

## Graduate Degree Program Self-Study

**Department**  
**Degree Program**

<b>WATS</b>
<b>PhD WASC</b>

For each graduate degree program in your department, complete this self-study by entering responses and data in the table boxes in this document. Please respond as concisely as possible. The total length of this completed document should not exceed 14 pages, 12-point font.

The self-study is organized into questions regarding the overall nature of each graduate degree program and the critical components of recruiting, mentoring, management, and funding.

### **Overall**

What is the purpose and mission of this graduate degree program?

The PhD in Watershed Sciences focuses on advanced training in hydrology, geomorphology, water quality, or watershed management. Pursuit of this specialized training is undertaken within the broader context of other geophysical, ecological, and management aspects of watershed sciences.
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What are the core strengths of this graduate degree program?

The core strengths of this program are the high-caliber research and teaching faculty who mentor students in the program. Especially strong areas of emphasis/expertise include geomorphic processes, meso-scale meteorology and climatology, hydrology, and acquisition of remotely sensed data using advanced technology.
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What are the primary needs to achieve and advance the purpose/mission of this degree program?

Our primary needs include additional faculty expertise in surface-water hydrology, ground-water hydrology, and surface-water/chemistry/nutrient interactions.
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## **Recruiting**

*Recruiting criteria include, but are not limited to, academic preparedness (GPA, standardized test scores, prerequisite degrees); diversity (gender, race, ethnicity, citizenship); number of applied/admitted/enrolled students*

What types and numbers of students are you targeting for this graduate degree program?

Our current faculty with expertise in geomorphology, hydrology, physical geography, and atmospheric sciences have the capacity to mentor a maximum of about 15 PhD students in any given year. We recruit nationally and internationally for PhD students, most of whom are from the United States.

What recruiting strategies are you currently using?

All of our PhD students are supported by graduate research assistantships associated with faculty grants. To recruit students, individual faculty members send flyers to scientific societies, colleagues, and established research labs across the country and internationally. We then encourage prospective student to visit USU and the department pays for half of their travel expenses associated with such visits. The faculty member will then request that a student formally apply to the program. We also receive many applications that are not solicited, and faculty contact some of these students if they have openings in their lab or anticipate openings.

How effective are these strategies?

Our department does not track recruiting effectiveness very well. We are generally effective in getting the applicants that we want from the pool of students that contacts faculty with GRA openings. We do not know how effective we are in generating a large pool of unsolicited applications, but this is not a strategy that we have pursued.

How do you evaluate recruiting effectiveness?

We evaluate recruiting effectiveness mainly in terms of the quality of students that apply and are accepted. We track the GRE scores and GPAs of incoming students and have a record of the number of students applying each year.

What would be required to be more effective in recruiting students for this graduate degree program? (list in rank order)

1. Having more funds to bring students in for personal interviews.
  2. Being able to offer more and better funded fellowships and research-assistantships.
  - 3.
- Extend list as needed

### **Mentoring**

*Mentoring criteria include, but are not limited to, preparation for future career; scholarly development; professional community participation; appreciation for diversity; collaborative opportunities*

Please provide the following supporting data on students in this graduate degree program:

	2008-2009	2009-2010	2010-2011
Number of research/scholarly presentations (or exhibitions, performances, etc. as appropriate) made by students in this program at state, regional, national, or international meetings	6	10	21
Total number of peer-reviewed publications whose primary author is a student in this program	0	0	2
Total number of peer-reviewed publications where a student in this program is a co-author	0	3	2
Number of students from the previous year's graduating class that have found employment in the field	0	0	0

Comment on data relevant to mentoring students in this degree program not captured in the table above.

We are uncertain of how accurate or representative these data are, but believe they are underestimates. The data reported for 2010-2011 are more typical of the number of scholarly presentations our PhD students make in a year. We need to improve the tracking of these activities at the department level.

What mentoring strategies are you currently using?

