

Grand Valley State University Annis Water Resources Institute

Science Advisory Board Review

March 10-11, 2017

FINAL REPORT

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Introduction and General Observations

At the invitation of the Director of the Annis Water Resources Institute, Dr. Alan Steinman, the Science Advisory Board (SAB) conducted a review of the Institute on March 10-11, 2017. The most recent previous review was conducted on March 11-12, 2014. The 2017 review included an assessment of the Institute's research program, graduate program, outreach and education program, service functions, facilities, and administration. While the primary purpose of the review is to provide an assessment of AWRI's programs and to offer direction as to how the Institute may most effectively fulfill its mission, the review also provides an opportunity for learning and intellectual exchange between AWRI and the various universities represented by the SAB. It was clear that AWRI faculty and staff see the review as a valuable exercise, and the SAB appreciates their efforts to provide a thorough, in-depth review of activities over the past three years.

AWRI is an important and unique educational and research facility. It is the only educational institution on the eastern shores of Lake Michigan dedicated to the study of aquatic ecosystems. Within Grand Valley State University, AWRI is a major player in the graduate program, providing a facility that is well equipped for training students in aquatic science and technology. Considering the increasing importance of water as an economic resource, particularly for Michigan, and the challenge of aquatic ecosystem stewardship in the face of growing threats and stressors, the research and education provided through AWRI makes a significant contribution to the maintenance of healthy ecosystems and economies within the state of Michigan.

During this review, the SAB was pleased that most of the significant issues raised during the 2014 review have been addressed (see Appendix), and that significant progress has been made in enhancing AWRI's research program. Noteworthy achievements include continued expansion of access to the outreach and education programs accessible through modifications of the vessels, solid extramural funding success, and an increase in research collaborations. Funding fluctuations have occurred among individual researchers, which is normal for a research institution that relies primarily on external funding for research support. However, AWRI researchers remain reasonably well funded, with expansion into some new funding sources, and have a suitable overall publication rate. Some challenges remain related to graduate student education, which are due primarily to the relatively small size of the student body and the limited number of teaching staff. Recommendations regarding these challenges, along with a more detailed assessment of research programs and administration follow in this document.

AWRI's mission is to integrate research, education, and outreach to enhance and preserve freshwater resources. The Institute's growth since it became an academic unit is well aligned with this mission; its research program has grown, it has a world class education and outreach program that focuses on the aquatic resources of Michigan, and its research and education programs are oriented around specific challenges related to aquatic resource management. The SAB continues to see AWRI successfully achieve its mission, and based on the current trajectory of its research and education programs, we expect it will continue to fill a unique educational and research niche within the state of Michigan.

Research Program

Research activities at AWRI cover a broad array of topics within the general field of aquatic sciences, including biogeochemistry, human and ecosystem health, landscape analysis, ecological modeling, molecular biology, food webs, ecotoxicology, ecological genomics, and biological conservation. The faculty of AWRI has remained largely static since the last review in 2014, with

one notable exception – the departure of Dr. Ryan Thum in 2014. This loss was compensated by the recruitment of Dr. Charlyn Partridge in 2015, which continues AWRI's active program in molecular ecology. It is worth noting that a new invasive species genetic testing company (GenPass) has been established, based on research originally began by Thum, and continued by his graduate student Syndell Parks, using Eurasian watermilfoil as the test organism. Parks took official ownership of the company in 2016, and leases space in AWRI to continue sample analysis from clients throughout the country.

