Spring 2006

Fisheries Management Section Newsletter

Presidents Message

Let me begin with an update from the AFS Midyear Governing Board meeting that was held on March 10-11, 2006.

First, AFS finances continue to be great. Gus has done a wonderful job for us, and I would suggest that every AFS member shake his hand and pat him on the back when you next encounter him. As a result of good financial standing, AFS divisions and sections are being polled to help develop a list of new or improved services that would be helpful. Once we have the list, we can begin to decide how to use AFS financial resources to help the divisions and sections do their jobs.

Most of the AFS sections have seen declining membership in recent years. We spent our afternoon "retreat" discussing this topic. We (i.e., governing board) decided to put a proposal out for vote by the entire AFS membership (at the Lake Placid meeting). A suggestion was made that all sections down to a minimum 50 members should have a vote on the governing board. To be honest, I was a little hesitant at first; I had some concerns over the biggest section (FMS) "losing influence" on votes. However, the Fisheries Administrators Section has not had a vote in recent years since their membership dropped below 200, and this proposal will allow them to vote. As a result, I supported the idea. Regardless, the overall AFS membership will have the final say at the Lake Placid business meeting. If any FMS members have feedback for me, please let me know.

We put a lot of time and energy into Katrina relief for AFS members. The needs of individual AFS members apparently are still great. The Southern Division, and especially Don Jackson, will ramrod this. Don is on sabbatical from Mississippi State University, just for the purpose of hurricane relief. AFS provided seed money, which will immediately be matched by challenge grants. The Southern Division will use this money to help AFS members with services, memberships, journal access, books, travel to meetings, etc.

Student members and services to students were a big part of discussions at the meeting. FMS members will recall that we approved free memberships for students in our section. Other sections, including Education and Computer Users, also took that step. I'm sure others will follow. Could we or should we do more for students? Should we have a FMS Best Student Poster award at the parent society meeting or at the Division meetings? Why only a poster award; why not oral presentation awards? Should we have FMS travel awards to help students get to meetings, or are the contributions that we make to other sections for this purpose already sufficient? Should we specifically have a student member on the executive committee of FMS? Many of these items require time and/or money, but all probably deserve further consideration.

The annual meeting at Lake Placid will be here before we know it. FMS will help sponsor an urban fishing symposium at the meeting. Given that the last published urban fisheries symposium from AFS was held in 1983, the topic certainly is ready for an update. The Fisheries Administration Section (they approved a name change from Administrators to Administration) has also proposed a workshop and facilitated discussion on the national fisheries habitat initiative for Sunday, September 10. As I write this (late March), this activity is in a very preliminary stage. However, we (FMS) agreed to help sponsor this important discussion and we'll keep the membership updated.

Please note that FMS Past-President Bob Wiley has **two** articles in this newsletter! While I hate to use all his ammunition at once, both articles were ready, and I didn't want to wait 6 months to get the second article in circulation. Thanks, Bob, for your continuing interest in providing stimulating editorial thoughts for us!

Finally, let me finish with a thank you to all who pay FMS dues. We support many worthy activities with our limited treasury, and the financial support of members is greatly appreciated!

Inside this issue:

The 2005 Coastal Cutthroat Trout Symposium: Status, Management, Biology, and Conservation

Sponsored By: Oregon Chapter, American Fisheries Society Pacific International Chapter, American Fisheries Society Humboldt Chapter, American Fisheries Society Alaska Chapter, American Fisheries Society http://www.fws.gov/columbiariver/cctsym.html

Post-Symposium Summary: The 2005 Coastal Cutthroat Trout Symposium was held on September 29 through October 1, at Fort Worden State Park, Port Townsend, Washington.

The objectives of the 2005 Coastal Cutthroat Trout Symposium were: 1) update coastal cutthroat trout information presented during the 1995 Sea-run Cutthroat Trout Symposium, in Reedsport, Oregon, 2) enhance knowledge on all facets of life history and ecology, 3) provide current assessment of the status of populations coast-wide, and 4) encourage development of a coordinated, range-wide conservation plan. Technical sessions included Status, Trends, and Management; Biology; and Conservation Planning. Other Symposium highlights included an angling seminar by two noted coastal cutthroat trout angling guides, an evening poster/mixer session, and a Banquet Keynote presentation by Dr. Bob Behnke. In brief summary, 10 years after the first Symposium, we still lack information about the status and trends of coastal cutthroat trout. However, significant progress has been made in the areas of coastal cutthroat trout genetics, habitat use, movement and migrations, and life history strategies. Significant opportunity remains to collaborate on range-wide conservation efforts.

A total of 110 people attended the Symposium, representing California, Oregon, Washington, British Columbia, and Alaska. Coastal cutthroat trout aficionados trekked from as far away as Maine and Massachusetts to attend the Symposium. Participants reflected the broad array of interests associated with this fascinating fish and included anglers, environmentalists, scientists, managers, academics, media, and tribes.

Thirty-five technical papers and 10 posters were presented. Most presenters submitted extended abstracts or full papers prior to the Symposium, and the Symposium's Publications Committee is planning on publishing the Symposium Proceedings in the near future. After the Proceedings are printed, copies will be available for purchase through the Oregon Chapter, American Fisheries Society.

In summary, the 2005 Coastal Cutthroat Trout Symposium was a great success. Excellent technical presentations and posters have improved our knowledge of coastal cutthroat trout. A large audience of broadly-divergent interests participated and enhanced dialog during the Symposium. Significant contributions helped defray travel, lodging, food, and registration costs, especially for students. The Symposium will use its proceeds to fund a coastal cutthroat trout graduate student research scholarship as well as a multi-state/provincial research and monitoring workshop. We hope the follow-up Coastal Cutthroat Trout Workshop will generate interest in range-wide research and monitoring agreements, and efforts to gather more information on this fascinating and important fish species. We also hope the Symposium and the follow-up workshop yield broad-scale collaborative efforts that lead to better-informed fishery management and conservation efforts. Finally, we hope that another Coastal Cutthroat Trout Symposium will be hosted in approximately five years. While no single entity has volunteered to host the next Symposium, it seems appropriate that the next Symposium be held in British Columbia. We hope to see you at the next Symposium, to review the newly generated information resulting from the 2005 Symposium's Graduate Student Research Scholarship, as well as information, activities, and plans generated from the Coastal Cutthroat Trout Research, Monitoring, and Evaluation Workshop.

