



- increased needs and expectations. Even when state funds increase they continue to represent a smaller proportion of total university budgets. Some public university administrators like to say that we had been state supported and now we are state assisted, and in the future we may only be state located. Universities can address funding shortfalls by increasing overhead income from external grants and contracts. Universities look less favorably on research projects that produce reduced overhead income. State and federal natural resource agency overhead rates for management research are generally low. While state and federal agencies provide significant in-kind support for research projects, such support does not represent bottom-line cash. In addition, some faculty members perceive that their performance evaluation, in part, is based on overhead generated from external grants and contracts. Finally, many universities share some percentage of the overhead with the researchers who generate it. Follow the money.
3. Universities and faculty view management research as less prestigious than ecology or conservation research. Frequently, many view management research as local, which diminishes its perceived importance. Moreover, some view management research as just benefiting anglers, hunters, and species of interest to them. Today, the term “hook and bullet crowd” is typically not used in a laudatory fashion. Greater numbers of faculty members now avoid such perceived negative associations by shifting to the right of the fulcrum.
  4. Faculty members now take a perceived more holistic approach to natural resource management and conservation. This approach comes at the expense of management research. We see a shift in emphasis from the population level to the community or landscape levels. As faculty members shift, programs shift—sometimes purposefully, sometimes accidentally.
  5. Public universities are now pressured by states to be economic engines (while at the same time states decrease their overall support to these institutions). Thus, pressure increases for research that generates tangible economic benefits, often immediate benefits. Although wildlife and fisheries resources have substantial economic values, such benefits are usually not viewed as being very important by many decision makers. Often natural resources are only viewed as economically beneficial if they are privatized, something most natural resource supporters are against. In addition, many of the primary benefits of these resources relate to citizen quality of life, words that state legislatures and the business community seldom, if ever, use. We lack in-depth information about the true economic value of wildlife and fisheries resources, especially as these benefits relate to quality of life. Additionally, by following an ecology or conservation ethos a faculty member may say “my research is more basic in nature, it is for others to do the application part,” thus trying to get off the “economic hook.” Economic pressure affects research direction in a myriad of ways—
    - some are not positive for wildlife and fisheries management research. Follow the money.
  6. As more faculty members move toward the ecology–conservation side of the scale, they tend to produce students oriented to that portion of the scale. Intentionally or not, faculty members produce students in their own image. A cascade effect, therefore, plays a role in the scope and speed of this shift to the right of the scale.
  7. Once a faculty member is successful and becomes attuned to obtaining research funding from particular sources, they seldom change, unless forced to, especially if they already have sufficient support. There is a comfort level in dealing with people and funding entities they know. Thus, once a faculty member goes in a particular direction, they tend to continue in that direction. Once a faculty member moves away from management research the likelihood of going back to it is reduced.
  8. As the ethos of faculty members has shifted, fewer faculty members are consumptive (and even nonconsumptive) users of wildlife and fisheries resources, which helps further distance them from agencies and the type of research they perceive these management agencies support. This behavior change also distances these faculty members from those people who constitute major components of agency clientele.
  9. Other factors also have contributed to the shift. Some of these may seem peripheral, but they have played important roles.
    - Emphasis in the biological sciences at universities has shifted toward the molecular and cellular level and away from the organismal level. More research money is available at the molecular and cellular level. In addition, there is also greater opportunity for patents and royalties at the molecular and cellular level; universities are enamored with patents and royalties. Follow the money. This shift reduces faculty numbers at the organismal level, at least as a percentage of biologists on university faculties. This problem has been more apparent where wildlife and fisheries programs depend on curricular components from other biological science departments for courses such as vertebrate biology and botany. Wildlife and fisheries programs imbedded in biology departments have also been affected by this faculty shift.
    - There are fewer students nationally in undergraduate wildlife and fisheries programs. This affects applicant pools for summer positions, permanent positions, and graduate school.
    - Student demographics have changed appreciably, especially in such areas as male:female, urban:rural, and consumptive user:nonconsumptive user student ratios. Overall, students come to universities with less background information in natural resources, which causes a need for faculty to present what some consider remedial information.
    - Student priorities concerning for whom they would like to work and the type of work they would like to

do have changed, and that shift has typically been away from management. Income (i.e., salaries) may also be an issue in this area.

- Because of increasing time demands on faculty, they see efficiencies in having one large research project rather than numerous small projects. Management research programs are often developed by faculty in bits and pieces. These bits and pieces appreciably increase planning and paperwork.
- A recent academic trend combines fisheries and wildlife programs with other natural resource programs, such as forestry. This trend has reduced faculty focus, shared vision, and collegiality. For some the term “identity crisis” is very appropriate.