Two key measures of research productivity are peer-reviewed publications and external funding. Here, we focus on the 8 research-active faculty, excluding Mr. Koches and the ISC, which provides more of a service rather than research function. In terms of peer-reviewed publications, during the past 3 years (2014-2017) these 8 faculty list 64 peer-reviewed publications (Dr. Steinman's review lists 56) for an average of 8 publications per PI or 2.67 publications per PI per year. We note that some of the 64 papers may be co-authored by multiple AWRI faculty and therefore counted twice or more and that 26 of those publications came from the laboratory of Dr. Steinman. The remaining 7 faculty are therefore responsible for an average of 5.4 publications per PI over the 3-year period. While this is reasonable productivity, AWRI's impact would be enhanced with an increased emphasis on scholarly publication. It is commendable to note that the PIs continue to engage their graduate students and postdoctoral fellows in the publication process (22 papers cited in Dr. Steinman's report) with many of those papers including those individuals as first or second author. Collaboration with scientists outside of AWRI is also evident in the publications, which also is a promising sign as recommended in our 2014 report.

Extramural funding acquired by the 8 PIs from 2014-2017 has included a large variety of sources ranging from NSF grants on nationally important topics to more regional grants addressing local issues. Based on the CV's of the 8 research faculty, total external funding (AWRI portion only) was roughly \$3.0 million over the past 3 years (grants received from 2014 to the present, but not including revenue from endowment), for an average of ~\$1,000,000 per year. This averages to approximately \$125,000 per PI per year. This funding level is reasonably good, especially given the current funding climate – in particular at the federal level. We note, with enthusiasm, that AWRI faculty have won two large grants from the NSF (one research, one REU) along with significant funding from the USEPA via the Great Lakes Restoration Initiative. Furthermore, funding is reasonably well distributed among the faculty and none of the 8 PIs currently lack external funding.

An increased level of research collaboration (one of our recommendations from 2014) is also evident among the faculty, with a number of grants having multiple AWRI co-PIs. For example, the newer faculty (e.g., Drs. Partridge, McNair, Strychar) are collaborating on active and pending grants including a substantial (\$405K) USEPA-GLRI grant focused on the population genetics of an invasive plant. In addition, Drs. McNair and Strychar co-lead a NSF-REU grant ("QUEST") for quantitative skills training in environmental science – an area of great interest within the NSF and beyond. As recommended in our previous report, Dr. McNair's modeling skills are showing evidence of integrating different research disciplines within AWRI, which is bearing fruit in grant proposal success. Dr. Strychar's global change expertise is also key to integrating science, technology, and the human dimension.

Many of the current research and management challenges related to aquatic ecosystems require interdisciplinary collaboration. We continue to see good evidence of collaboration by AWRI scientists with external investigators. Dr. Ruetz's work with the GLRI-funded Coastal Wetland

Monitoring Program is an example of a strong multi-institutional collaboration to assess the condition of Great Lakes wetlands. Dr. Steinman is a part of several very large NOAA projects (~\$8M each) focused on restoration of the Lower Muskegon River and Muskegon Lake. Dr. Luttenton is engaged in a large multi-investigator NIH grant to “mine” for anti-cancer chemicals in aquatic fungi. The collaborative NSF grant held by Dr. Biddanda explores the biogeochemistry of important cyanobacterial mats in the Great Lakes. Dr. Rediske has numerous collaborations with outside investigators to assess environmental contaminants, and has expanded his lab to conduct molecular ecology including qPCR for beach monitoring of potential pathogens. As mentioned in our 2014 report, the SAB was also pleased to note that AWRI scientists continue to progress from more focused regional science to broader, fundamental issues of interest to the general scientific community.

The newest member of the AWRI faculty, Dr. Charlyn Partridge (an Assistant Professor hired in fall 2015), has gotten off to a strong start in her first 1.5 years. As a molecular ecologist and evolutionary biologist, Dr. Partridge brings an important skill set and intellectual focus to AWRI. Dr. Partridge has already won two substantial grants – one from the USEPA-GLRI fund to study the population genetics of meta populations of invasive baby’s breath in coastal dune ecosystems, and the other from the MDEQ to develop molecular rapid assessment tools for harmful algal blooms. As she gathers data for these two projects, Dr. Partridge is also actively publishing papers from her postdoctoral work at the University of Western Ontario. The SAB was pleased to see Dr. Partridge’s quick success in obtaining funding, and looks forward to seeing her publications from these projects as they emerge. Dr. Partridge’s coherent and growing program holds great promise for a successful career at AWRI and potential for future leadership of research and training grants.