You can never do TOO MUCH sampling

Ken Gerow (WY), who is both a statistician at the University of Wyoming and a FMS member, recently developed a useful Excel tool that biologists can use to determine sample size calculations and power calculations when the goal is to compare two means (e.g., comparison of mean CPUE in a sampling gear between years). Dr. Gerow also has a manuscript entitled "Power and Sample Size Estimation Techniques for Fisheries Management: Assessment and a New Computational Tool," that is *in press* with *North American Journal of Fisheries Management*. As a special introductory offer (humor intended), we obtained permission to post a pre-publication copy of the manuscript AND the Excel tool on our FMS web page! Check it out.

"Dilemma" and "Epilogue"

An article originally published in *Fisheries* (1987), Volume 12, Number 6 [reprinted with permission from AFS], with an epilogue added in 2006.

Robert W. Wiley, retired, Wyoming Game and Fish Department

Roger sat at his desk brooding about the past season's work and the magazine article he had been asked to write. Writing the article didn't bother him but he remained troubled by the assignment. He had difficulty defining the problem but he could feel that now familiar ache beginning deep in the pit of his stomach. It wasn't hunger, he knew, because he had breakfasted on some of his wife's best waffles just a couple of hours ago. The ache had often developed into a soul-wrenching knot lately even though visits to his doctor had given him a fit bill of health. No, the problem was much deeper and it was affecting him in a way that he didn't like.

The morning proceeded slowly, interrupted by the usual phone calls and discussions with others on the management crew. Roger knew that he would have to find a quiet place if he were going to successfully tackle the article. He sought out his favorite space in the comer of his den at home. His wife was away for a civic meeting and the kids were in school.

He thought of the many things he had experienced during the nearly two decades he had worked for the Department of Natural Resources. Times had certainly changed during those years and he had progressed from a seasonal biologist through crew assistant and on to regional manager. Life had been kind to him and he felt that he had learned a few things along the way.

Professional societies had recognized his accomplishments. These organizations had elected him to governing responsibilities and had given him an award or two. Roger didn't often think about those things, but one of the awards caught his eye and he gazed at it for awhile. He had been recognized by his peers as a competent and qualified resource scientist-at least that's what the document hanging there indicated. What did that really mean? The knot began to tighten.

Roger felt that his thoughts and ideas were not strange but at times they certainly made him feel that way. The article was progressing very slowly; in fact, it wasn't going anywhere at all. He began to reflect over the past 20 years and realized that resource management had changed through that time. Of course, that was to be expected. Perhaps the greatest change he had noted was that the public (the people he and his colleagues served) were becoming more and more interested in what was going on with the wildlife resources in the state. Roger knew that was happening all across the country but it seemed somehow different on his home ground. What was the key issue? His stomach churned, the knot tightened, and Roger reached for a tumbler of milk to help soothe the ache.

He looked again at the certificate proclaiming him a certified scientist. Should that be considered the same as or similar to the certificates his dentist and physician displayed? Roger knew that he trusted them

"Dilemma" and "Epilogue" cont.

completely and accepted their diagnoses, recommendations, and treatment almost without question. Did his certificate accord him the same professional respect among hunters, fishermen, and those who just liked nature? Should it?

Ralph and George (his dentist and doctor) liked to hunt and fish. Ralph, the hunter, had his opinions about game management and had hunted in the same areas for many years. He often asked about the game herds and wondered if things might be handled in a more effective way. George fished every free moment with his family and with other fishing cronies. They fished their favorite waters year after year. George, too, asked the same sort of probing questions about fishing that Ralph had about hunting. The questions concerned some of the goals set for resource management and they represented sincere and logical points of view. What concerned Roger was that these points of view were very often dismissed with virtually no consideration. It seemed as though the opinion of the resource user about management goals directly affecting them was considered as something less than applicable to the resource. People weren't questioning management techniques; they had expressed confidence in how the work was done. Roger pondered that and the knot tightened still more.

Roger realized that he didn't question his dentist's recommendations and procedures other than to understand them. He did not feel qualified to do so because he was not a trained dentist or physician, and he certainly didn't look into and study peoples' mouths as a hobby. Yet, these doctors had what seemed to be sound views and suggestions about the resource. Those, Roger realized, were born of many seasons spent hunting, fishing, and observing wildlife in the same areas. He had often heard it said that everyone has an opinion about how game or fish should be managed but that they really didn't understand how natural systems worked. Roger refilled his glass and quaffed the white elixir rapidly; his guts were torturing him more than ever. He was close to the issue at hand and it bothered him exceedingly.

At that moment the front door banged open with the return of his children from school. Roger knew that his wife would not be long in arriving because they had long ago agreed that there should be someone to greet the youngsters when they came home from school. The solution to the problem would have to wait until tomorrow. He looked wistfully at the pile of papers on his table knowing that he hadn't written one word for the article that was due in the main office in three days. He cast aside the papers and rushed off to see his children.

The morning dawned cool and gray with the promise of rain, a fitting continuation of a night of only fitful sleep. Roger walked briskly towards his office through the first light sprinkles. He had arrived about 30 minutes early, hoping to get a start on the article before the office bustle began. Roger sought out the quietest corner of his office and set to work.

He thought again of the opinions his friends had about their beloved hunting and fishing experiences. He sat straight up with the realization that the problem was at last coming into focus. He remembered the conversations he had participated in with a patron saint of outdoor writers. The man had come to his area to fish for several days on one of the most important rivers in the state and one, at the time, that was jeopardized by lack of recognition that water ought to be set aside for fish populations.

"Dilemma" and "Epilogue" cont.

