**Project Title:** Submersible Fluorometer for Aquatic Ecology Research and Education.

<table>
<thead>
<tr>
<th>Department/Organization:</th>
<th>ESCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Applicant(s):</td>
<td></td>
</tr>
<tr>
<td>Principal Contact</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>James M. Helfield</td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Ruth Sofield</td>
</tr>
<tr>
<td>Name</td>
<td>F. Scott Wilkinson</td>
</tr>
</tbody>
</table>

**Amount Requested for Project**

<table>
<thead>
<tr>
<th>Proposed Budget:</th>
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</thead>
<tbody>
<tr>
<td>1. Equipment total</td>
</tr>
<tr>
<td>2. Plus site preparation <em>(not STF funded)</em></td>
</tr>
<tr>
<td>3. Total Project Cost (spreadsheet total from part IV of this form, Total Project Budget)</td>
</tr>
<tr>
<td>4. Less organization’s contribution</td>
</tr>
<tr>
<td>5. Less site preparation</td>
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<tr>
<td><strong>STF Grant Request</strong></td>
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**IMPORTANT NOTE**

1. THE STF Committee will accept only complete proposals by the announced deadline. Every section (I–IX) and all items of this proposal format must be addressed.

**I. Executive Summary (800 words max)**

Provide a summary of the project and the benefits to be derived. Explain what the students would gain from the project, and how the acquisition would meet the Student Technology Fee mission.

**STF Mission:**

The Student Technology Fee provides Western students with adequate and innovative technology experiences by:

- Broadening/enhancing the quality of the academic experience
- Providing additional student access to technology
- Increasing integration of technology into the curriculum

Fluorescent dye tracing is a powerful tool for measuring and mapping water flow through complex systems. Where known concentrations of fluorescent dye are injected into a water system, fluorometric analyses of nearby water samples can be used to determine
the extent of connection and flow rates between injection and sampling locations. This approach is widely used by researchers and environmental management professionals for a variety of applications, including delineating the potential spread of water-borne pollutants and assessing the effectiveness of stream restoration efforts. Dye tracing is particularly useful for measuring subsurface (e.g., groundwater) flows, which are not easily measured through other empirical methods, and which represent an important frontier in stream ecology and salmon habitat biology.

Laboratory- and field-based fluorometers can detect minute concentrations of fluorescent dye, which allows for sensitive and precise analyses, but conventional fluorometers are limited by the effort and expense required for frequent or extended sample collection. For example, given the typically slow velocities of groundwater, a tracer experiment will in most cases require repeated, frequent sample collection over a period greater than 24 hours. With a laboratory-based fluorometer, this entails multiple trips to transport water samples from the field site back to the laboratory. With a field-based fluorometer, this entails an extended stay in the field and requires a power source capable of powering the fluorometer for extended periods of time. Both of these options may be prohibitively expensive, inefficient or otherwise impracticable at remote field sites. Consequently, researchers and environmental management agencies have begun using submersible fluorometers capable of collecting and logging accurate, real-time fluorometric data for extended periods of time.

This proposal seeks funding to acquire a submersible, data-logging fluorometer to support undergraduate and graduate courses and independent student research in the Department of Environmental Sciences. Acquisition of a submersible fluorometer would fulfill all three objectives of the Student Technology Fee mission: It would enhance the quality of students’ academic experience by providing hands-on training in the use of state-of-the-art technology used by researchers and environmental management professionals, and by facilitating use of real-world data for assignments and exercises in various courses. In many cases, the frequent or extended sampling trips required for conventional fluorometric analyses are prohibitively expensive and time consuming for use in regularly scheduled courses. Moreover, by making the fluorometer available for use in class and for independent student research projects, this project would provide additional student access to technology and increase integration of technology into our curriculum.

II. Relationship to STF Objectives / Impact on Current Academic Programs

The STF Committee will use as its primary assessment criteria the three objectives—quality, access, and integration—defined in the STF mission (above). Given this criteria, describe your proposed project in detail.

1. Tell us—focusing on what the students will gain from the project—how the project would provide positive benefits to specific courses or instructional programs. Specifically, answer at least one of a, b, and c below:

a. How would this project provide additional student access to technological resources?

   This project would provide additional student access to technological resources by bringing a new type of technology (i.e., the submersible fluorometer) onto campus and making it available for student use. Specific courses that might use the submersible fluorometer include ESCI 429/529 (Stream Ecology), ESCI 411 (Habitat Assessment for Pacific Salmon and Trout), ESCI 470 (Ecological Restoration) ESCI 459 (Aquatic Toxicology), ESCI 460 (Contaminant Movement in the Environment), ESCI 440 (Wetlands Ecology), ESCI 463 (Wetlands for Wastewater Treatment), ESCI
522 (Estuarine Ecology), and BIOL 326 (Ecology Laboratory). Moreover, the submersible fluorometer would be accessible to undergraduate and graduate students for independent research and thesis projects.

b. How would this project **broaden or enhance the quality** of the student’s academic experience through the proposed technology?