Overall, the SAB is impressed by the level of AWRI’s research activity and scholarship, the increased level of collaboration among faculty, and the appropriate combination of regionally focused and broader research projects. **While some concern was expressed by the PIs about the management challenges of the NSF-REU program, this training grant puts AWRI “on the map” of the national science scene and GVSU should support this program with any administrative or academic resources it can muster.**

Education and Outreach

The Education and Outreach (E&O) Program, under the direction of Dr. Janet Vail, continues to serve students and teachers well in western Michigan and beyond, advancing the mission and visibility of AWRI. Both the D.J. Angus and the W.G. Jackson had active schedules of about 130 events per year in 2014-2016. The Angus conveyed 2,555-2,647 participants and the Jackson conveyed 3,148-3,308 participants.

The indoor program in the Annis Educational Foundation Classroom also provides educational opportunities for the K-12 student groups that attend the vessel program: half of the students that are bused in from a school participate in the classroom program while their classmates are out on the vessels, and then the groups switch. This arrangement is efficient for the schools, and provides the students with additional hands-on engagement.

The seasonal staff members of the E&O Program have returned to work there year after year, and the program has benefited from their past experience as teachers and as returning AWRI staff. Because many of the educators are also grandparents, schedules sometimes have to be arranged around their babysitting obligations.

Funding from the Great Lakes Restoration Initiative for "Making Lake Michigan Great" allowed

the vessel program to extend its reach to other ports in 2014-2016: Holland MI, White Lake MI, Muskegon MI, Michigan City IN, East Chicago IN, Waukegon IL, Burns Harbor IN, and Hammond IN. This not only widened the educational reach of the E&O Program, but also provided publicity for the work of AWRI throughout Lake Michigan. The funding for that project has now ended.

Program funding has come from a variety of other sources. The endowments greatly subsidize the local outreach programs, but at levels that fluctuate slightly over time with market changes (the fluctuation is tempered because distributions from interest earnings are based on 16 quarter rolling averages). Other sources of funding during the past three years have included the Waukegan Citizens Advisory Group, the Sanitary District of Michigan City, the Indiana Department of Environmental Management, and the Alcoa Foundation.

Dr. Vail has been very active in environmental education curriculum development. Educator workshops were held at a variety of venues, and Dr. Vail is state coordinator for Project WET (Water Education for Teachers) and the GLOBE (Global Learning and Observation to Benefit the Environment) Program. The E&O Program is an active participant in the Michigan Environmental Education Curriculum Support (MEECS) program. AWRI was honored this year to have been the site of two programs taped by PBS Learning Media (see online PBS Learning Media and type MEECS in the search bar).

Dr. Vail has also worked with other AWRI faculty on curriculum development. An example is a lesson plan for exploring a time series of water quality monitoring data, developed with Dr. Biddanda. This effort was published in the Michigan Science Teachers Association Journal.

Dr. Vail was also selected as the 2016 Informal Science Educator by the Board of the Michigan Science Teachers Association. She was chosen "for unique and extraordinary accomplishments, scholarly contributions, and direct and substantial contributions to the improvement of non-school based science education over a period of time." In addition, the quality of the vessel educators is embodied by the awards received. For example, Sherry Claflin received the National Association of Geoscience Teachers (NAGT) 2017 Outstanding Earth Science Teacher (OEST). The annual award is for "exceptional contributions to the stimulation of interest in the Earth Sciences at the pre-college level."

In summary, the E&O program remains a vital and well-run AWRI component, providing benefits to a variety of groups and helping to raise local awareness of environmental issues.