He had read many of Lee Wulff's stories and about the importance of wild trout, fly fishing, the need to release fish, and to limit kill. Like his counterparts, Roger had always believed in the production aspect of fishery management. That is, fish were there to be caught and as many as possible within the legal limit ought to be taken. It was easy to think that those espousing something else were akin to wolves in sheep's clothing. After all, weren't the goals set for resource management what was best for the resource and the public?

Roger shared conversations with Mr. Wulff about Atlantic salmon, trout fishing, and the river. Roger found his opinions made sense and that the things he believed in were sincere opinions born of a half-century of angling experience in virtually every corner of the world. Mr. Wulff had asked about the river fishery, the regulations, number of people fishing, and how the fish population compared with past years. His questions were probing and responsible as though he were talking with a fellow resource manager. Roger was surprised and amused-here was a non-professional who appeared to understand quite a bit about the very thing that Roger was paid to do. The answer was obvious, Mr. Wulff had an understanding of the resource that rivaled that of many scientists. That understanding had come from paying close attention to fish and where they could be caught during a lifetime of angling experience. Roger valued those discussions and the opinions received. Here was a man who understood the resource and yet was not paid to do so. Of course, part of his livelihood depended upon writing about fish, catching fish, and the philosophy of fishing.

As he prepared to leave the river after the third day, Mr. Wulff indicated to Roger that it was one of the best streams he had fished and that he would be back. Roger had explained how it was managed-with fingerling hatchery-reared rainbow trout. That didn't bother Mr. Wulff one bit; in fact he supported management that could produce such a fishery. They did discuss different strategies that might be implemented.

Different strategies, different ways of doing the same thing, but suggested by people who were not professional resource managers. What was it about this that appeared to so upset resource management agencies? His stomach began to tighten again. Where were his antacid tablets? Roger fumbled through his desk and found half a pack of old stomach pills, gulped four, and his mind began racing again.

Roger realized that he had identified part of the problem. The experience with Lee Wulff had taught him that dealing with reasonable people who had an understanding of the resource was really not difficult. What about the others who had strong opinions that, though they might be sincere, were based on little or no understanding of how natural systems were assembled?

He gazed across the room for several minutes looking at nothing in particular. At length, he remembered how he and a colleague had talked about how to more effectively address an issue of vital importance to fishery management in the future. Water left in streams for benefit of fish wasn't legally recognized as a valid use of water in his state. One or two people in the legislature had repeatedly killed all consideration of the issue. Roger and his friend had suggested that they contact the two legislators (among other key people) to explain the Department of Natural Resources' point of view. It had been difficult to convince anyone in the organization that this was a good approach-always the response seemed to be that these legislators would not listen, didn't want to understand, and, furthermore, it was a waste of time to talk with them.

"Dilemma" and "Epilogue" cont.

The appointments were completed and the visits made. The result was that Roger and Fred had been well received and thanked on each occasion. One of the two so-called unyielding legislators had arranged for further presentations to his constituents. The other, from a more provincial area of the state, continued in opposition to the issue. Roger noticed, though, that the old arguments had been replaced by other concerns-the man had listened, after all, even though he still spoke against the issue.

That was the second part of the issue. What was the next piece of the puzzle? Roger realized that the missing piece might be those who could be considered unreasonable.

What was beyond reason? That was a tricky issue. Maybe that was an area where there could be no agreement because each side was unwilling to consider opposing points of view. Roger had experienced it once, and it was not pleasant. Still, Roger thought, those people deserved their day in the sun just like everybody else. He felt that agencies and professionals might be justifiably defensive when dealing with unreasonables -- as long as they were not being unreasonable as well. To be reasonable, one had to be willing to at least listen, and listen with an open mind.

Suddenly, he had the solution. It seemed that people or agencies tended to ignore ideas offered by outsiders that would produce the same or better results. This appeared especially true when ideas were offered by non-professionals. Roger remembered years earlier when one of the seasonal technicians had suggested contacting reporters to accompany them on field programs. He had thought that strange but tried it and the new program reaped a bountiful harvest; understanding on both sides (reporter and scientist) had developed.

Programs suggested by the public had also been implemented and benefited the resource just as all conservation agency programs were supposed to do. Certainly some ideas were not the best, but the point was that some cooperation had been achieved and the results were almost always positive. What had happened was that an exchange had resulted that educated the professional resource manager and the non-professional (the resource user). Maybe, Roger thought, resource management agency ideas weren't always the only way to produce the same result. The key, it seemed to him, was to listen more and react less. Would it be possible?

Roger glanced at the plaque again. He was recognized by his peers as a competent and qualified resource scientist. At last that, too, was coming into focus. The people he served probably wouldn't put a lot of stock in that certificate unless he had demonstrated that he was competent (knew the difference between right and wrong), qualified (by experience and accomplishments), and credible (people could believe in what he said). That, Roger realized, was exactly how the public judged conservation agencies.

Roger glanced at the clock; it was 3:15 P.M. He began to write feverishly. He knew the article would meet the deadline. The knot in his stomach loosened, the churning subsided. It had all been caused by the difficult digestion of a troublesome issue over a long period of time. He had finally realized that a non-biological problem (suggestions made by the hunting and fishing public) could not be solved by scientific analysis but had to be addressed by talking with people and giving their ideas real consideration.

Wiley, R.W. 1987. Dilemma. Fisheries (Bethesda) 12(6):30-32. Committee reports

Multidimensional Modeling of Yellow Perch Population Dynamics in Natural Lakes (Excluding the Great Lakes): A Request for Collaboration

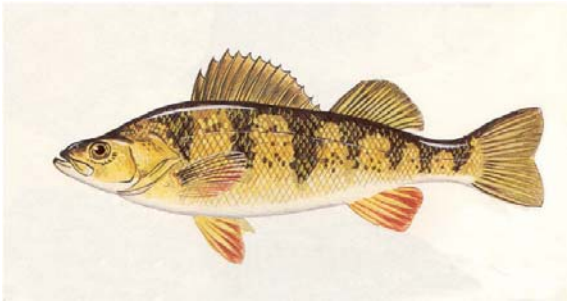
We are in the process of collecting data for yellow perch populations across the species range. The overall goal of this project is to model factors that influence yellow perch population dynamics (recruitment, growth, and mortality) among natural lakes over a large geographic scale, across jurisdictional boundaries.

