

Muslim heritage

47



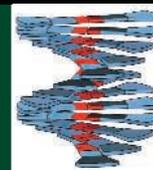
Saving amphibians

48



Insights into self-assembly

55



LETTERS | BOOKS | POLICY FORUM | EDUCATION FORUM | PERSPECTIVES

LETTERS

edited by Etta Kavanagh

Public Access Failure at PubMed

THE NIH PUBLIC ACCESS POLICY REQUESTS THAT NIH-SUPPORTED INVESTIGATORS SUBMIT FINAL peer-reviewed primary research manuscripts to the PubMed Central database (PMC) upon acceptance for publication (1). The policy went into effect 2 May 2005. As of January 2006, only approximately 3.8% of NIH-funded research papers published after 1 May 2005 had been submitted to the PMC repository (2).

Low compliance only tells part of the story. More than half of the manuscripts available on PMC were published before 2 May 2005 (3). Many reviews and commentaries, which fall outside of the scope of the request, and papers inappropriately made publicly available before the publisher's public access embargo were also found in the database. This suggests either wide misunderstanding of the policy or deliberate submission of papers falling outside the scope of the database.

The policy also allows posting of papers that differ significantly from the final published version, which has the potential to create intellectual property issues as each public disclosure of the research represents prior art in the eyes of the law. Also, there is no dedicated system to guarantee that corrections made after publication, which can be significant, are made to the author-submitted paper.

By NIH estimates, if only half of the eligible papers are submitted to the database, the cost would reach \$2 million per year, or \$62 per paper (2). Without a mandatory policy, however, submission of half of all eligible papers is unlikely. The NIH already provides close to \$30 million annually to cover publication costs. As the policy expands, archiving could cost an additional \$3 million (4).

The submission rate over the course of 2005 varied little. Submissions have increased significantly since then, but are still not approaching full compliance (3, 5). Both internal and external warnings that, if voluntary, the program would fail were outweighed by the NIH's desire to allay the concerns of some publishers and those advocating public access policies.

There is some good news, though. Authors publishing in some of the more influential journals in biomedical research seem to have a higher compliance rate than the estimated average (3). There is no obvious link between journal cooperation and author participation or any clear explanation for the journal-to-journal variability, but it is still a positive sign for PMC.

Notably, we still lack a demonstrated desire by the general public for access to primary research papers, leaving the true public value of the repository an open question on a backdrop of a disinterested scientific community and angry publishers and societies. The public access movement is spreading quickly, nonetheless.

Senators Cornyn (R-TX) and Lieberman (D-CT) recently introduced the Federal Research Public Access Act (S.2695), which imposes a mandatory public access policy on publications resulting from research funded by all federal agencies with extramural research expenditures over \$100 million. Not surprisingly, the bill has drawn criticism from many publishers and societies, some of whom feel that it unfairly places scientists between funding agencies and publishers. An April European Commission report recommends that funding agencies promote public access to research publications and suggests that agencies make compulsory deposition a condition for funding (6). Research Councils UK released a draft open access policy last June that called for a mandatory policy at the earliest opportunity (7).

NIH's faltering experience so far indicates that public access policies must be mandatory and curated if they are to have any chance of success. It would also be wise for there to be a real demonstration of public desire or need before we expand it to other agencies. Unfortunately, this experiment has cost taxpayers money and the NIH credibility.

MICHAEL STEBBINS,^{1*} ERICA DAVIS,²
LUCAS ROYLAND,¹ GARTRELL WHITE¹

¹Federation of American Scientists, 1717 K Street, NW, Suite 209, Washington, DC 20036, USA. ²Institute of Genetic Medicine, Johns Hopkins University, Baltimore, MD 21205, USA.

*To whom correspondence should be addressed. E-mail: mstebbins@fas.org

References

1. *Fed. Regist.* **70** (26), 6891 (2005).
2. See http://publicaccess.nih.gov/Final_Report_20060201.pdf.
3. See <http://www.fas.org/pmc>.
4. E. Zerhouni, *Science* **306**, 1895 (2004).
5. Statistics can be found at <http://www.nihms.nih.gov>.
6. See http://ec.europa.eu/research/science-society/pdf/scientific-publication-study_en.pdf.
7. See <http://www.rcuk.ac.uk/access/index.asp>.