Individual faculty work very closely with individual students during all phases of a students program. Most faculty labs have multiple graduate students and senior students and post-doctoral researchers contribute to mentoring students. Most faculty have weekly lab meetings at which weekly objectives and accomplishments are set and discussed. Most faculty also schedule individual weekly meetings with new graduate students to ensure that students have sufficient guidance and feedback regarding their program of study and thesis work. These lab groups create synergisms such that groups attend national meetings en masse, celebrate publications from the lab group, and work to bring in nationally prominent scientists in their focus areas.

Students also get alternative ideas about their research and career options from other faculty in the department. We encourage our students to talk with other faculty who try their best to help all students in the department. We discourage the model where students just live in the bubble of their major professor.

Our students are also required to present a seminar on their proposed dissertation work their 2<sup>nd</sup> semester at USU. This Graduate Symposium is designed to ensure students make timely progress in launching their research and it provides a way of introducing each student and their ideas to a broad within- and cross-department audience.

How effective are these strategies?

As measured by student satisfaction with all aspects of the WATS graduate experience (see Figure 1), we believe we have developed an effective mentoring strategy.

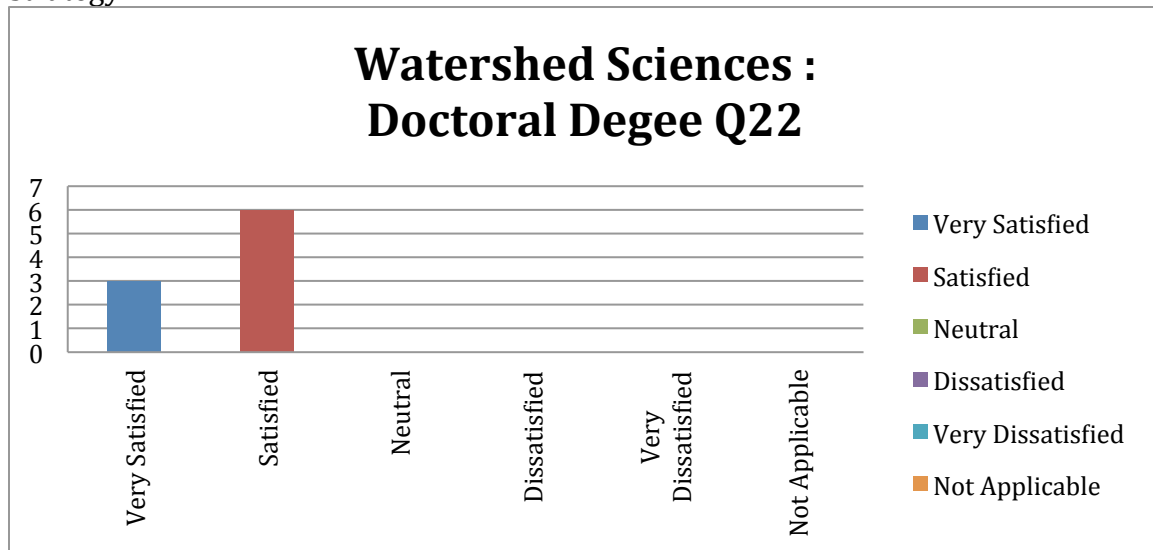


Figure 1. Response of WATS PhD students to the Graduate School survey regarding overall quality of their graduate education.

How do you evaluate mentoring effectiveness?

Our job placement surveys indicate that over 90% (51/55) of the graduates of all of the department degree programs over the past five years are employed in their research or management areas. 100% (10/10) of the PhD recipients from the Department are employed in agency or academic positions. Based on informal surveys, we believe that most of our students are very satisfied with the mentoring they receive. That view is supported by the graduate student survey conducted in conjunction with the self assessment in which 100% of our 9 current PhD students were satisfied or very satisfied with the overall quality of their graduate student experience.

What would be required to be more effective in mentoring students in this graduate degree program? (list in rank order)

1. Additional post-doctoral researchers would help our students see the steps needed to seek faculty positions.

2.