There is an abundance of literature exploring yellow perch population dynamics over small geographic scales. For example, yellow perch recruitment has been investigated in Oneida Lake, New York (Forney 1971; Clady 1976), Lochaber Lake, Nova Scotia (Alto and Newsome 1993), Brant Lake, South Dakota (Pope et al. 1996), South Bay, Lake Huron (Henderson 1985), Chequamegon Bay, Lake Superior (Bronte et al. 1993), and southern Lake Michigan (Shroyer and McComish 2000). Koonce et al. (1977) developed a recruitment model for percids over a large geographic scale, but only tested the effects of temperature on year-class development. These studies have provided valuable insight into local factors influencing yellow perch recruitment. However, there is still a need to develop models over a large geographic scale that could be used to better understand the ecology of yellow perch. In addition, a broad characterization of yellow perch growth and mortality rates would provide resource managers with references to compare with individual or groups of populations.

The objectives of this project are to (1) quantify and model yellow perch recruitment over a large geographic scale incorporating both density independent factors (i.e. temperature, wind, precipitation, vegetation coverage) and density dependent factors (i.e. mature yellow perch C/f, mature walleye C/f, mature northern pike C/f), (2) quantify and model yellow perch growth over a large geographic scale and (3) quantify and model yellow perch total annual mortality over a large geographic scale.

We propose to use an information theoretic approach to individually model yellow perch recruitment, growth, and mortality. Candidate models would be developed a priori and would depend on the annual data that we are able to obtain from cooperators. Data (essential data are bolded) we would like to receive includes the following:

1. **Yellow perch lengths**
2. **Yellow perch ages (denote aging structure)**
3. **Age-0 yellow perch C/f (from late summer or fall sampling)**
4. Yellow perch weights
5. Gender information (sex ratios) of yellow perch
6. C/f of yellow perch (trap or gill net)
7. C/f of potential predators (e.g., walleye, pike, smallmouth bass)
8. C/f of potential competitors (e.g., bluegill, black crappie)
9. Lake data
    a. Lake type
    b. Surface area
    c. Mean and maximum depths
    d. Fetch
    e. Shoreline development index (SDI)
    f. Percent coverage of aquatic macrophytes
    g. Average seasonal water temperature
    h. Regulation information such as
    i. Bag and length limits



Harvest information such as catch, effort, and harvest would also be very helpful.

After population data are compiled we will obtain climatological information (e.g., precipitation, mean monthly wind speed, and air temperature) for the local area from NOAA's National Climatic Data Center and other databases.

Multidimensional Modeling of Yellow Perch Population Dynamics in Natural Lakes (Excluding the Great Lakes): A Request for Collaboration cont.

Data format can be any common spreadsheet or database (e.g., Microsoft Excel or Access). *Please indicate the state or province, lake name, date of collection, and gear type used. Data can be transmitted via email or any common media (CD, diskette, etc.).

If you have data or will be collecting data of this type please contact Casey Schoenebeck (casey.schoenebeck@sdstate.edu) or Michael Brown (michael.brown@sdstate.edu) for further information.

Casey W. Schoenebeck
Wildlife and Fisheries Sciences
South Dakota State University
Box 2140B
Brookings, SD 57007-1696

References:

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Moderators Needed

Planning to attend the 2006 American Fisheries Society Annual Meeting in Lake Placid, New York?

The Program Committee is looking for volunteers to serve as moderators at the 2006 Annual Meeting. Moderators are responsible for overseeing a block of 5-6 oral presentations (time slots are 20 min.)—this includes contacting speakers prior to the meeting, introducing speakers, and monitoring time to make sure that the session stays on schedule. In Lake Placid, Freshwater Fisheries Management and Freshwater Fish Ecology will be two of our largest sessions, and will require over 20 moderators. If you would be willing to volunteer your time to serve as a moderator of a contributed session, please contact Maureen Walsh (mwalsh@usgs.gov). Please include in your email a session preference and any time conflicts that you might have during the meeting (both sessions will be running the length of the meeting, Monday-Thursday).

Thanks, and we hope to see you in Lake Placid!

The 2006 Program Committee

Request For Funding

AFS Fisheries Management Section Request for Funding: New procedures implemented by Past-President Steve Rideout require that funding requests to the Section that exceed $500 be routed through our formal (online) application system. Once we receive a request, then the Section officers vote to determine whether the request is presented to the membership. Final approval occurs at the annual business meeting. Below is a recent request that we received from funding, and your officers voted unanimously to bring this request forward to the membership with a favorable recommendation. Any FMS members that wish to comment on this request can do so by contacting any AFS officer; we will take a final vote for approval at the business meeting in Lake Placid.

Title of Request: 2007 Urban Fishing Symposium

Description of Project: The 2007 Urban Fishing Symposium will be composed of the actual symposium event and the published proceedings. The event will be held over two days and will encompass approximately 40 oral presentations and a poster session. The proceedings will include manuscripts of every oral presentation and 1,000-2,000 word summaries of every poster presentation.

The overall goals of this symposium are as follows: To hold a nationwide urban fishing symposium in conjunction with the AFS annual meeting in San Francisco in 2007. To provide a forum for urban fishing and aquatic education professionals to present research and case studies on urban fishing and aquatic education programs in oral and poster formats. To invite respected professionals from both within and outside of fisheries science to revisit topics from the original urban fishing symposium and other topics that the steering committee believes are important to urban fishing. To provide a collective peer-reviewed published reference on urban fishing topics, research, and case studies in the form of a peer reviewed proceedings. To facilitate an atmosphere where professional relationships between urban fishing biologists can form. To stimulate interest in urban fishing and to encourage research in the field of urban fishing.

