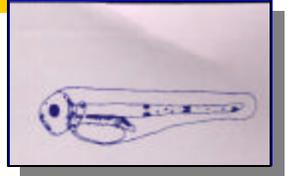


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Stages



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27th Annual Larval Fish Conference. Santa Cruz See p. 10 for details

AFS 11th Annual Southern Division, Wilmington, NC, Feb 12-16. nelsonk3@earthlink.net

AFS 133rd Annual, Aug. 10-14, 2003, Quebec City, bfritz@fisheries.org

Thank you! First, I would like to thank you, the members of the section, for electing me as President of the ELHS. I consider it an honor and a privilege to serve an organization with such a rich history and esteemed membership. Second, on behalf of the membership, I would like to thank our out-going executive board. Art Kendall did an outstanding job leading the section and presiding over a couple of great Larval Fish Conferences. I hope I can adequately follow in his footsteps. Susan Sogard also did an outstanding job as secretary, as evidenced by our growing membership and strong meeting attendance. Our treasurer, Kathy Lang, has kept the organization afloat and out of hot water, and has agreed to serve an additional term despite the fact that her current job protecting the country kept her from attending the Larval Fish Conference. Next, I would like to thank Perce Powles, Stages Editor, Jim Rice, our Webmaster, Tom Miller (publisher of Stages), and all of our regional representatives for their efforts in keeping the rest of us informed. Without your efforts, our section wouldn't exist. I also would like to thank Howard Browman and the Institute of Marine Research for hosting our conference. What an outstanding meeting! You'll be hearing more about that later in this issue. And, thank you Churchill Grimes and the National Marine Fisheries Service for agreeing to host next year's meeting. Santa Cruz will certainly be an attractive venue. Finally, I would like to thank you, the members of the section, for your interest and support. I think we all feel that the Larval Fish Conference historically is a great meeting, and we hope to enhance it and our profession by our membership in the section.

Now what do I do? As one of my first official duties, I attended the Executive Board Meeting of the Parent Society in Baltimore. Due to our relatively large membership, we as a section have voting rights on the board. Few other sections do. This gives us a large voice in the society. Although the board meets twice each year, a sub-set of the board called the Management Committee conducts the business of the organization through

The Masthead

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<http://www2.ncsu.edu/elhs/index.html>

President's Message (con'd)

monthly conference calls. I was elected to that committee, and thus, our section has even more say about the current and future dealings of the AFS. Here's a few take-home points from the meeting and calls to date. First, the AFS is truly an organization run by its members. If you have an opinion about what AFS should be doing, I'd love to hear it and pass it on. Second, it is my impression that a lot of section members and affiliate members hold grudges about things they feel the society has done in the past that may conflict with the goals of the section. I would like to assure you that Gus Rassam is doing an excellent job carrying out the mission of the officers, and that all current and future activities of the board are undertaken with the full knowledge and consent of the active membership. The society's annual report is available through the web site (. It contains detailed information on the mission and activities of the society, as well as plans for future activities. Take a look at it, it's your society. If we are or aren't doing something you feel strongly about, let me know and we'll see if we can instigate a change. I plan on being a squeaky wheel, and I need you to help me make noise.

What's the difference between Ignorance and Apathy? Hey, I don't know, and I don't care. Reducing the level of apathy in the section has been a theme of the past few presidencies. The 80 - 20 rule seems to hold true in this section (80% of the work is done by 20% of the members). For example, we did

President's Message (concl'd)

not hold our regular election because we could not fill a slate of officers. Although I appreciate those that have agreed to be nominated so far, we are still trying to fill the slate for our next election. If you have not been nominated and are interested in serving the section, nominate yourself. We have openings on the ballot for most every position. If you plan on being active in the profession, section service is a great way meet the experts in the field and to make professional contacts and friendships that will last a lifetime. I would especially encourage new graduates to get involved. It could even help you land a job. If the business of the section bores you, there are numerous opportunities to assist with our annual conference. Contact Churchill Grimes, or me to volunteer. With that, I'll step down from my soap box and promise to provide messages with more substance in future Stages. I look forward to serving you.

Jeff Isely

2002 Business Meeting of the Early Life History Section 26th LFC Solstrand Fjord Hotel, Os, Norway July 2002

Attendance (A. Kendall, presiding)

The meeting was called to order at 19:00 on 7/25/02. There were too few Section members in attendance to attain a quorum; therefore the meeting was held for information purposes only.