This project would broaden and enhance the quality of students’ academic experience by (a) providing hands-on training in the use of state-of-the-art technology used by researchers and environmental management professionals, and (b) facilitating use of real-word data for assignments and laboratory exercises in various courses.

c. How would this project **increase integration** of technology into coursework?

In many cases, the frequent or extended sampling trips required for conventional fluorometric analyses are prohibitively time consuming for use in regularly scheduled courses. By facilitating use of fluorometric analyses in course assignments and laboratory exercises, the this project would increase integration of technology and use of real-world data into coursework.

2. Would other departments be involved with this project?

No ☐ Yes ☒ If yes, describe.

The submersible fluorometer would also be available for use by students in the Departments of Biology, Geology and Environmental Studies.

3. Has any part of this project previously been funded by the Student Technology Fee?

No ☐ Yes ☒ If yes, describe.

4. Is the proposed project a pilot project?

No ☐ Yes ☒

III. Utilization

List the anticipated number of times and duration per each use—per quarter or per academic year—that students would use the proposed technology. The committee is looking for **total student hours** and **total number of unique students** who would use the technology in that time period. Explain how you arrived at this utilization.

The submersible fluorometer would be used for one laboratory/field exercise every spring quarter in ESCI 429/529. Each exercise would involve approximately two hours to calibrate and deploy the fluorometer and to inject the dye tracer, followed by another two hours to retrieve the fluorometer, download the data and analyze the data. Excluding the time during which the fluorometer would be out in the field recording data, each student in ESCI 429 would therefore use the submersible fluorometer for approximately four hours per quarter. The average enrollment in ESCI 429/529 (2010-2014) is 24.5 students. For ESCI 429/529, this project would therefore entail approximately 100 student hours for approximately 25 students per year.
For ESCI 470, the submersible fluorometer is likely to be used, on average, for one group project per quarter, which would entail approximately 48 student hours for six students per year, calculated as eight hours of use (2 deployments) for one six-student group.

For independent research projects, the submersible fluorometer is likely to be used for >20 hours per student per project.

If the submersible fluorometer is used in ESCI 429/529, ESCI 470 and one additional laboratory course (assuming usage comparable to ESCI 429/529; see above list of specific courses) and for one independent research project per year, total utilization may be estimated at approximately 268 student hours for approximately 57 students.

IV. Total Project Budget

This section details the estimated total cost of the project. Include costs that would be covered—by your department or another source—for ongoing costs such as personnel or operating expenses.

1. For assistance in preparing your budget, please consult with relevant campus support departments (ATUS, Purchasing, Space Administration, etc.).

2. For more information about these contacts and helpful tools/links: from the STF website home page (http://www.wwu.edu/stf), choose “STF Tech Initiatives” on sidebar, then section “II. Tech Initiatives Forms and Instructions.”

Attach an Excel spreadsheet if you have additional details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Item Cost</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submersible fluorometer + warranty + accessories (see attached quote from Turner Designs)</td>
<td>1</td>
<td>12,189</td>
<td>12,189</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>12,189</td>
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<tr>
<td>Allowance for price increases (3% of subtotal)</td>
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<td></td>
<td>366</td>
</tr>
<tr>
<td>Shipping (taxable)</td>
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<td>0</td>
</tr>
<tr>
<td>Tax (8.7%)</td>
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<td>1,093</td>
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<tr>
<td>Total <em>This budget total (or your attached spreadsheet total) should match the projected budget figure on page 1 of this proposal. (See box on page 1, line 3.)</em></td>
<td></td>
<td></td>
<td>13,648</td>
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</table>

Important Notes from the STF Committee:

- We recognize your proposed budget as an estimate. Final funding for successful projects will be established after thorough technical review; some costs may need adjusting due to price changes.
We recommend that you include a 3 percent cushion to allow for price increases.

We may impose special conditions on a proposal before approval. See STF Proposal Guidelines.

Funding is not provided directly to departments for purchases. All purchasing is done via the Office of the VPIT/CIO and savings are retained in the STF fund.

3. What funding or contributions are available from your department or other sources?

   Note: “Contribution” is defined as a monetary contribution. A vendor discount, for example, is not considered a contribution.

   0

4. Could this project be divided into discrete elements that could be funded separately?

   Note: A “no” response to this question creates an “all or nothing” proposal. That is, if the STF Committee decides against funding your entire proposal, it will not consider any elements for partial funding. If elements could be funded separately, the applicant is responsible for prioritizing them before submitting the proposal.

   No ☐ Yes ☐ If yes, summarize and prioritize project elements with cost estimate for each.

5. Are course or lab fees charged for any of the courses that will use this equipment?

   No ☐ Yes ☒ If yes, describe. Please note: The total funding requested from the Student Technology Fee must reflect the amount collected from course fees for equipment replacement and/or equipment acquisition.

   ESCI 429/529 and ESCI 470 charge lab fees.