It is advantageous and more efficient for urban fishing programs to learn from each other rather than to make their own mistakes. The symposium will provide an efficient medium for the dissemination of knowledge and will produce a valuable reference material that will aid in the research of urban fishing and creation of more urban fishing programs. In addition, the only Urban Fishing Symposium ever held was in 1983 and the proceedings were published in 1984, unfortunately the proceedings from 1984 are out of print and very hard to find, essentially there is not currently a reference.

Estimated time to completion: The Symposium Event will be held in conjunction with the 2007 AFS Annual Meeting in San Francisco and the event will conclude there. The Proceedings publication target date is July of 2008.

Amount requested: $2,000

Disposition of unused funds: While we do not foresee a significant amount of funds being left unused. If there are any unused funds they will be used to further offset publication costs.

Contact Information:
Name: Tom Lang, Steering Committee Chair
Address: 1107 West St
City: White Hall
State: Arkansas

Request For Funding cont.

Other funding sources and amounts provided:
USFWS Fish and Wildlife Mgmt Assistance Branch ($5,000)
Recreational Boating and Fishing Foundation ($2,500)
Minnesota Department of Natural Resources ($2,500)
Arkansas Game and Fish Commission ($2,500)
American Sportfishing Association ($2,500)
Southern Division AFS ($2,000)
Arizona Game and Fish Department ($2,000)
AFS Fisheries Administrator's Section ($500)
In-Fisherman Inc. ($500)
University of Arkansas at Pine Bluff student sub-unit of AFS ($100)

We currently have $20,100 sponsored. Our total funding goal is approximately $25,000.

How will the contribution of the FMS be acknowledged? Sponsorship will be recognized at the symposium orally and with the display of the FMS logo at every symposium event. In addition, FMS will be recognized in print, in the "Proceedings of the 2007 Urban Fishing Symposium," published by the American Fisheries Society.

Disposition of unused funds: While we do not foresee a significant amount of funds being left unused. If there are any unused funds they will be used to further offset publication costs.

Contact Information:
Name: Tom Lang, Steering Committee Chair
Address: 1107 West St
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FAX Number: 870 575-4639
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Our budget breaks down as follows: $10,000 for the publication, $12,500 for travel grants, and $2,500 for special projects.

1) $10,000 (40% of our budget), will go straight to the AFS publications office to ensure the proceedings are published (the book proposal was approved earlier this month).

2) $12,500, (50% of our budget), breaks down into 25, $500 travel grants. We are offering a travel grant to everyone serving on a committee and to all of our invited presenters.

3) $2,500 (10% of our budget), will be used to ensure sponsors are well recognized (display of logo at event) and properly thanked (organization contact person given a gift of some sort, at least a copy of the proceedings), ensure all authors and committee members are properly thanked for their commitments, miscellaneous office supplies/ postage fees, and finally to supplement budget items one and two as the steering committee sees fit.

Request For Funding cont.

We are attempting to hold a social event at the meeting. I want to make it clear that FMS sponsorship will not go toward a social event and in fact, none of the sponsorships that we have listed will. We are attempting to procure funding from the private sector for that event.

While I have your ears, I want to point out that the FMS did sponsor the original symposium in 1983. The only other section that sponsored the original symposium was the Administrator's Section, and they have already signed up to sponsor this one too.

If anyone feels as though they require additional information in order to make a decision or are just interested and want to know more about the symposium please do not hesitate to contact me. In addition, I (and I am sure several other committee members) will be in attendance at the section meeting in Lake Placid in case any section members have questions.

Reminder on Awards!

The Fisheries Management Section is currently seeking nominations for its three awards. The application deadline for these awards is **30 May**. Send nominations (letter outlining the accomplishments of the individual/organization that meet the qualifications of each award) to Joe Larscheid, Iowa DNR, 122 252nd Ave, Spirit Lake, IA 51360; joe.larscheid@dnr.state.ia.us.

The **Conservation Achievement Award** recognizes any significant action, program, or initiative by a non-member individual, non-governmental organization, or state (provincial), local, or federal agency that contributes substantially to fishery conservation or fishery science. Click here for a list of past award recipients.

The **Award of Merit** recognizes a singular accomplishment of an individual or group acting as a team or committee for contributions in fisheries management and research. The award can be given for outstanding leadership, administration, or project-related accomplishment in any aspect of the fisheries profession. Click here for a list of past award recipients.

The **Award of Excellence** is given for inspirational leadership in the fishery profession and substantial achievements for AFS and the fisheries resource. The recipients must have effectively communicated their work at the national and/or international level. The Award of Excellence is given for cumulative accomplishments rather than a singular effort as recognized by the Award of Merit. Click here for a list of past award recipients.

Trout Stocking Rates: A Wyoming Perspective

Robert W. Wiley
Fisheries Biologist, Retired

Abstract

Stocking hatchery-reared trout *(Salmonidae)* in inland waters has always been an important facet of fisheries management. Late 19th and early 20th Century trout stocking in Wyoming and elsewhere in North America focused primarily on improving fishing and attracting more fishing-based tourism. Like annual reseeding of agricultural crops, fisheries pioneers believed annual trout stocking was necessary to sustain good fishing. Little attention was paid native nongame fishes or to maintaining biological diversity of fish assemblages. Stocking rates – trout per acre – varied greatly and were based on trial and error, personal preference, or calculated according to a wide variety of stocking models. Wyoming trout streams sustain standing stocks at or near productive capacity; 45% of stream trout stocks exceed 60 pounds per acre, 20% exceed 120 pounds per acre and only 10% of stream trout populations sustain more than 200 pounds per acre. Wyoming recommends stocking rates >200 subcatchable trout per acre for new impoundments, less for other waters. Natural productivity of waters, not public opinion, best guides fisheries managers in determining appropriate numbers of fish to stock in candidate waters. Trout stocking rates at or near 200 subcatchable trout per acre produce good results. The Wyoming experience indicates that stream trout standing stocks do not significantly increase by stocking subcatchable size trout, number stocked notwithstanding. Return to anglers of lake-stocked subcatchables is more a function of lake productivity than fishing pressure; best returns are from lakes of moderate depth (20 to 50 feet), with lowest return from deep (≥100 feet), oligotrophic lakes or waters with competing coolwater species or piscivorous trout. It is our job as modern, competent resource professionals to explain our fisheries management recommendations, including trout stocking, to constituents and provide a sound understanding of how lake and stream fisheries work – instilling in anglers a sensible philosophy of fisheries resource management, resulting in a more effective, beneficial resource management relationship.