Graduate Program

Graduate students often provide the core of academic units, and AWRI is no exception. The SAB was pleased to note that the AWRI Master's program continued to flourish during the period 2014-2017, with a core group of dedicated and articulate students who expressed a strong sense of solidarity and mission, and faculty who are genuinely engaged in the mentoring and development of the students. In his overview of AWRI, Dr. Steinman highlighted awards and distinctions received by nine AWRI graduate students advised by six different AWRI faculty, which is a significant accomplishment for these students and their advisors. The students themselves expressed general satisfaction with resources for academic development, including funds for conference attendance and publication costs. They also appreciated the high quality of infrastructure and research equipment at AWRI. In contrast to the past, the students spent minimal time discussing their support package. This implies to us that the students are generally satisfied with the level of financial support (i.e., stipend) provided by GVSU.

Curriculum - The SAB met with a group of 10 articulate and engaged graduate students (plus one undergraduate) and discussed a number of wide-ranging issues, including curriculum, academic and intellectual environment, integration into the academic ladder, and financial support (to a lesser degree). At several junctures, the SAB also heard the views of the director and the faculty of AWRI on the graduate program, particularly on the issue of future directions of the graduate program. The SAB meeting with students, most of whom are enrolled in the AWRI M.S. program via the Biology Department, was open and productive. More so than in past meetings, a substantial amount of time (at the students' choice) was spent on the M.S. curriculum. We discussed the required and elective coursework for the M.S. degree. The core curriculum for the Biology M.S. degree consists of three core courses:

- BIO 610 - Scientific Methodology (taken in Year 1)
- BIO 698 - Perspectives in Biology (a capstone course)
- A course in statistics (either BIO or STA)

These core courses were generally viewed as being useful by the AWRI graduate students. AWRI students take an additional two required classes – Aquatic Ecosystem Management and Advanced Aquatic Ecology. Aquatic Ecosystem Management is generally viewed as being useful but the students recommended possible modifications to Advanced Aquatic Ecology. In the latter course, each participating faculty member presents a 3-hour lecture (theory based) followed by a 3-hour topical discussion. While students appreciated the theory, they considered the ensuing discussion period to be less useful. **The students discussed possible changes in the format and content of that class, including the possibility of “demonstrations” of sampling and analytical approaches utilized by the PI as a replacement for the discussion period.** That is, the PI could potentially host a live practicum within their laboratory to bring their science “to life”.

Students generally felt that course offerings were adequate, but cited two significant obstacles to completing their coursework in a reasonable amount of time – ideally in Year 1 of their graduate program so that Year 2 can be devoted entirely to research. First, courses offered every other year present a scheduling challenge because a M.S. degree typically lasts only 2 to 2.5 years. Second, the general requirement for a graduate course to have 10 enrolled students (or be canceled) means that smaller but important classes often do not “go” with little notice. Given the size of the AWRI Master's program (18 students, not many more than the minimum class size), this presents a clear challenge to efficient completion of coursework by the students.

Students are also, as in the past, challenged by classes that are held on the main Allendale campus of GVSU, especially those held during the middle of the day that tend to divide up field and laboratory work days. This problem is common to all graduate programs, but is particularly acute due to the commuting time from AWRI to the Allendale campus and the lack of a regular shuttle. **We discussed possible remedies, including the use of “remote learning” via video links or online courses. Students were intrigued by this idea, which perhaps could be explored in more detail by AWRI and GVSU leadership.**

While not a curricular issue, an interesting perception was also expressed by some that even the small physical separation of the Field Station building from the main AWRI building may erect barriers to fuller exchanges among personnel, including students, at AWRI. **To overcome this, the students expressed the desire for a regular “journal club” run by senior graduate students and/or postdocs to better engage the M.S. students as an integrated cohort.** This would also provide vertical mentoring opportunities among the M.S. students.

One final note is that the students highly enjoyed hearing seminars from returning AWRI graduates

about their experiences after getting their M.S. degree, and **encouraged even more of these interactions**. This may be the outcome of the recent AWRI Awards to program alumni, a wonderful idea in the opinion of the SAB.