I. Approval of minutes

Minutes for the 2001 business meeting were approved.

II. Treasurer's Report (A. Kendall reporting for K. Lang)

Expenses accrued during 2001-2002 including printing and mailing of Stages and grants for student travel to the annual meeting. Income was generated

via membership dues, interest, and publication sales. The section is in solid financial position with a current balance of approximately \$29,000. The Sally Richardson award endowment has a current balance of approximately \$11,000. The treasurer's report was approved and a special thank you of appreciation extended to Kathy Lang for her continuing contribution as our treasurer.

III. Committee reports

1. Standing committees

Nomination and mail ballot (A. Kendall reporting for J. Cowan)

This committee needs new members. President Kendall announced a request for nominations, which should be sent to incoming president Jeff Isely.

2. Time and Place (J. Govoni reporting)

The 2003 annual meeting will take place August 19-23 in Santa Cruz, California, hosted by Churchill Grimes, director of the Santa Cruz Laboratory, National Marine Fisheries Service. Julia Neander from the Santa Cruz Lab provided an overview of the meeting venue, scientific program, and special events. A website at [http://www.nmfs.gov](#) has been posted providing further details. Registration will begin in January, using the website. Future meeting locations have not been formalized. Jeff Isely has submitted a proposal to host the 2004 meeting at Clemson University in South Carolina, and Pilar Olivar has volunteered to host the 2005 meeting in Barcelona, Spain. Written proposals from all interested parties are needed to establish a final commitment.

. Sessional Committees

1. Sally Richardson Award (Grace Klein-MacPhee reporting)

Jeff Govoni volunteered to fill in as a member of the committee. The institution of a poster award was discussed but no final decision made.

2. Student Travel Grants (Rich McBride reporting)

Jeff Buckel took on the task of reviewing student proposals for travel funding for the Bergen meeting. From a large pool of 14 applicants, 4 received travel funds, 2 via the Section and 2 via the local committee.

The subventions proposal made in 2001 was approved by the EXCOM, with the maximum amount of potential funding increased to \$5000. This provides a formal mechanism for obtaining funding from the society for specific publications. Lee Fuiman thanked the Section for support of his book, co-edited with Bob Werner.

Extensive discussion took place concerning the position of Editor for the Section and the role of that position. Options included 1) oversight on all publications arising from ELHS conferences, 2) local committees would have the option of requesting the Editor's services for any ensuing publications, and 3) local committees would retain all responsibility for publishing any proceedings. No resolution on these options was made by the members present.

D. Ad Hoc Committees

1. Lifetime Achievement and student poster awards (Jeff Isely and Churchill Grimes reporting)

This committee is currently inactive.

2. Stages (Perce Powles reporting)

Publication of Stages continues to function smoothly. Attending members thanked Perce for his dedicated efforts in preparing the newsletter (Tom Miller still publishes it for distribution –ed)

IV. Old business

A. Historian position - it was reported that this position is open for any members that are interested.

B. *Fisheries* contributions - the editor of *Fisheries* has requested more submissions from the ELHS. Don Hoss agreed to provide them with a report on the current meeting.

V. Installation of new officers

A. Jeff Isely was installed as the new president of the Section, and Rich McBride as the new secretary. Outgoing officers Art Kendall and Sue Sogard were recognized with certificates of appreciation.

VI. New business

A. Lee Fuiman requested that the Section find ways to increase membership. The problem of dues

payment by foreign members was discussed. The Section is currently not able to provide credit card services for payment. One suggestion is to allow new members to pay dues in conjunction with registration for meetings. Sue Sogard agreed to implement this for the 2003 meeting.

VII. Adjournment

The meeting was adjourned at 20:00.

26th Annual LFC in Norway, a huge success. Comments by Perce Powles

A wonderful scientific meeting was arranged by Howard Browman and Anne Skitesvik for our 26th annual LFC. We are grateful for all their work, and especially for their efforts in raising extra support for graduate students to attend, the arranged visit to the Institute of Marine Research, Austoevoll Aquaculture Research Station, Storebo, organizing sight-seeing visits, and subsidizing our lavish hotel arrangements, including the banquet. I know I speak for all, when I say that it was a huge success, scientifically, socially, and sociologically. A few brief comments on the meeting follow, but do not do it justice, I am sure.