Introduction

As a rookie fisheries biologist, stocking hatchery-reared trout was among my earliest responsibilities. We stocked mostly rainbow trout *Onchorhynchus mykiss* in lakes and streams near Pinedale, Wyoming that summer of 1962. Others had planned the stocking and I thought little about number stocked other than making sure fish arrived in good condition and were safely deposited in their new home. The following year, nearly 3 million rainbow trout were stocked in newly impounded, 42,000 acre Flaming Gorge Reservoir in southwestern Wyoming and northeastern Utah. A very good fishery resulted. About the same number of rainbow trout were stocked annually through 1965, but because trout condition had declined substantially by fall, we reduced stocking by 60% for 1966. Rainbow trout condition rebounded and all was well until Utah chubs *Gila atraria* began competing with trout for zooplankton and dominating gillnet catches late in the 1960s and early 1970s.

Reasons for poor rainbow trout condition in fall1965 and the companion die-off in the mid portion of the reservoir, despite abundant zooplankton, were unclear, although much discussed. The situation was complicated because of an enormous, companion bloom of the blue green algae, *Aphanizomenon flosaquae,* a species sometimes associated with fish kills. Could too many rainbow trout have been stocked? I believe so, even though the 42,000-acre reservoir was only 3 years old, but that is a story for another time.

Historical Background

The initial footprints of Wyoming fisheries management were regulation of fishing, development of fish culture and trout stocking. The first Territorial Legislature (1869) defined hook and line as legal fishing tackle but set no angling season, creel, or possession limit. An 1875 statute indicated that wildlife could be taken in amounts reasonable for human sustenance, recognizing fish harvest as a beneficial resource use. At the time only native cutthroat trout *Oncorhynchus clarki* inhabited the state's waters. A Territorial Fish Commissioner, appointed in 1879, was charged with controlling fishing and stocking fish. The first introduced trout

Trout Stocking Rates: A Wyoming Perspective cont.

(brook trout *Salvelinus fontinalis)* arrived by rail in 1880.

Legislators had the right idea but many streams were cleared of natural habitat features – like woody debris and large boulders - to facilitate floating railroad ties to market. The consent law was repealed in1932.

From the time of the first Wyoming Fish Commissioner (1879), resource management emphasized better fishing, introducing new game fishes to create more fishing, and building fish hatcheries to improve trout populations to attract more fishing-based tourism (Barkwell 1883; Miller 1890). From this beginning and for about the next 80 years the traditional fisheries mission was providing fish for anglers by the most expedient means. Often anglers benefited at the expense of native, self-sustaining trout and other native fishes. People were aware of fish other than trout, but more complex management goals like maintaining ecological diversity of fish assemblages seldom received due consideration.

Fisheries managers everywhere have sought to enhance trout populations by stocking, hoping for better fishing and more satisfied anglers. Wyoming Fish Commissioner J. J. Lenihan (1914) wrote that most Wyoming waters sustained wild [native cutthroat] trout or trout that had been stocked, but he believed that increased stocking of hatchery-reared trout would increase trout populations and improve fishing. Fifteen years later (1929), the eight state-owned hatcheries were producing 20 million fingerling trout for stocking. By 1931, even that amount of production was purportedly insufficient to supply increasing demand for fishing. Much of resource management focus remained on producing hatchery-reared trout for stocking, fueling the quest for ever better fishing. Fish Chief A. F. C. Greene (1950) boldly recommended emphasizing management for wild trout and closed many of the state-sponsored trout rearing ponds – despite public and political criticism - because they produced less than one-third of what was expected.

Wyoming's first fisheries biologists came aboard in 1950 and, as the decade matured, they paid more attention to native trout and other native fishes that sustained no angling. For example, the Jackson fisheries crew focused on the Snake River cutthroat trout subspecies *Oncorhynchus clarki* spp. from its inception, several state-private partnership rearing ponds were eliminated because they yielded trout far below anticipated production, and the Laramie crew reintroduced orangethroat darter *Etheostoma spectabile* to native streams following chemical removal of nonnative nuisance species. Those actions were farsighted for a time when it seemed that most fisheries biologists were solely responsible for maximizing angler satisfaction.

Stocking hatchery-reared trout is important. Hobbs (1948), describing the role of fish culture in the development and management of New Zealand's trout fisheries, said that the New Zealand hatchery system was over 70 years old, meaning that most anglers were born to it, had accepted it, and believed it essential to the well being of their fisheries. After almost 70 years (1884-1950) of trout stocking, Wyoming fisheries biologists realized that anglers generally believed that good trout fishing required annual stocking – much like annual reseeding of agricultural crops.

Wyoming fish culture remains vital to maintenance of quality trout fisheries; today, 10 fish hatcheries produce nearly 9 million trout annually. About 85% of this production is stocked in lakes, the rest in streams. How well do stocked trout return to anglers? Those stocked in streams survive and return best when numbers of competing trout (wild or carryover planted) are low. Even then, a mean of only 5.7% of the number of hatchery-reared subcatchable (<8.25 in) and 27.5% of the number of catchable-size (≥8.25 in) trout stocked in streams return to anglers (Wiley et al. 1993).

