American Fisheries Society

EDUCATION SECTION

VOLUME 32(1) JANUARY 2011

INSIDE THIS ISSUE:

President's Line

"A good education should leave much to be desired" - **Alan Gregg**

Steve Chipps is the Assistant Unit Leader at the South Dakota Cooperative Fish and Wildlife Research Unit and can be reached at steven.chipps@sdstate.edu

A friend's email informed me that today (01-11-11) is a binary day. I couldn't believe I missed this important fact until I realized that there are only 10 types of people in the world --- those who know and those who don't. I trust everyone is embracing the new year and looking forward to new projects and activities. We have a lot to be proud of over the last year, as the Section made important contributions to book projects, student activities, travel awards, and the mission of the American Fisheries Society. A special thanks to Wayne Hubert and Mike Quist for their timely (and economical) delivery of the 3rd edition of *Inland Fisheries Management in North America*. Last fall, our "Special Essay Series" in *Fisheries* kicked off with articles by Don Gabelhouse Jr. (Needs and proficiencies of fisheries hires by state agencies) and Andrew Seitz/Trent Sutton (Distance learning in today's classroom) – with more to follow in 2011. The new year also brings new opportunities for service in the Section, as committee chairs and officer positions become available. As Past-President Tom Kwak pointed out in Pittsburgh – it is important that our EXCOM be represented by the diversity of our membership. Toward this end, I encourage everyone to consider how you might serve the Section and think about running for an office or committee chair. Several members have volunteered their time and service as new chairs or representatives for 2011 and deserve special thanks: Steve Cooke and Lisa Kerr were elected as new Division Representatives, serving the North Central and Northeastern Divisions; Jill Leonard and Tracy Galarowicz are the new Co-Chairs for the Best Student Paper and Poster symposia; Dan Daugherty serves as Chair of the Skinner Memorial Award committee; and Dan Dauwalter and Justin VanDeHey have joined the New Initiatives committee. As we look ahead to 2011, a number of important initiatives and activities are being planned. The Young Professional Award, a new initiative proposed by the Membership Committee (see details below), provides a great opportunity to support non-student travel needs to AFS meetings. The New Initiatives committee is working on a plan to better serve continuing education needs of AFS units by working to create a link among the Education Section, the Continuing Education Committee and the AFS Certification committee. And later

Visit the Education Section of the American Fisheries Society online at: www.fisheries.org/units/education/

President's Line (cont)

his month, the Student Subsection, with support from the Section, will be hosting the 4th annual student colloquium at South Dakota State University.
Like most, I find that this time of year is a good time to catch up on writing and helping students with their analyses. I suspect that with unbelievable amounts of snow (2-4 inches - ☻), even our colleagues to the South are stuck behind a desk this month. So here is some writing advice from a recent paper by Kendall (2010) entitled "Publish like a Pro" :

- "You are only as good as your last paper — previous success does not guarantee future acceptance.
- You've got to hook the editor with the abstract.
- Don't delete those files. Keep every version. You never know what aspect you can use for some other piece of writing.
- Writing is an amazingly long learning curve. Many authors say that they're still getting better as a writer after several decades.
- The most significant work is improved by subtraction. Keeping the clutter away allows a central message to be communicated with a broader impact.
- Write every day if possible.
- Once you've written what you wanted to convey, end it there."

Finally, my ignorance got the best of me, so I had to find out more about binary dates --- As it turns out, the next real binary date, like November 11, 2011 (11-11-11), won't occur for another 1,000 years. So, happy and productive new year to all. As always, if you have any question or ideas, please drop me an email (steven.chipps@sdstate.edu) or call (605.688.5467).

Powell, K. 2010. Publish like a Pro. Nature 467:873-875.

Best Student Paper/Poster Award

Students – just a reminder that the registration deadline for Best Student Paper and Poster at the Seattle, Washington Annual Meeting is February 11, 2011. This submission process is the same as the contributed abstract submission, with some extra requirements.

To be considered for an award, applicants must:
(1) submit an extended abstract to the committee and
(2) have their advisor indicate on the website that the study is at the stage appropriate for award consideration.

For more information, visit the AFS web page at
http://afs.confex.com/afs/2011/student/cfp.cgi

Dumbing down fish biology texts: a smart move?

Peter Moyle

Once a year, I teach a basic fish biology course to 65-85 bright undergraduates. The basic structure of the course is top down: I lecture, while the students listen and read a text book, write a few papers, and take exams to test their knowledge. I learned long ago that the standard lecture is a killer for learning so I try to break each one up with changes of pace, e.g., some Power Point slides, then a chalk talk, then a pop quiz or discussion, then back again to Power Point. The best lectures have personalized stories imbedded in them (if student attention is the marker).