The meetings started with a series of review seminars by specialists in their fields. (this symposium was organized by Jeff Govoni) who brought us up to date, and presented their messages to us in most interesting and diverse styles covering the areas of morphological development and physiological function in fish. (See website for full titles) 126 papers and 30 posters were presented, with representatives from 27 countries attending.

Below is our new President, **Jeff Isely**, presenting the Sally Richardson award at the banquet in Norway, July 25th, 2002. to **Hannes Baumann**, of the Institute for Marine Research, Kiel, Germany.

The paper was entitled: Do growth patterns of larval radiaed shanny, *Ulvaria subbifurcata*, reflect spatial and temporal differences in environmental conditions?

Honorable mention went to **J. Adam Luckenback**, North Carolina State University. Effects of temperature on sex determination in southern flounder (*Paralichthys lethostigma*) and to **R. S. Fulford**, also of North Carolina State University, for his paper An investigation of factors important to predation vulnerability of larval yellow perch in southern Lake Michigan: an experimental and modelling approach.

Special award for most enthusiastic student paper went to: **Mohammad Ebrahim Jalil Zorriehzahra** Of Iranian Fisheries Institute, Tehran for his study: Observations of a case of enteric redmouth morbidity in fry of rainbow trout propagation farm around Tehran Province, Iran.



New President Jeff Isely presents the Sally Richardson award to Hannes Baumann at the Norway meeting

Photo courtesy of A.Nigel Finn, Norway.

Those arriving early for the meetings had a chance to experience a day-long trip by bus train, and boat, through some spectacular scenic areas of Norway—the Norway -in-a-nutshell tour. We saw glaciers, waterfalls, fjords, and lakes—and get this—the

temperatures were running at about 80 F! Not a fly or mosquito to be seen, either. But the tunnels!! I have the subterranean mole award, as I drove through the famous 26 km-long tunnel—Flam to Lerdle.

All the hotel rooms had balconies, and windows with no screens, looking out onto the fjord. Even the water was warm enough to swim in—a cool 20 C, but plenty warm enough for Jeff Govoni and the Erlend Moksness.!

The Norwegian breakfast was a light affair: fresh breads, biscuits, jam, sliced tomatoes and cucumbers, cold meats, pickled herring, sardines, pate, smoked salmon, various fish spreads, eggs, bacon, shrimp, crab, and cheeses! Most notable cheese was a brown, sweetish cheese, made with goatmilk and caramel : “gutbrandsdalsost” tuck that in your cheese repertoire now the most popular cheese in Norway. Great with something like an apple!. Ah yes, with only 4 hours of darkness, the fruits had a long growing season, relatively speaking, and the apples and cherries were delicious. With a breakfast like this, who needed lunch or dinner? I must admit, most of us did make the attempt.!

The country was beautiful, but expensive. It is rated no. 1 to live in by United Nations. The wealth comes from its oil and gas reserves, and the cost of living comes from being a welfare state. There is no poverty, and the wealth is distributed around to subsidize wages. Yet there was no apparent evidence of indolence, and even modest homes were a picture of neatness with gardens of roses and flowers. Ah yes, and everyone speaks English!!

Midweek, was the trip to the Institute of Marine Science, to view the aquaculture operation, and the Lab inside. We were ferried across in a comfortable ship, and then escorted through the Lab. Where Anne is the Director, and Howard has a beautifully equipped behaviour/physiology lab. Outside, the species in pens were displayed in sea pens, where it never freezes because of the salinity. Salmon jumped happily, and cod and halibut facilities could be viewed and questions asked. The set-up was very impressive. Oh yes, and of course, we were wined and fed there.

Meetings ended with a lovely banquet, including

Thanks Anne and Howard. For those of us lucky enough to have been there, we thank you for all your work, and the thought you put into the meetings, the arrangements, and the logistics. Hope to see you both in Santa Cruz next summer.