Results of stocking trout in Wyoming lakes is less problematic, with returns ranging to about 20.0% (mean 11.1%) of number stocked for hatchery-reared subcatchable to over 90.0% (mean 47%) of number stocked for catchable-size trout (Wiley et. al. 1993). Return to anglers of lake-stocked subcatchables is more a function of lake productivity than fishing effort; best returns are from lakes of moderate depth (20 to 50 feet), with lowest return from deep (≥100 feet), oligotrophic lakes or waters with competing coolwater species (e.g. walleye *Sander vitreus*) or piscivorous (e.g. lake *Salvelinus namaycush* or brown *Salmo trutta*) trout. Return of catchable-size trout depends almost entirely on fishing effort, assuming no environmental problems.

Trout Stocking Rates: A Wyoming Perspective cont.

Most Wyoming streams, except tailwaters, are managed as self-sustaining fisheries because years of experience have shown that stocking trout in streams does not increase trout populations beyond stream production capacity. Platts and McHenry (1988), studying streams in seven western ecoregions, found standing stocks ≤60 pounds (trout and char) per acre were most common (55 to 96% of observations) for streams across all seven ecoregions, suggesting that streams sustain trout to carrying capacity. About 55% of estimated trout stocks in Wyoming streams are ≤60 pounds per acre, 80% are ≤120 pounds per acre, and 90% are ≤200 pounds per acre; only 10% of Wyoming streams have trout standing stocks greater than 200 pounds per acre (Wiley 1992). Wyoming has stocked trout in streams for more than 120 years without significantly increasing trout populations above the level of self-sustaining trout stocks, number of subcatchable-size trout stocked notwithstanding. Now stream stocking in Wyoming takes place almost exclusively in tailwaters.

Guidelines for Stocking Rates - Trout per Acre - for Lakes and Streams

Review (1992) of trout stocking guidelines for eight states and two Canadian provinces showed wide variation in methods used to determine trout stocking rates per lake or stream acre (sometimes per stream mile). Trout stocking rates vary throughout North America based on assessment of many chemical, physical, and biological factors. For example, rate may vary with elevation, water temperature, expected post-planting growth rate, size at stocking, fishing effort, expected (desired) harvest, habitat quality, estimated production capacity for wild and stocked trout or virtually any combination of factors, including trial and error (Heidinger 1999). Politics, economics (stocking attracts more anglers), and societal opinion also influence trout stocking recommendations. Clawson (1963) was right; conservation agencies cannot escape responsibility for public perception of fishing quality because their actions largely created it.

Table 1. Stocking rates (trout per surface acre) for put-grow-and-take standing water fisheries using Size 2 (1.25 to 3.00 inch) and 3 (3.25 to 5.00 inch) trout.

Fishing effort	Biological potential			
(hours/acre/year)	Low	Fair	Good	Excellent
Low (≤25)	<25	25	50	75
Moderate (25-75)	75	125	175	*200
High (<75)	125	175	*200	*200

**Formerly 225 to 350 trout per acre. Rates that high are suggested only for new waters or those out of production for a year or more. Stock one or two years at the high rates, thereafter at rates illustrated. Return rate to anglers of one pound per each pound of trout stocked indicates a successful stocking program for Size 2 and 3 trout.*

Stocking rates >200 trout per acre are recommended for new impoundments, less for other standing waters. High (>200 trout per acre) stocking rates sometimes remain for years because fishing remains good with no perceived need to achieve the same result with fewer fish. Fisheries managers should consider lower stocking rates, particularly for waters stocked at rates above 200 trout per acre.

Wales and Borgeson (1961), working 48-acre Castle Lake, California, found that stocking rainbow trout fingerlings (210 per acre) increased yield by only 1.4 pounds per acre over that of self-sustaining brook trout. Increased yield cost about US $1.26 (1961 dollars) per additional pound yielded. Moreover, heavy stocking established a rainbow trout population at the expense of self-sustaining brook trout that steadily declined after rainbow planting began. Could brook trout have sustained good fishing and satisfied anglers? The self-sustaining brook trout population would certainly have been on balance with lake productivity and less costly. Perhaps fisheries managers sought to diversify the Castle Lake fishery or simply enhance it by introducing rainbow trout.

Klein (1976) observed that natural productivity could best guide fisheries managers in providing fishing in many productive, heavily fished Colorado waters, resulting in more efficient and cost effective management. Colorado decided otherwise, increasing production and stocking rates of hatchery-reared, catchable-size trout. Results showed that return to anglers was best (about 88% of number planted) when stocking of catchable-size trout was light (250 per acre) and that high stocking rates (>750 per acre) produced lowest return (about 66% of number planted) to anglers (Klein 1976).

Trout Stocking Rates: A Wyoming Perspective cont.

Table 2. Biological potential: information applies to stocking guidelines for put-grow-and-take fisheries.

Component	Definition		*Score
Competition	No competing fish species; trout only		5
	Few competing fish species		4
	Moderate number of competitors		2
	Competitors abundant		0
Productivity (TDS)	Excellent for trout growth	(TDS ≥200 mg/l)	10
	Good	(TDS 100-200 mg/l)	8
	Fair	(TDS <100 mg/l)	5
	Low	(TDS ≤40 mg/l)	2

**Scores for Competition and Productivity are summed. The following scores indicate Excellent, Good, Fair and Low biological potential as shown in Table 1.*
Excellent: 14-15 Good: 11-13 Fair: 8-10 Low: <8

Bentz et. al. (1991) studied stocking rates of 100, 200, 400, 800, and 1,000 rainbow trout per acre for inland south-central Alaska streams and found decreased survival to one year post-stocking with increasing stocking rates. They recommended stocking no more than 200 rainbow trout per acre for best economy and return of stocked fish to anglers. Platts and McHenry (1988) had it right when they said that streams sustain trout up to their natural production capacity.

Trout must find suitable places to live, feed, rest, and reproduce, post-stocking in lakes or streams. Where those habitat elements are abundant, large populations of trout are expected and where they are limited, trout populations are smaller but on balance with habitat. Wyoming experience indicates that stream trout standing stocks do not significantly increase by stocking sub-catchable size trout, regardless of number stocked.

Now Therefore, What?