But I still require assigned linear readings from a big thick ichthyology textbook, that, not coincidentally, I wrote. Academics like me write textbooks for three audiences, in order of importance: (1) themselves, (2) their colleagues who might adopt it for a class, and (3) students. A successful textbook is one that gets adopted by many faculty and tends to be chosen on basis of completeness, how well it covers what the faculty member thinks is important, and whether or not the instructor's papers are cited. The assumption is that students will mine the text for information needed for their class and then keep the text as a reference for later use, justifying an encyclopedic approach. My impression is that today's students find trying to ferret information out of a text to be difficult and boring. Increasingly, they get rid of the book as soon as the class is finished. So making the text (assuming one is even needed) more useful and stimulating for learning is important.

In 1993, I published a book called *Fish: an enthusiast's guide* (UC Press), which is still in print. It was meant to be a popular version of my ichthyology text, aiming at high school or community college students, as well as amateur naturalists. It is written with a light touch, using personal stories and good drawings. But it also includes a lot of basic information. In fact, if the average student in my fish biology class came out of the class knowing well the core information in the enthusiast's guide, I would consider my teaching a huge success. I am not convinced they come out of my class with that much background today.

I am now thinking of using this book (or perhaps an update of it) in my fish biology class and take advantage of the student's facility with electronic devices. When a species of fish is discussed in the book, a student can flash to Google Images for a quick look at color photos or even videos. Do students need a better explanation of some concept or fish group than is in the text? They can go to Wikipedia or other increasingly reliable websites. As instructor, do you find you don't like the account on Wikipedia for your favorite subject? Revise it. Do you want your students to learn more about some favorite subject? Provide summaries on a class website, with links to a real paper. Or have the students create the summaries. With an easy-to-read, enjoyable text guiding interactive learning I assume much greater knowledge (the kind that sticks) will result. True?

So my question for students and faculty who are reading this is: is using a more elementary text book this way dumbing down the material or is it actually improving learning? Keep in mind you are probably biased because you loved endless lectures and text accounts of fish biology. But is that true of the student in the back (or even middle) row, who will not wind up as an aquatic biologist? What other alternatives are there? I would like your opinion, perhaps expressed as a dialogue in this newsletter.

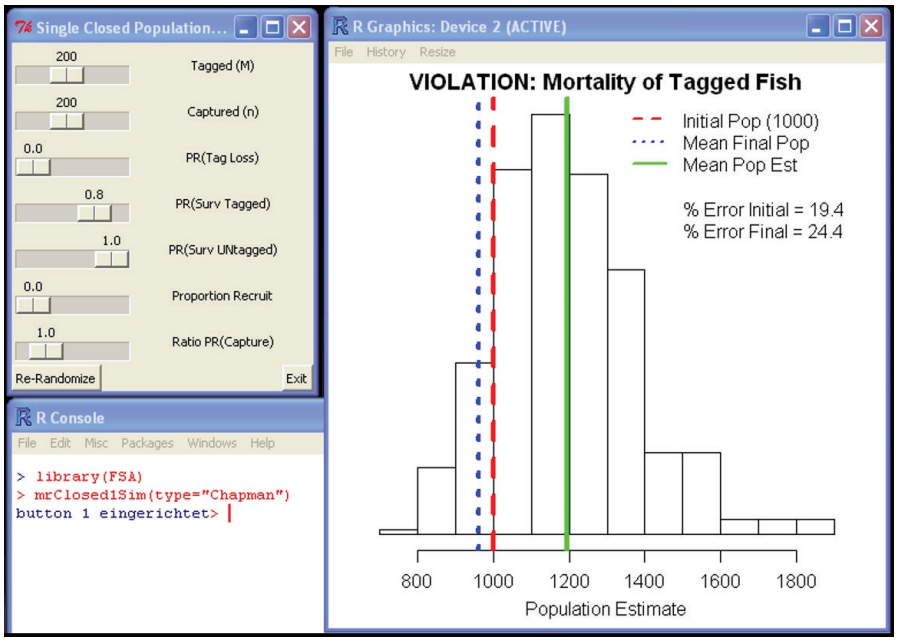
Editors Note: Responses to Dr. Moyle's contribution will be published in the next Education Section Newsletter (i.e., July 2011). Hopefully, a diversity of opinions (e.g., graduate students, young and old educators) will offer insight into the future of fisheries texts. Your responses are encouraged and can be sent to the Newsletter editors Joe Gerken (gerkenje@ksu.edu) or Jesse Fischer (fischer@iastate.edu).