V. Impact on Existing Resources

Your proposal must address the project’s potential impact on existing resources. Give special attention to the impact on data transmission networks (e.g., sources accessed, networking equipment, etc.), and personnel (e.g., staffing, administrative support, faculty support, etc.).

1. Describe how existing equipment is used. Contrast this to projected use if your project were funded.

   This project would not require any additional resources for data analysis or transmission, nor would it require any additional personnel.

2. Is similar equipment or technology available elsewhere on campus—such as the Student Technology Center, Classroom Services, Video Services, Western Libraries, a college lab?

   No ☒ Yes ☐ If yes, describe why the existing equipment does not meet the needs outlined in this proposal.

3. If this project involves the replacement of equipment, including computers:

   a. Describe the “before and after” configuration changes. (A spreadsheet reflecting these changes may be attached.) Or, write “N/A.”

      N/A
b. Describe the costs and benefits of replacing vs. upgrading. Or, write "N/A."

N/A

4. Would this equipment be available to students outside of your department?

No ☐ Yes ☒ If the proposed technology would be used by students outside of your department, describe how they would gain access, how equipment availability would be publicized, the hours/week when equipment would be available, and any costs that would apply.

The submersible fluorometer and accessories would be housed with other field sampling gear in the Department of Environmental Sciences. Equipment availability would be publicized through word of mouth communication among faculty and staff. Faculty and students in Environmental Sciences and other departments alike would gain access on a first-come first-served basis by submitting an informal request to F. Scott Wilkinson or James Helfield. No costs would apply for use of the fluorometer, although students or faculty from other departments may be asked to replace any expendable materials (e.g., rhodamine dye) that they consume. This sort of informal arrangement is currently in use for a variety of field and laboratory equipment that is routinely lent among faculty and students in the Departments of Environmental Sciences, Biology and Geology.

5. Does this project involve the check-out of equipment to students?

No ☐ Yes ☒ If yes, discuss whether or not the Student Technology Center/ATUS Loan Pool could be assigned this task.

Check-out to students would be managed by faculty and staff in Environmental Sciences, as is currently done with other laboratory and field equipment.

6. Does the department have adequate operating funds to provide ongoing maintenance and support?

No ☐ Yes ☒ If yes, describe.

Ongoing maintenance should require minimal support.

7. Does the department have adequate personnel funds to provide ongoing staff support for the project?

No ☐ Yes ☒ If yes, describe.

The Department of Environmental Sciences maintains a variety of field and laboratory equipment used for instructional purposes. The additional support required for adding a submersible fluorometer would be negligible.

VI. Space and Site Information

This section addresses any space alteration or site preparation necessary for the proposed project. Site alterations include painting, holes in walls, security systems, carpeting, construction, lighting changes, or conversion of a lab or office.

Special Note: If this project would require any site preparation, or if this project would use any space not currently under your department’s control:

a. You must submit a draft proposal to Space Administration by March 13, 2015.

b. Space Administration and Facilities Management will then conduct a site survey and respond to you by March 20, 2015 about project feasibility, cost, and schedule.
c. You must include the site survey response with your final proposal.

1. Location for installation of equipment or technology:

   The submersible fluorometer is portable. It will be stored with other field and laboratory gear in the Department of Environmental Sciences.

2. Would site modification be required?

   No ☒ Yes ☐ If yes, describe the modifications (e.g., electrical, air, painting, lighting, security, network access, etc.).

3. Would this project use space not currently assigned to your department or area?

   No ☒ Yes ☐ If yes, describe.

VII. Project Schedule

Describe your overall implementation schedule. (Remember that project awards are announced during spring quarter, and that projects are to be substantially completed by the end of the calendar year.) If any site preparation is involved (see section VI above), align your project schedule with the schedule provided by Space Administration and Facilities Management.

   We propose to make the submersible fluorometer available for use in student research projects beginning in the summer of 2015. It would be available for ESCI 470 in Fall 2015, and for ESCI 429/529 in Spring 2016.

VIII. Constraints

List or describe any external or internal factors/constraints that could affect your project schedule, project objectives, or the project budget (e.g., if external approval is required for curricular changes, or if funding must be received by a certain date).

   N/A

IX. Submitting the Proposal

1. Make sure your proposal does not exceed 12 pages (not including Tech Initiatives Summary Sheet).

2. Complete a 2015 Tech Initiatives Summary Sheet for the front of the proposal.

3. Submit the proposal and summary sheet electronically for prioritizing (PDF preferred, or Word document):

   a. Faculty and staff: Submit by internal due date, which must be before proposal due date of April 2.

   b. Students: Submit by March 31 to AS VP for Academic Affairs at ASVPforAcademicAffairs@wwu.edu.

4. Submit prioritized proposals:

   a. Organization reps and AS VP for Academic Affairs: Submit to Student Technology Fee (STF) Committee by 12:00 noon on April 2.
b. For each proposal, email one electronic version (PDF preferred, or Word document) of both the proposal and the summary sheet to diane.bateman@wwu.edu (the STF Committee secretary).

Note: Paper copies of proposals are no longer required; please do not send.