Mullan and Goede (1976) said that when early fish culture proved not an obvious remedy for diminishing fish stocks, fisheries biologists were hired as a sop to public demands for better fishing. The ensuing partnership of fisheries management and fish culture produced credible success over the intervening years. Solid achievement notwithstanding, traditional views of fisheries biologists as low-priced, interchangeable assembly-line cogs and the ever-present need for "good public relations," in spite of what makes resource sense became institutionalized. Results of the modern dogma of asking the public what they want and then providing it are all too self-evident (Mullan and Goede 1976).

Klein (1976) got it right – natural productivity of waters can best guide efficient and cost effective fisheries management, including trout stocking. It is our job as modern, competent resource professionals to explain our fisheries management recommendations to constituents to provide a sound understanding of how lake and stream fisheries work – instilling in anglers a sensible philosophy of fisheries resource management, resulting in a more effective, beneficial resource management relationship.

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Trout Stocking Rates: A Wyoming Perspective cont.

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Intelligent Courage: Natural Resource Careers That Make a Difference

A forthcoming book by Conservationist Michael Fraidenburg: *Intelligent Courage* is designed for students nearing completion of their university education and currently employed professionals, especially those in the first half of their careers. *Intelligent Courage* will be of interest to all natural resource professionals wanting to maximize personal effectiveness. The backbone of *Intelligent Courage* is in-depth interviews of seasoned professionals who analyze their careers as learning experiences. By introducing readers to these distinguished professionals, *Intelligent Courage* accelerates learning of the 'street smarts' natural resource managers gain through experience. *Intelligent Courage* can be used by students in seminar or group discussion and encourages readers to anticipate their work environment. I*ntelligent Courage* is a catalyst for employed professionals to direct their careers toward greater effectiveness. The book presents practical, wise, workable ideas to succeed in the real-world work environment of natural resource professionals. *Intelligent Courage* focuses on the professional's personal career experience. It identifies difficult career situations frequently encountered by professionals and provides advice from the people who lived these work experiences. *Intelligent Courage* is different from business administration books because the narrators are public-sector managers whose working environment, while having some parallels, is radically different (e.g., inability to exclude customers, public access to decisions, multiple and competing objectives instead of a single profit motive, the economics of public goods, overview and supervision by legislative bodies). It goes beyond the telling of 'war stories' by identifying core dilemmas professionals encounter and by offering prescriptive advice to deal with these situations.

The foundation of *Intelligent Courage* is in-depth interviews of distinguished natural resource professionals such as Mike Dombeck, former chief of the US Forest Service; Roger Contor of the National Park Service; and conservation activist and Olympic Champion Andrea Mead Lawrence. Emphasizing career lessons they were not taught during their formal education, the narrators focus on career experiences that other professionals can benefit from as they embark on their careers or strive to improve personal effectiveness in their current jobs.

If you ever wondered how you would manage the controversy from the first 'let-it-burn' fire in the history of the National Park Service; mount a critique of the politically powerful and well financed Sage Brush Rebellion; justify expending considerable agency resources and confront substantial economic development interests to save a 'useless' minnow from extinction; or organize a massive shift from an agency culture focused on commodity production to a culture of conservation; then *Intelligent Courage* will help you navigate a successful and rewarding career.

Part One includes in-depth interviews from the narrators telling in their own words the lessons they learned from their careers. Part Two unites and interprets these stories identifying key issues that natural resource professionals routinely face in their careers. Throughout *Intelligent Courage* the narrators give prescriptive advice about how to handle difficult situations in a work environment with increasingly complex challenges and diversified public interests.

FMS funding helped to support the development of this book. Michael has a seminar for students on the career management lessons learned coming out of the book that is getting good reviews. He also has a keynote address suitable for currently employed practitioners. He is accepting invitations to present these on college campuses and at professional conferences. These presentations are supported with a 22 page pamphlet based on the book results (57 Tips for Creating a Natural Resource Career That Makes a Difference). For further information on the book, please go to the following web site. www.IntelligentCourage.com.

National Fish Hatcheries Fuel Economic Engine (from the *Fisheries Forever* newsletter)

A new peer-reviewed study by economist **Dr. James Caudill** of the U.S. Fish & Wildlife Service shows that when you toss a lure toward a rainbow trout produced by a National Fish Hatchery, you're also fueling an economic engine that can drive for the long haul.

Here's a snap shot of what Dr. Caudill found; his research was based on stocking information and a dollar's value in 2004. He included only stocking information from 11 National Fish Hatcheries producing largest quantities of rainbow trout among the 70 National Fish Hatcheries across the country.

NATIONAL FISH HATCHERIES with significant responsibilities in rainbow trout production.

Alchesay-Williams Creek NFH, Arizona
Chattahoochee Forest NFH, Georgia
Dale Hallow NFH, Tennessee
Ennis NFH, Montana*
Erwin NFH, Tennessee*
Garrison Dam NFH, North Dakota
Greers Ferry NFH, Arizona
Hotchkiss NFH, Colorado
Jones Hole NFH, Utah
Neosho NFH, Missouri
Norfork NFH, Arkansas
Willow Beach NFH, Arizona
White Sulphur Springs NFH, West Virginia*
Wolf Creek NFH, Kentucky

* These are brood stock hatcheries.

Those 11 hatcheries that year raised 9.4 million rainbow trout, providing nearly four million angler-days on the water. Retail sales on things associated with fishing for rainbow trout, like food, gas, lodging, rods and reels, and bait and tackle amounted to $172.7 million. That spending provided employment for 3,502 people and income of $80 million. Those wage earners contributed back to public treasuries – $2.9 million in state income taxes, and $10.6 million in federal income taxes. The bottom line is that fishing for rainbow trout generated a total economic output of **$325.1 million** in one year.

Taxpayers that fund the National Fish Hatchery System paid **$5.4 million** to produce rainbow trout. This means that for every dollar spent on rainbow trout production, it rises up through the economy fueling $32.20 in retail sales and **$36.88** in net economic value. *[My thanks to author **Craig Springer** for excerpts from his article.]*

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