Simulations to Aid Understanding Mark-Recapture Assumptions

Derek H. Ogle

All fisheries students learn the Petersen mark-recapture method for estimating fish abundance at some point in their undergraduate curriculum. Basic development and use of the calculational formula is fairly straightforward to teach and understand. However, understanding the effect of violating one or more of the assumptions on which the formula rests is not as easy to understand. I used the R program to develop an interactive simulation tool to aid a student's exploration of the basic mark-recapture assumptions. I briefly introduce this tool below with the understanding that the Petersen method, and it's assumptions, are familiar to you.

The `mrClosed1sim()` simulator produces 500 independent samples from a population of 1000 fish given user settings for the number of captured, marked, and returned fish from the first sample and the number of captured fish in the second sample. The population estimates (PE) using the Petersen method (with the Chapman modification as shown here) from the 500 samples are then plotted (right side of figure below) as a histogram with a vertical green line representing the mean PE from the 500 samples, a vertical dashed red line representing the known initial population size (prior to the first sample), and a vertical dashed blue line representing the mean final population size (prior to the second sample). The percentage errors of the mean PE from the known initial or mean final population size are also displayed on the figure. From this figure, the student can immediately see the sampling distribution of the PEs (i.e., the histogram) and the potential bias (or lack thereof) of the PE for estimating the initial or final population size (i.e., comparing the vertical green line to the vertical red or blue lines).



The student can model assumption violations by moving slider bars (left side of figure) to various values. For example, the student can …

- Move the `PR(Tag Loss)` slider (i.e., "probability of tag loss") to a value greater than 0 to simulate tag loss.
- Move the `PR(Surv Tagged)` slider (i.e., "probability of survival for tagged fish") to a value less than 1 to simulate mortality (or immigration) of tagged fish.

Move both the **`PR(Surv Tagged)`** and **`PR(Surv Untagged)`** sliders (i.e., "probability of survival for untagged fish") to the same value less than 1 to simulate mortality of all fish.

Move the **`Proportion Recruit`** slider (i.e., "number of recruits as a proportion of population size") to a value greater than 0 to simulate recruitment or emigration.

Move the **`Ratio PR(Capture)`** slider (i.e., "the ratio of the probability of capture of tagged to untagged fish") to a value greater than 1 to simulate an increased catchability for tagged fish (i.e., "trap happy") or to a value less than 1 to simulate a decreased catchability of tagged fish (i.e., "trap shy").

The figure shows, for example, a student modeling an 80% survival rate of tagged fish between the two samples. The effect of the assumption violations on the PEs is shown immediately as the histogram, corresponding vertical lines, and percent error statistics are updated as the slider bars are moved. For example, this student would see that a 20% mortality rate for tagged fish would, if undetected by the biologist, lead to an average 19.4% over-estimate of the initial population size and a 24.4% over-estimate of the final population size.

In the classroom, I briefly describe (i.e., lecture) the mark-recapture assumptions, describe the simulator graphic, describe each of the slider bars, illustrate how to interpret an example graphic when one of the assumptions has been violated, ask the students to then independently determine the impact of various assumption violations on the estimates of the initial and final population sizes by manipulating the sliders, and, then, reconvene the class to discuss the results. While discussing the results I attempt to engage the students in thinking critically about why certain assumption violations lead to the observed results. For example, I will ask "***why*** does mortality of tagged fish lead to an over-estimate of the population size?"

I have not formally assessed the impact of this tool on student learning largely because I have modified the simulator after each use. My belief is that this tool has helped each student to, at least, realize the importance of assumptions on PEs made with the Petersen method. Discussions with more thoughtful students have been deeper and have ranged from how we can (or cannot) detect and correct for assumption violations to looking at the sampling distributions relative to using different statistical distributions to compute PE confidence intervals.

The **`mrClosed1Sim()`** simulator function is contained in the FSA package for the R program. The R program is available at www.r-project.org (follow the "download" link). The FSA package is available at www.rforge.net/FSA/ (follow the instructions under the "installation" link). The simulator program requires the tcltk language to be installed which can be problematic (but can be overcome) in the Macintosh environment.

Derek H. Ogle is a professor of Mathematical Sciences and Natural Resources at Northland College in Ashland, WI. Please feel free to contact him (dogle@northland.edu) with any questions, comments, or suggestions for improvements to the simulator.