## **Management**

*Management data and criteria include, but are not limited to, the faculty and their scholarship, opportunities for and placement of graduates; average time to degree completion; degree completion rates; frequency of course offerings; graduate enrollment numbers (headcount and FTE); retention; number of degrees conferred; credit requirements; specializations offered; faculty resources*

Please provide the following supporting data on faculty with a terminal degree who teach courses or mentor students in this graduate degree program:

	2008-2009	2009-2010	2010-2011
Number of faculty	13	14	14
Average number of peer-reviewed publications (or books, exhibitions, performances, etc. as appropriate) per faculty member	2.9	1.9	3.0
Number of faculty who received extramural grants for research	12	14	13
Average dollar amount per faculty member of extramural grants received	\$200K	\$341K	\$318K

Comment on the data relevant to managing this graduate degree program not captured in the table above.

These numbers do not reflect the normally close relationship our faculty have with their students, which allows them to become excited about science and be effective in their endeavors.

What are the professional/career opportunities for graduates of this degree program? Comment on the need for and viability of this program in terms of the graduate placement market.

Graduates find employment mostly with natural resources agencies, the private sector, and in academic institutions. As mentioned above, our job placement surveys indicate that over 90% (51/55) of the graduates of all of the department degree programs over the past five years are employed in their research or management areas. 100% (10/10) of the PhD recipients from the Department are employed in agency or academic positions. Our PhD degree programs in Watershed Sciences and associated water sciences are highly viable as evidenced by our high (3<sup>rd</sup>) national ranking in aquatic sciences graduate degree programs.

How is this information communicated to potential and current students?

Through our departmental and faculty web sites and visits to individual labs.

What strategies are used to keep this degree program current in terms of its:

a) Philosophy?

We have regular faculty discussions of our educational mission and goals at

department meetings, workshops, and retreats.

b) Methodology?

Individual faculty are expected to train students in the theory and application of the most current concepts within the discipline and the most relevant analytical approaches used to test general theory and query and interpret data.

c) Technology?

We encourage individual faculty to seek new tools and technological improvements to methodology through requests for equipment funds. We have recently instituted 3-14 day short courses for graduate students that specifically address technological advancements in our field.

What is the targeted time to completion for students in this degree program?

5.0 years

How is this information communicated to potential and current students?

Via the WATS Graduate Student Handbook (available on our web site) and individual discussions with students.

In the past 3 years, how many students have completed their degrees within this targeted time? (numbers of students completing on time vs. total number of students)

In the last 3 years, no PhD students have completed their degrees.

What are the factors that affect completion?

In some cases, students have received less than ideal advice and mentoring with respect to the time it takes to complete projects and what is adequate progress. In other cases, students have accepted jobs prior to degree completion and discovered that trying to finish a dissertation during evenings and weekends is much more challenging than anticipated. A few students have simply lacked the personal drive to finish.

If improvements are needed, what are they?

Better long-term planning regarding the time it takes to complete degrees and more 'forceful' and active mentoring.

What is the minimum number of credits currently required for this graduate degree program?

60 credits beyond the Master's degree or 90 credits beyond the Bachelors degree.

How does the number of required credits comply with standards in the discipline/field (e.g., accrediting agency, professional certification board and/or peer degree program)? Would you increase or decrease required credits to degree, and why?

These credit requirements are similar to many programs but higher than some. We are considering decreasing the number of credit hours required for the degree because formal course work is often the least important component of most student's PhD work.

What changes, if any, should be made to the current specializations offered for this degree?

We currently offer no specialization in either the Watershed Sciences MS or PhD degree but are proposing a specialization in Geomorphology and Earth Surface Processes, which will be offered jointly with Geology.

What would be required to make this graduate degree program more effective?

It is important that we maintain and enhance linkages with other programs on campus including Geology; Civil and Environmental Engineering; and Plants, Soils, and Climate. We are also considering revising our graduate curriculum to strengthen it relative to comparable programs elsewhere.