Just so everyone recognizes you in Santa Clara

Anne Skitesvik and Howard Browman

The use of fish scales for aging fish : back-calculating to the future

By Richard McBride

Florida Fish & Wildlife Conservation Commission
Florida Marine Research Institute

Originally written for 'The Shellcracker (FL-AFS newsletter)', 4/2/02
Revised for 'Stages (AFS-ELHS newsletter)', 5/31/02

The ridge-like patterns on fish scales that are associated with annual cycles are referred to as annuli. Scale annuli were first used to age carp, *Cyprinus carpio*, as early as 1898 (Carlander 1987), and during the early 1900s this new methodology led to seminal research in ecology and fisheries science (Sinclair 1988). By the early 1920s, Welsh and Breder (1924) reported age and growth information for fish from southwest Florida using scales. Aging fish by the scale method was so common by then that Lee (1920) and van Oosten (1929) reviewed this method for a number of freshwater, anadromous, and marine species. Early on it was noted that difficulties could arise in the use of scales from: 1) false

annuli, 2) compaction of annuli near the edge, and 3) variation in appearance of growth ridges between fish from different localities. These problems still persist for many species, and critical reviews of the scale method for aging fish (e.g., Summerfelt and Hall, 1987), coupled with the success of using otoliths for aging teleosts has led many scientists away from the scale method. The purpose of this article is to present a brief overview of the methodology and applicability of using scales for aging fishes, particularly for species of the southeastern United States, and to comment on the potential for their continued use in age and growth studies for this region.

One of the main advantages of scales, over other anatomical parts used for aging fish (e.g., otoliths, vertebrae, opercle, spines, rays), is that scales are easy to collect and process from teleosts. Once a fish is collected, scales can be removed quickly by using forceps or a knife. The scales can be stored indefinitely in inexpensive envelopes. Almost no processing is necessary, except a simple cleaning, if the raw scales are examined directly. Over time, however, the scales may become translucent or brittle so they can not be considered archival records of fish age. In addition, the thickness of larger scales reduces the scale transparency, and scales are not typically flat, which causes diffraction and distortion of light transmitted through a scale. Problems related to archival needs and readability are common and may be resolved by making impressions of the sculptured side of a scale onto plastic slides (Arnold 1951, Dery 1983, Everhart and Youngs 1981, Jearld 1983, Carlander 1987). Regardless of the specific technique, the goal is to have clean scales or clear impressions of scales that reveal the concentric ridges on the outer surface of a scale (i.e., the circuli). These circuli are found on both cycloid and ctenoid scales and may be interrupted by scale radii that extend from the scale focus to the margin (i.e., from the origin of the circuli to the scale edge) (e.g., Hubbs and Lagler, 1947). The criteria for counting annuli is to examine for patterns of cutting over, discontinuity, or crowding of the circuli (Everhart and Youngs 1981, Jearld 1983, Summerfelt and

Several species, of several Families, that occur in the southeast United States have been aged using scales including American shad (Clupeidae: *Alosa sapidissima*), Atlantic menhaden (Clupeidae: *Brevoortia tyrannus*), ballyhoo (Hemiramphidae: *Hemiramphus brasiliensis*), bluefish (Pomatomidae: *Pomatomus saltatrix*), dolphin (Coryphaenidae: *Coryphaena hippurus*), tomtate (Haemulidae: *Haemulon aurolineatum*), knobbed porgy (Sparidae: *Calamus nodosus*), whitebone porgy (Sparidae: *Calamus leucosteus*), black drum (Sciaenidae: *Pogonias cromis*), red drum (Sciaenidae: *Sciaenops ocellatus*), southern kingfish (Sciaenidae: *Menticirrhus americanus*), and striped mullet (Mugilidae: *Mugil cephalus*) (Broadhead 1958, June and Roithmayr 1960, Judy 1961, Beardsley 1967, Berkeley and Houde 1978, Manooch and Barans 1982, Waltz et al. 1982, Smith and Wenner 1985, Matlock et al. 1987, Barger 1990, Horvath et al. 1990, Matlock et al. 1993). In these studies, scale annuli were validated using a marginal increment analysis, or from recaptured fish, or they simply judged to be valid based on the appearance of continuous growth of the scale and circuli patterns.