Opportunities for mentorship and to be mentored - Vertical mentoring from PIs to postdocs to graduate students to undergraduates is a vital part of academic training. The graduate students noted that opportunities for mentorship of undergraduates are currently limited at AWRI, although this may actually be laboratory-specific. **If possible, AWRI should explore opportunities for graduate students to work with and mentor undergraduate researchers, perhaps through summer internships or via the REU-QUEST program.** Even short-duration mentoring experiences would have value. In addition, PIs can forge relationships with faculty at Ph.D. granting institutions to enable short-term exchanges of students (in either direction). Exposure to Ph.D. students may encourage AWRI students to consider entering such programs after their M.S. Also, as discussed in previous SAB reports, postdocs are a vital part of the academic ladder who can provide M.S. students with recent, real-life advice about doctoral programs. Certainly, internal resources (e.g., endowment) constrain the recurring postdoctoral positions that can be filled, but **AWRI PIs should consider writing in postdoctoral positions into grant applications where appropriate.**

Graduate School - Dr. Mark Luttenton, who has long been an important link between AWRI and the GVSU Biology Department, is now Associate Dean of the Graduate School. He provided a perspective on graduate studies at GVSU, which consist of 40 graduate programs with about 3,200 total students. Grad enrollment in previous years was ~3,800, but is now lower because the College of Education is smaller. Some graduate programs are self-funded, such as the College of Health Professions, whereas other graduate programs are not. GVSU is generally concerned about the demographics of declining numbers of high school graduates and its potential impact on undergraduate enrollment, and is thus seeking to increase enrollment of graduate students. This has the possibility to benefit the M.S. program at AWRI, but caution will need to be exercised to ensure that the M.S. program does not evolve into a revenue-generating mechanism for GVSU. If revenue is the goal, and as noted in previous reports, a separate Professional Master's program (non-thesis and tuition charging) would be the appropriate mechanism, as has been discussed by the SAB in that past with AWRI leadership. The well run and successful M.S. program at AWRI, where students are provided a reasonable stipend and pay low tuition, should not morph into a revenue stream for the University. The students noted that they feel and are treated like "researchers" and do wish to be viewed as "professional" students.

Service

AWRI faculty service benefits GVSU, NGOs, local and state government entities, scientific professional societies, and even developing countries. These accomplishments are even more impressive given that they are done on top of their considerable research, teaching, and advising loads.

AWRI faculty perform substantial service to the University through participation on various committees, including Strategic Positioning, Student Life Funding, Graduate Program, Personnel, New Programs, Academic Senate, and Curriculum committees. The AWRI faculty provide service to their professions by reviewing proposals and sitting on review panels for NSF, NOAA, NASA, EPA, and other agencies. They also provide journal reviews and serve on editorial boards for a wide range of regional, national, and international journals. Most faculty serve on the wide range of AWRI committees as well.

Almost all of the AWRI faculty work with state or local entities charged with advancing aquatic science and protecting natural resources. Examples include service on the Michigan Space Grant Consortium Executive Board, the Michigan Department of Environmental Quality, the Michigan Green Chemistry Roundtable, the Michigan Department of Natural Resources, the Muskegon Lake Watershed Partnership, Muskegon Environmental Research and Education Society, and the Boy Scouts of America. Dr. Steinman's role on boards of trustees of the Michigan TNC and the Community Foundation, as well as serving on the science committee of the Great Lakes Advisory Board and the National Estuarine Research Reserve System are notable, as are Dr. Vail's extensive education and outreach engagements detailed in the Education and Outreach section.

