added to the monitoring program until the source of contamination can be identified. This procedure will demonstrate if the ground water quality in the area meets EPA standards for human consumption. The second and third years well water samples will be tested for nitrates, fecal coliforms and other organics.

6. The weather stations and the equipment used to determine well water levels shall be calibrated annually by a certified independent local testing lab.

7. All volunteers involved with data collection shall be trained in the methods to be used in sample taking to assure that accuracy and timeliness are achieved.

8. About 1,000 well logs will be obtained and evaluated. Well owners and the Department of Ecology will provide these logs. This information will assist in determining the direction of ground water flows and what aquifer the water is being withdrawn from.

g. Facilities and equipment

1. Weather Stations: Three weather stations will be purchased and installed at three residences. The weather stations will be located to form a triangle to obtain representative weather data for the study area.

2. Weirs: Six Cipolleti (trapezoidal) weirs will be constructed locally and installed at six different locations about the area. Each weir site will include automatic continuous recording stage recorders to record water levels for each weir's rating curve for flow measurements. Property owners at each weir installation will be paid \$100.00 for allowing the weir to be placed on their property during the life of this project.

3. Wells: Forty wells will be selected, one for each square mile. Wells with accurate well logs will be selected first for this study. In those sections where accurate well logs are lacking, the well will be selected on the basis of best available geological information from other surveys. It is important to determine what aquifer the well is drawing water from. A PVC pipe will be installed to allow the insertion of an electrical tape so that the tape will not interfere with pump plumbing and wiring. Well owners will be paid \$100.00 for the use of their well during the life of this project.

4. Water Samples: STAGS will work closely with the testing lab to make sure water samples are not contaminated during the sampling and transporting process. Six wells throughout the area will be monitored for water quality. An additional six wells immediately around Clear Lake will also be included in the water quality

monitoring portion of the study. If initial samples find waters not in compliance with EPA potable water standards, additional wells in the vicinity of the found contaminants will be added to the study in an attempt to learn the cause and source of the found contaminants.

5. Information Gathering: All persons assigned to gather information and samples will receive a minimum of ten hours of training. This will assist in setting a standard for the study.
6. Study Narrative Report: Four members of the science community will review the study results and the preliminary report. One qualified professional each from the State of Washington, the county of Spokane, a local university, and the private sector will be selected or assigned to review the report draft and data. A fee will be paid to these individuals and their comments will be evaluated, acknowledged, and included in the final report.

h. Budget

ITEM	DESCRIPTION	NUMBER	UNIT	UNITAMOUNT	COST \$
1.	Trapezoidal weirs	6	EA	3,500	21,000
2.	Weather stations	3	EA	2,250	6,750
3.	Water samples, initial	12	EA	285	3,420
4.	Water samples, 2 nd year	40	EA	100	4,000
5.	Water samples, 3 rd year	40	EA	100	4,000
6.	Well water levels 1 st yr	480	EA	25	12,000
7.	Well water levels 2 nd yr	480	EA	25	12,000
8.	Well water levels 3 rd yr	480	EA	25	12,000
9.	Weir readings 1 st yr	104	EA	25	2,600
10.	Weir readings 2 nd yr	104	EA	25	2,600
11.	Weir readings 3 rd yr	104	EA	25	2,600
12.	Training	1	LS	1,800	1,800
13.	Legal fees	1	LS	3,500	3,500
14.	Report writing	320	HR	36	11,520
15.	Calibration Weather Sta 1 st yr	3	EA	150	450
16.	Calibration Weather Sta 2 nd yr	3	EA	150	450
17.	Calibration Weather Sta 3 rd yr	3	EA	150	450
18.	Calibrate water lvl rcrdr 1 st yr	7	EA	75	525
19.	Calibrate water lvl rcrdr 2 nd yr	7	EA	75	525
20.	Calibrate water lvl rcrdr 3 rd yr	7	EA	75	525
21.	Install instr.	96	HR	36	3,456
22.	Well site selection	1	LS	14,400	14,400
23.	Weir site selection	1	LS	2,160	2,160
24.	County O&M and Admin	1	LS	25,000	25,000
25.	Landowner permit fees	46	EA	100	4,600

26. Well sampling fittings	40	EA	200	8,000
27. Household water meters	6	EA	350	2,100
28. Full well survey (horiz/vert)	2	EA	150	300
29. Water level recorders	7	EA	3,500	24,500
30. Well log review	500	HR	36	18,000
31. Prof. review of prelim. report	1	LS	2,000	2,000
32. Critical path schedule of work	100	HR	36	3,600
33. Electrical tape for well water	1	LS	1,500	1,500
34. Well contingency	30	EA	385	11,550
35. Data compilation	420	MH	36	15,120
36. Weir/well equip. removal	75	MH	36	2,700
37. Printing of Final Report	10	EA	100	1,000
38. TOTAL				\$242,701

Section 9. Key personnel

1. James G. Miller
14606 S. Stangland Rd.
Cheney, WA 99004
Home Phone: 1-509299-9085
e-mail: jandj@cet.com

BS Mechanical Engineering, Seattle Univerisyt 1991

This is James third career, the other two were in the public service field. Since graduation James has become a Project Engineer for a Mechanical/Electrical Engineering consulting firm in Spokane. He has to his credit sixty three(63) design projects, eleven(11) Heating, Ventilation and Air Conditioning studies for Washington State Projects. James has been a member of the Critical Aquifer Recharge Committee for Spokane County. James is a home owner and lives in the study area.