## AGENCIES

### The Shift!

Yes, agencies have also shifted on the scale, including federal agencies with primary wildlife and fisheries responsibilities, such as the United States Fish and Wildlife Service, the Forest Service, and the National Park Service. State natural resource agencies that have primary wildlife and fisheries responsibilities are also a large component of this agency grouping.

Agencies traditionally were to the left of the fulcrum; all have shifted rightward. State agencies are and will remain to the left of the fulcrum into the foreseeable future primarily because they are mostly funded by consumptive users who play an important role in agency direction. Federal agencies shifted further rightward than most state agencies. In reality, federal agencies may now even be to the right of the fulcrum. This shift may be a reflection of funding source. Federal agencies receive funding from all citizens; state wildlife and fisheries agencies receive all or much of their funding from users. The shift may also be a result of reduced research flexibility or funding reductions. Whatever the reasons, I believe that with all agencies averaged they are still to the left of the fulcrum, but not as far left as they were 35 years ago.

Note that I believe agencies still average to the left of the fulcrum while university academic programs now average to the right of the fulcrum; thus there is a disconnect. Remember that university programs not only do research for these agencies (and others), but also educate students who agencies hire and provide agencies with technical services. This disconnect is a growing and essentially unaddressed problem at the national level.

### Why the Shift?

Again, multiple factors come into play. Following are some, again in no particular order of importance. Others could no doubt be added.

1. Agencies have received mandates, usually unfunded mandates, from congress and state legislatures that moved them rightward on the scale. Although such mandates have been more likely for federal agencies, states have not been immune. These mandates modified the type of research conducted, often at the expense of management research. Some major mission shifts have occurred in agencies in the last 35 years. Follow the money.
2. There are fewer dollars for research in most natural resource agencies, especially in federal agencies. Just as in university programs, flat or reduced budgets result in less research. In addition, of the money available more is needed to cover uncontrollable costs (salary increases, etc.), thus further reducing research capabilities. Follow the money.
3. The need to answer complicated research questions, especially those that address broader issues, moves agencies rightward on the scale. Some believe that much of the simpler applied management research has been completed, leaving only more difficult questions to answer. As researchers conduct less management-based research, the number of faculty members involved with this type of research erodes.
4. The cost of doing research with universities continues to go up. Increased overhead costs, greater costs for supporting graduate assistantships (for example, assistantship tuition waivers are not free to most research projects), increased assistantship pay, increased travel costs, etc., all now need to be built into project costs. This results in less research per dollar, negatively affecting agencies, regardless of the type of research, and reduces how much can be done. Follow the money.
5. As research needs become more complicated, more research undertaken at universities requires Ph.D.-level students, again reducing the amount of research (but not depth) conducted. This also increases research costs.
6. As university faculty members shifted to the right, their students shifted to the right. This has had an effect, sometimes negative, on agency perceptions of student educational quality, at least in reference to management capabilities. However, these students have still been hired and this has moved the agencies rightward. Do such students need more agency orientation and continuing education efforts? Who does this? How much does it cost? How is it done?
7. Agencies have not embraced The Wildlife Society and American Fisheries Society certification programs. Regardless of what one thinks about certification programs, both of these certification programs require some management-oriented coursework. By not using these certifications (or at the least their coursework requirements), agencies disregard their only tool in directing university academic programs to provide the expertise that agencies say they desire in employees. The society certifications are currently available and not effectively utilized by agencies.
8. Political leadership (or a lack of) negatively affects agencies and their research, impacting not only federal agencies, but also state agencies and universities. Anti-science political leadership has not made agencies and universities and their functioning more effective; the

results have been the opposite. Not wanting to find the “wrong information” leads to not doing anything or only doing research that will not give the wrong information. In addition, when researchers find the wrong things, their results have often been suppressed or politically spun. Such manipulation of science and scientists has a chilling effect and the long-term ramifications of this problem are little understood. Filtering science through a prism of political and religious dogma has a long history of failure for societies that have practiced such filtering. This issue has massive future implications for the nation and its position of research leadership in the world. In reality, we may no longer hold the position of research leadership in

the world because of this problem coupled with long-term reduced expenditures on research of all types (except those with military or security applications).

## **IMPLICATIONS**

We can go along as we currently are and see what happens. However, I believe a better approach would be to have a serious dialogue concerning how to address the disconnect between universities and agencies, what can be done to ameliorate its effects, and what actions best insure the future of these fisheries and wildlife resources that we all hold so dear.