Facilities

The primary focus of the facilities presentation to the 2017 SAB related to vessels. As always, the AWRI fleet has been expertly, safely, and efficiently managed by Captain Tony Fiore and his crew. Captain Fiore has been able to recruit highly qualified help who are enthusiastic about running the *D.J. Angus* and the *W.G. Jackson*, to the benefit of AWRI's educational and research programs. New guidelines for average weight per passenger implemented by the U.S. Coast Guard somewhat reduced the number of passengers that could be accommodated by the *W.G. Jackson*, but the total number of participants and events served by the two vessels remained high in 2014-2017. There were, however, two signs that the operation of the AWRI fleet may have to change in the future: (1) the captain vacancy and (2) the aging crew.

As of the SAB meeting in March, the position of captain on the *D.J. Angus* was vacant. If the position cannot be filled, Fiore would have to take over as captain, thereby relinquishing some of the other duties he would have done over the summer. Captain Fiore attributed the difficulty in finding a captain to the recovering economy and resulting improved demand for ship captains throughout the U.S.

Captain Fiore also noted that the average age of the crew on the *D.J. Angus* is 63 and on the *W.G. Jackson* is 68. On the one hand, the fleet benefits from crew with a wealth of experience (15th season for deckhand James Rahe, 13th season for engineer Dave Fisher, 5th season for Captain John Bontrager), but on the other hand the demands of the job will eventually preclude some of the oldest crew from returning. Fiore also described the work last summer of a younger (age ~18) recruit from the Muskegon area; such mentoring could have long-term benefits.

Given these staffing challenges, it would be worthwhile to do some brainstorming (“strategic planning”) about how to recruit new crew, and how operations might change in the future to accommodate staff reductions. For example, it seems that vessel maintenance has been relatively inexpensive due to the efficiencies of using deckhands for prep-prime-paint in the off-season, but perhaps this work could be contracted to a third party, even though it would be more expensive. A backup plan in the event of captain illness also seems prudent; Captain Fiore would no longer be able to serve as a backup if he needs to be captain of the *Angus*. **It is probably time to create a plan for when Captain Fiore leaves AWRI.**

A number of safety improvements were made to both vessels, including removing existing life floats and storage racks and installing new life rafts and launchers, and installing a man overboard recovery pole on the *W.G. Jackson*. Vessels were also upgraded to improve navigation and research capabilities: replacing *W.G. Jackson* pilothouse helm console, replacing all electronics in both vessels with current technology including electronic charts and pubs, laptop, and wifi, and fabricating and installing a removable stainless steel dive ladder. Captain Fiore continues to promote handicapped accessibility, an issue initially raised in the SAB's 2011 report. As always,

vessel operation and maintenance are efficient, and updates are proactive.

Administration

AWRI continues to be run efficiently and effectively under Dr. Steinman's leadership, leading to a scientific, education, technical, and student staff that are productive both individually and collectively. Dr. Steinman's ability to raise interest and support from the local community continues to impress. The Huntings Directorship Fund endowment, created to support both his efforts and those of the collective Institute, is the most recent recognition of his engagement.

The SAB was pleased to see that a portion of PI's indirect charges provide funding to offset some of the vessel operation costs in their proposal budgets, and encourage this be continued as it is standard practice at most institutions and can go a long way in underwriting vessel operations, maintenance, and upgrades.

In our last review, the SAB recommended reducing the level of indirect funds returned to the faculty and retaining a higher proportion centrally to enhance collaboration across the faculty, increase technical and student support where needed, and seed innovation and new directions. This was not implemented and while the Hunting endowment can help in this regard, **we encourage further consideration of this recommendation.**

Summary

Strengths:

- Strong institute leadership
- A strong, well-designed outreach and education program
- Active faculty highly engaged in research, teaching, and service
- Good integration of students into faculty research programs
- Robust external funding with improving national awards
- Good internal collaboration among faculty, resulting in multi-disciplinary research.
- Excellent community service of faculty through collaboration with state and local agencies
- Disability access to vessels and well maintained and operated fleet
- National-class facilities in the Robert B. Annis Field Station

Challenges:

- Graduate students are somewhat insulated from other GVSU departments
- Overcoming student and faculty travel time to Allendale campus
- Increasing student exposure to PhD students and postdocs
- Increasing average publication rate per PI
- Addressing an aging vessel crew
- Replacement of Dr. Rediske and Mr. Koches
- Changing leadership of the University
- Recruitment and funding of postdoctoral fellows at AWRI

Recommended actions:

- Consider altering the Advanced Aquatic Ecology course to iterate methods demonstrations with the theory lectures instead of a more general discussion.
- Pursue distance learning options that will allow students to take AWRI and Allendale courses

remotely. This will reduce commuting time for both students and faculty.