The importance of validation has been stated clearly by others (e.g., Beamish and McFarlane 1983), and investigators ignore this at their own peril because scales may not always be useful for aging fishes. Beamish and McFarlane (1987) demonstrated that the scale method provided erroneous ages for 16 freshwater and marine species. In general, scale ages underestimated validated age or age determine by some alternative method, typically by otoliths. Otoliths are fundamentally different in their organic structure compared to scales and they continue to grow as a fish ages, while scales do not continuously grow in older fish. In addition, calcium can be resorbed from scales of stressed fish but this does not appear to occur for otoliths. Interpretation of the annulus location also appears to be more difficult in scales than in otoliths, which can lead to inter-reader error in assignment of annuli and ultimately in the calculation of growth rates or backcalculation of size at age (Casselman 1983). In a recent example using a regional species, Lowerre-Barbieri et al. (1994)

concluded that crowding of annuli on the scale margin was problematic in older weakfish (*Cynoscion regalis*) and demonstrated that sectioned otoliths provided more accurate ages and more precise indications of annulus location. As another example, Davis (1976) concluded that scales were unsuitable to age hogfish (*Lachnolaimus maximus*) older than 3 years, so McBride (2001) validated annulus formation using sectioned otoliths and used these to age this species. In an ongoing study at the Florida Marine Research Institute, we are using scale annuli to age dolphin (*Coryphaena hippurus*) because otoliths are unsuitable for aging dolphin older than one year. On the other hand, however, Casselman (1983) regarded scales as unsuitable in general for aging tunas, billfishes, and sharks. This broad level of criticism of the scale method can make it difficult, without independent age data, to evaluate the results of unvalidated scale ages reported in previous studies. For example, McBride (2002) noted that sizes at age were larger for two searobin species (*Prionotus carolinus* and *P. evolans*) in published reports from New England compared to independent reports for the Chesapeake Bay region. However, this result could have been the result of different aging structures used, because the New England study used scales and the Chesapeake Bay studies used otoliths. Thus, McBride (2002) used otoliths from new fish collected along a latitudinal cline to demonstrate that this geographic pattern in size at age did in fact exist.

In summary, the widespread lack of annulus validation in previous aging studies, most of which used scales, has come back to haunt the value of these studies. Scales are not appropriate for aging many species, particularly slow-growing, long-lived species. Scales may be useful for aging faster-growing, short-lived fish, or they may be useful for aging young fish of long-lived species (i.e., for sizes that scales can provide accurate ages) when mortality from scientific sampling needs to be reduced. When the advantages of scales appear applicable for a proposed study, then the investigators should pursue some level of validation before too much effort is expended toward collecting, processing, and aging

As recently as the early 1980s, Everhart and Youngs (1981) regarded scales as the most popular means of estimating the age and growth of fishes. This is no longer true today, particularly following the critical assessment of scale ages by several scientists in Summerfelt and Hall's (1987) "Age and Growth of Fish" book (see also Hales, 1989). Moreover, the considerable attention paid to otoliths in recent years has overshadowed the use of scales in age and growth studies (Summerfelt and Hall 1987, Stevenson and Campana 1992, Secor et al., 1995). Some of this increased emphasis towards using otoliths is justified. Scales are, however, relatively easy to use and may become more widely used in the future where non-lethal sampling is desirable or required. Aside from aging fish in annual increments, scales may also be used to measure growth across periods shorter than annual cycles (Ottaway and Simkiss 1979, Busacker et al. 1990, Talbot and Doyle 1992). Daily rings have been validated on scales of weakfish (*Cynoscion regalis*) although the use of circuli for estimating daily age appears to be limited to this species alone (Sedlmayer et al. 1990, 1991). In addition, scale shape has long been used for stock identification of modern collections or species identification of archeological collections (e.g., Ihssen et al. 1981, Daniels 1996), and recently Moran and Baker (2002) demonstrated that archival scale samples are valuable for genotyping of historical collections. The ease of collecting scales without killing fish has led to archived material at many labs, and these historic and newer collections can continue to play a part in understanding the population dynamics of fishes.

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This article originally appeared in the "Shell-cracker", and Rich modified it for us early life history types. Thanks Rich, and thanks Shell-cracker. ed

Next Year's Meeting—Make your plans now for California Details follow Contact Julia Neander julia.neander@noaa.gov

27th ALFC UPDATE

Planning continues for the 27th Annual Larval Fish Conference of the Early Life History Section, to be hosted by the NMFS Santa Cruz Laboratory at the University of California, Santa Cruz (UCSC). The conference will be held August 20 through 23, 2003.

Churchill Grimes is chairing the Local Committee with **Sue Sogard** heading up the Program Committee. **Ed Houde** of the University of Maryland will present the plenary keynote talk.

Three broad interest theme sessions are planned:

- 1) Understanding dispersal, settlement, and recruitment
- 2) Genetics
- 3) Otoliths, physical processes, and applications.