## Funding

*Funding criteria include, but are not limited to, funding sources (departmental, institutional, contracts, grants); percentage of students receiving support via tuition awards, assistantships, fellowships; average level and duration of support; selection process for tuition awards, fellowships, assistantships*

Please fill in the following chart to show the number of students funded by type and level of funding (FTE), and the average amount of funding per student for 2008-2009, 2009-2010, and 2010-2011:

		2008-2009	2009-2010	2010-2011
Number of students funded by type and level of funding (FTE) per year		#	#	#
a) Externally funded fellowships, traineeships, & internships only	Full support (0.5 FTE)	0	1	0
	Partial support (<0.5 FTE)	0	0	0
b) USU fellowships only	Full support (0.5 FTE)	0	0	0
	Partial support (<0.5 FTE)	0	0	0
c) Teaching assistantships (departmental) only	Full support (0.5 FTE)	0	0	0
	Partial support (<0.5 FTE)	0	0	0
d) Research assistantships from internal sources only (UWRL, UAES, department, etc.)	Full support (0.5 FTE)	1	1	1
	Partial support (<0.5 FTE)	0	0	0
e) Research assistantships from external grant/contract sources only	Full support (0.5 FTE)	2	2	2
	Partial support (<0.5 FTE)	0	0	0
f) Administration or other assistantships only	Full support (0.5 FTE)	0	0	0
	Partial support (<0.5 FTE)	0	0	0
g) Combination of external support (a) <u>with</u> fellowships (b), or assistantships (c, d, e, &/or f)	Full support (0.5 FTE)	0	1	2
	Partial support (<0.5 FTE)	0	0	0
i) Combination of USU fellowships (b) <u>with</u> assistantships (c, d, e, &/or f))	Full support (0.5 FTE)	0	0	0
	Partial support (<0.5 FTE)	0	0	0
j) Combination of different types of assistantships (c, d, e, &/or f)	Full support (0.5 FTE)	2	0	1
	Partial support (<0.5 FTE)	0	0	0
k) Other Describe:	Full support (0.5 FTE)	0	0	0
	Partial support (<0.5 FTE)	0	0	0
Number of <u>self-funded</u> students per year		0	0	1
Total numbers of students per year		5	5	7
Average amount of funding per student per year		\$	\$	\$
a) Full support (0.5 FTE)		18,200	17,900	16,600
b) Partial support (<0.5 FTE)		NA	NA	NA



Comment on data relevant to funding students in this graduate degree program not captured in the table above.

Our funding levels represent a trade-off between the amounts we believe are necessary to be competitive in attracting the high quality students into our program and the practical constraints imposed by the level of funding granting agencies are willing to support.

Comment on the sources and relative proportions of funding available to students in this graduate degree program.

Nearly all of the PhD students in Watershed Sciences are funded. The amounts of the annual stipend could be increased to make us more competitive with other national programs. Students who lack funding are frequently international students or are students finishing up (All But Degree). It is often difficult to predict the support students will receive from their home countries.

Describe the adequacy and appropriateness of the current level of funding for recruiting and retaining graduate students to completion in this degree program.

We have funding for our current numbers of graduate students. Additional funding, particularly from longer-term grant sources, are needed to expand the PhD program in Watershed Science.

Describe the adequacy and appropriateness of the current level of funding for recruiting and retaining faculty to build and sustain this degree program.

The number of faculty within the WATS department, in combination with water science faculty in other departments, are sufficient to sustain our current PhD program, but a specific recommendation in our recent external departmental review was to build our PhD program. However, we are currently limited in our ability to expand our graduate programs in several critical areas of watershed science and management. We are trying to develop a new focus in river restoration and rehabilitation. We also need expertise in water quality with an emphasis in the source and fates of environmental contaminants. We have no expertise in hyporheic/groundwater hydrology. We can only expand if we have access to additional funding.

What could be done to more effectively fund graduate students in this degree program? (list in rank order)

1. More fellowships

2. More research funding

3. More tuition waivers

Extend list as needed

**Are there any important aspects in evaluating this graduate degree program that have not been captured in the information above? If so, please comment.**

One of the biggest challenges for our PhD program is to have graduates compete successfully for faculty positions at other universities. Part of this issue relates to the lack of recent academic positions available, but other issues contribute including a lack of interest in pursuing academic positions. Our faculty have discussed this issue and no obvious recommendations for changes in the management of the program have emerged.