- Consider augmenting the Hunting fund to enhance collaboration across the faculty, increase technical and student support where needed, and seed innovation with more indirect funds held centrally.
- Reinstigate the journal club for students with sessions led by faculty, postdocs, or senior graduate students, and encourage more seminars from AWRI alumni.
- Create opportunities for graduate students to mentor undergraduates, perhaps through summer internships or via the REU-QUEST program.
- Consider expanding relationships with faculty at Ph.D.-granting institutions to enable short-term exchanges of students in both directions.
- Embark on a strategic planning effort to prepare for potentially significant turnover in vessel operations.
- Identify a role for AWRI in the proposed Water Resource Policy program at GVSU
- Aggressively argue and justify replacement positions for Dr. Rediske and Mr. Koches, perhaps with new scholarly directions to address emerging aquatic resource issues.
- As discussed in the past, assess opportunities for creating a separate Professional Master's program (non-thesis and tuition charging) as a way to provide alternatives to the current research-focused degree.
- Work with GVSU Allendale Campus to establish video links, online courses, or other remote learning opportunities for AWRI students and faculty.

Appendix: SAB Comments/Recommendations from 2014 Report

Recommended short term actions:

Develop mechanisms for students from other GVSU departments to conduct work at AWRI, e.g. through undergraduate internships.

Response: open competition for all AWRI undergrad internships

Give increased consideration to inclusion of non-AWRI faculty in graduate student committees.

Response: being implemented (CMU, ND, Northland College, et al.)

Consider reducing credit requirement to 15, to make it easier for students to complete all credit requirements in 1 year. Alternatively, revise the curriculum so that students can take all desired courses in their first year. This may require faculty to develop courses (possibly in collaboration with other departments) that appeal to a broader cross-section of students, rather than specialty courses that cater to a small number of students.

Response: beyond our control

Explore ways to provide health insurance options for students 26 and older.

Response: available currently (but at cost); evaluating whether we can afford to offer insurance to all incoming grad students

Have faculty members write individual self-assessment reviews annually.

Response: faculty write peer-evaluations of each other but not yet individual self-assessments except during personnel action years. But other forms of input serve the same purpose

Include vessel costs in grant proposals.

Response: implemented - we currently redirect 2% of the total amount of indirect costs recovery that is returned to AWRI to the Fleet Captain line.

Revise the allocation of indirect funds so that a smaller proportion is directed to faculty and a larger proportion is directed to AWRI administration.

Response: Not implemented

Recommended long term actions:

Expand research collaboration with other universities.

Response: still being done, limited success with Hope College but mostly on an ad hoc basis; broader overtures made with UM and Loyola, but never came to fruition (everyone is too busy), We have established collaborations with the USGS Water Science Center, TNC, and NOAA.

Continue to support various research programs with modeling expertise, while also developing specific, self-supporting modeling initiatives. For example, AWRI's collaborative work with multiple management agencies may benefit from the development of decision-support software, which could integrate both AWRI's Information Services Center (ISC) expertise and modeling expertise.

Response: Not yet fully implemented, but a goal for postdoc replacement for Koches

Consider feasibility of a professional master's program. The ISC seems like an ideal platform for this type of program, but other specialties within AWRI, such as environmental chemistry, are also amenable to such a program.

Response: Invited Tim Mihuc (SUNY Plattsburgh) to visit in April to discuss their program