Session co-chairs :

Churchill Grimes Churchill.Grimes@noaa.gov
Steve Ralston Steve.Ralston@noaa.gov
and Mark Carr carr@biology.ucsc.edu

- Trade-offs and compromises in growth processes of early life history stages. Session co-chairs: Sue Sogard, Susan. Sogard@noaa.gov and Mark Mangel, msmangel@cats.ucsc.edu

- Maternal effects on offspring performance: What does Mom have to say?

Session co-chairs: Steve Berkeley, stevenab@cats.ucsc.edu and Ian Fleming, ian.fleming@hmsc.orst.edu

In addition there will be two focused theme sessions:

- Marine stock enhancement. Session co-chairs: Masuru Tanaka,

masatnk@kais.kyoto-u.ac.jp and Ken Leber, KLeber@mote.org

- Early life history of fishes in the San Francisco estuary and watershed. Session chair: Fred Feyrer, ffeyrer@water.ca.gov

Contributed papers and posters will also be presented. A Call for papers, abstract submission information, and registration forms will be posted in January 2003. For more information, please check the conference website at www.lfc2003.com or email your questions to info@lfc2003.com. Mark your calendars now for August 20-23, 2003. Seeyou in Santa Cruz!

Julia Neander Julia.Neander@noaa.gov

American Fisheries Society
Early Life History Section
Elbert H. Ahlstrom Award:

Below are the guidelines for the Ahlstrom Career Award. At our 26th meeting we discussed awarding this in the future. Please comment on the guidelines so that we can discuss this topic again in Santa Cruz.

ELBERT H. AHLSTROM CAREER ACHIEVEMENT AWARD

Administered by the AFS Early Life History Section

Purpose: The purpose of this award is to recognize sustained scientific excellence through research, teaching, administration or a combination of the three involving the early life history of fishes.

Selection of Recipients: The President of the Early Life History Section (ELHS) shall appoint a selection committee of three members and a chair that are affiliate or full members of ELHS. The tenure of the committee is indefinite, but the President should assure that membership changes frequently enough to represent the diverse views of ELHS. The award may be conferred annually, but no more frequently, and the selection committee may elect not to confer the award if suitable candidates were not recommended. The committee shall solicit nominees for the award from the ELHS membership by various means, but shall publish a solicitation for nominees in *Stages*, the newsletter of ELHS. The committee chair shall develop and implement a method for selecting the recipient from among the candidates nominated. After selection has been made the President of ELHS will be notified, and the President shall notify the recipient with a formal letter and a personal telephone call. The name of the selectee shall

remain confidential until presentation of the award. The award consists of a certificate mounted in a walnut plaque and travel and related expenses (if needed) to attend the annual meeting to receive the award.

Nominations shall consist of a letter of nomination and a complete curriculum vitae for each candidate. The letter of nomination should come from a colleague familiar with the nominee's career achievements, and shall be the sole piece of advocacy for the nominee, so it needs to be sufficiently detailed to demonstrate how the nominee meets the criteria for the Ahlstrom Award. The chair of the selection committee shall prepare a brief final report to the executive committee of ELHS along with a short biographical sketch of the recipient with justification for why they are being given the award for the presentation ceremony.

The following guidelines are suggested for selection of recipients:

1. North American residents are the preferred recipients, but the award may be given to any suitable candidate.
2. Membership in the American Fisheries Society is a positive attribute, but is not required. AFS membership could tip the balance between otherwise equally-deserving candidates.
3. Living recipients are preferred, but the award may be given posthumously
4. The Committee considers not only candidates who, by virtue of their position and personality, are widely known, but may also have labored quietly and are less well-known, but who have made sustained and important contributions.

5. Candidates should be clearly identified with the early life history of fishes in the marine or freshwater environments. Contributions to any discipline within a broad spectrum of activities should be considered appropriate for candidates, including systematics,
6. Runner(s)-up for the award for any given year will be considered automatically for the award in the subsequent year. Each year the committee will decide at the time of their deliberations to select the awardee which, if any, remaining candidates will be carried forward to the next year

Would you like to submit an article or announcement to Stages?

Send your copy to Perch Powles: pmpowles@netcom.ca or after Jan 15/03 , to: Perce Powles@noaa.gov

Next issue deadline for material : Mid -January)

Coming up in next issue:

More on Santa Cruz Meeting LFC
Larval Fish Quiz
Regional Reps reports,
New Books in Fisheries