2. Jenine D. Miller
14606 S. Stangland Rd,
Cheney, WA 99004
Home Phone: 1-509-299-9085
e-mail: jenine@cet.com

Jenine has been a computer professional for twenty-two(22) years. Jenine has taken numerous college courses in banking and bookkeeping. Jenine has completed a study for the Swedish Hospital, in Seattle, for the use of computers in patients room's. Jenine has been a member of the Critical Aquifer Recharge Committee for Spokane County. Jenine is a home owner and lives in the study area.

3. Cheryl Davis
S. 21002 Malloy Prairie Rd.
Cheney, WA 99004
Home Phone: 1-509-239-4483
e-mail: cheryld@gntech.net

Cheryl is the Vice President of Resource Development for United Way of Spokane County. Cheryl attended Eastern Washington University from 1975 to 1978, with undergraduate work focusing on earth sciences. She's been active in community organizing and planning since 1990, and was appointed to the Spokane County Critical Areas Citizens Advisory Group (1995-1997), and most recently the Spokane County Critical Aquifer Recharge Areas Committee (10/97-10/98). Cheryl has also just completed participating in a three-year Leadership Development and Holistic Management program through Washington State University, funded by the Kellogg Foundation. Cheryl is an owner/operator of a cow/calf operation and lives in the study area.

4. Jerry Pitts
W 21204 Blue Heron Rd.
Cheney, 99004
Home Phone: 1-509-299-4928

Jerry has been an active concerned citizen in his community for several years. He had made application to the Centennial Clean Water Fund for a study of Clear Lake. Jerry has been part of the Clearance Clear Lake Revival Association since 1992 for the restoration of Heron Pond, which is part of Clear Lake. In the many years that he has lived near Clear Lake, he has seen the degradation of the lake. He wants to reverse the trend and bring it back to the purity that was once known.

5. Maurice Robinette
S. 16102 Wolfe Rd.
Cheney, WA 99004
Home Phone: 1-509-299-4942
e-mail: mlr@ior.com

BS Sociology EWU Cheney, WA 1973
MS Sociology UI Moscow, Idaho 1976

Maurice graduated from Eastern Washington University in 1973 with a Bachelor of Science in Sociology. His masters work was also in sociology at the University of Idaho where he graduated in 1976. Maurice has been part of numerous studies and groups in this area, they are Co-chair Lane Hills-Heyer

Point Coalition; member Critical Areas Committee 1993-1996; Member Agricultural Committee Spokane County 1995-96; Member of the Critical Aquifer Recharge Committee Spokane County 1997-1998; Past President of Spokane County Farm Bureau 1991-1992. Maurice is the owner/operator of the Lazy R Ranch and lives in the study area.

6. Jerry Rouse
W. 21620 Lorene
Cheney, WA 99004
Home Phone: 1-509-299-5259
e-mail: gbrouse@msn.com

BS Agriculture, Range Science U of Ariz., Tucson, 1978
MBA & graduate studies in Range Ecology USU, Logan 1981

Jerry has been a Range Specialist with the USDA, Natural Resources Conservation Service, for the past twenty(20) years. Jerry is a home owner and lives in the study area.

7. Tory Rouse
W. 21620 Lorene
Cheney, WA 99004
Homes Phone: 1-509-299-5259
e-mail: gbrouse@msn.com

BA Education USU, Logan, 1984
Graduate Studies, USU, Logan
Continuing Education, EWU, Cheney, WA

Tory has been an Agriculture Teacher in Ekukharryeim Secondary School Swagland, South Africa for the US Peace Corp 1981-1983. She was Basic Skills instructor Salt Lake City Community College, 1988-89. Director parent Education Resource Center, Tooele, UT from 1986-89. Instructor English as a second language, Intensive English Language Institute at Utah State University 1984-86. Certified teacher, K-12 endorsements in English, teaching English as a second language and Art at Spoken School District #81 since 1991. Tory is a home owner and lives in the study area.

8. Stephen W. Blomgren, PE , WA # 18229 since 1979

21110 S. Harrison Rd.
Edwall, WA 99008-9619
Home/business Phone: (509) 236-2353

BS Agricultural Engineering, WSU, Pullman, 1963
USDA continuing education: Soil Mechanics, Economics, Federal Government

Construction Contract

Administration, Hydrology, Planning Public Projects, Agricultural and Domestic Waste Systems design, Irrigation Systems design and operation, and Land Surveying with the Natural Resources Conservation Service (NRCS), 1967-1996

Stephen has professional engineering experience with the design and installation of public and private water control/management systems and structures in agricultural waste, domestic on-site sewage, flood control and irrigation. Stephen has also done the field work, hydrology and report preparation for flood plain studies under NRCS contracts with HUD and FEMA. His planning experience also includes project plan preparation for PL-566 and RC&D watersheds, and NRCS salmon plans. Tenmile Creek on the Nooksack River (PL-566), and salmon plans such as Asotin Creek, Tucannon River, and Omak Creek are watershed plans Stephen worked on, 1991-1996. Locally, Stephen revised the computer hydrology models (NRCS TR-20) for Latah (Hangman) Creek, 1993 and Dragoon Creek, 1994. At his retirement in January 1996, Stephen had just completed the full hydraulic survey, profile and cross sections, of sixty two miles of the San Poil River in Ferry County, Washington. He has also certified public water supply wells as being installed as designed for Skamokawa Park, Wahkiakum County Port District #2, Cathlamet, WA. Since retirement, Stephen has designed two on-site septic systems and has developed springs and wells for cattle watering. Stephen owns and lives on 578 acres of farm land in the study area.

Section 10. Information/technology transfer

When the report has been through all the reviews, printed copies will be given to the Spokane County Water Resource Department and the Washington State Department of Ecology. A small number of “extra” copies will be kept and made available on request.

Congratulations!