Connectivity in Marine Protected Areas

MARINE PROTECTED AREAS (MPAS) ARE A PROMISING tool for many problems, from biodiversity conservation to fisheries management (1). Their success depends on connectivity among protected areas and spillover into unprotected areas. In their Report "Scaling of connectivity in marine populations" (27 Jan., p. 522), R. K. Cowen *et al.* integrated key ecological factors important in the design of MPAs to show lower connectivity—i.e., reduced larval dispersal between and greater larval retention within reef systems—than previously predicted among Caribbean reefs. In the accompanying Perspective "Staying connected in a turbulent world" (27 Jan., p. 480), R. S. Steneck noted that connectivity will be further reduced by habitat fragmentation and overfishing. The solution Steneck noted, that marine resource managers must protect their reefs on a local scale, makes considerable ecological sense; practice and theory have shown that this will increase the abundance and size of fish, thereby promoting connectivity and spillover (2, 3). A negative, evolutionary impact of local protection on connectivity may offset these advantages, however.

As commercial or recreational fishing pressure intensifies outside reserves (4), local protection can select for decreased dispersal distance (and increased local recruitment) (1), thus accelerating the fragmentation of reefs via rapid evolution of life-history characteristics and potentially reducing the genetic capacity of resident organisms to respond to future environmental change. Analogous effects may limit spillover, and because dispersal distance is likely genetically correlated to larval development and size at maturation (5), the effects of MPAs on life-history evolution could be synergistic. As with the known effects of selective harvesting on the evolution of fish life histories (6), notably age and size at maturation (2, 7), these changes could be rapid enough to

be measured with existing methods (8, 9). The results could be used to construct networks of MPAs, perhaps of various sizes and spacing (10, 11), designed to maintain ecosystem function on evolutionary time scales. These networks may implicitly also be well suited to protecting different life-history stages and the diverse life histories of the varied organisms that they harbor.

MICHAEL N. DAWSON,^{1*} RICHARD K. GROSBERG,¹
LOUIS W. BOTSFORD²

¹Section of Evolution and Ecology, College of Biological Sciences, ²Department of Wildlife, Fish and Conservation Biology, University of California at Davis, One Shields Avenue, Davis, CA 95616, USA.

*To whom correspondence should be addressed. E-mail: mndawson@ucdavis.edu

9. G. P. Jones, S. Planes, S. R. Thorrold, *Curr. Biol.* **15**, 1314 (2005).
10. S. R. Palumbi, *Annu. Rev. Environ. Resour.* **29**, 31 (2004).
11. D. M. Kaplan, L. W. Botsford, *Can. J. Fish. Aquat. Sci.* **62**, 905 (2005).

Response

DAWSON *ET AL.* RAISE AN INTERESTING AND important point about possible negative evolutionary consequences of managing metapopulations of coral reef-dwelling fish as they become increasingly isolated due to overfishing and habitat loss. This could potentially be problematic should managers elect to establish small reserves on the basis of relatively small, ecologically relevant dispersal distances. To this point, Cowen *et al.*'s original premise was that the tails of the dispersal kernel, which encompass maximum dispersal distances, were genetically relevant (i.e., genetic exchange would occur over large distances). Further, their finding that some subsidy is important for the maintenance of almost all populations and that there are regional patterns in connectivity that map onto genetic data suggests the importance of larger-scale genetic population connectivity, in addition to small-scale ecological connectivity. Although recent evidence (1) may counter the concern raised by Dawson *et al.*, as genetic diversity actually increased within reserves, the authors nonetheless also warn that "local measures are insufficient [for genetic

Letters to the Editor

Letters (~300 words) discuss material published in *Science* in the previous 6 months or issues of general interest. They can be submitted through the Web (www.submit2science.org) or by regular mail (1200 New York Ave., NW, Washington, DC 20005, USA). Letters are not acknowledged upon receipt, nor are authors generally consulted before publication. Whether published in full or in part, letters are subject to editing for clarity and space.

References

1. L. W. Botsford, A. Hastings, S. D. Gaines, *Ecol. Lett.* **4**, 144 (2001).
2. C. M. Roberts, J. A. Bohnsack, F. Gell, J. P. Hawkins, R. Goodridge, *Science* **294**, 1920 (2001).
3. M. L. Baskett, S. A. Levin, S. D. Gaines, J. Dushoff, *Ecol. Applic.* **15**, 882 (2005).
4. F. C. Coleman, W. F. Figueira, J. S. Ueland, L. B. Crowder, *Science* **305**, 1958 (2004).
5. L. A. Levin, J. Zhu, E. Creed, *Evolution* **45**, 380 (1991).
6. C. A. Stockwell, A. P. Hendry, M. T. Kinnison, *Trends Ecol. Evol.* **18**, 94 (2003).
7. D. O. Conover, S. B. Munch, *Science* **297**, 94 (2002).
8. S. E. Swearer, J. E. Caselle, D. W. Lea, R. R. Warner, *Nature* **402**, 799 (1999).

exchange] when the scale of connections encompasses large areas of territory." In fact, these points suggest the importance of a network of reserves (to, at a minimum, preserve genetic linkages). Yet, more extreme management measures at the local scale are also needed. Such diverse viewpoints contribute to a fog of uncertainty in which managers must determine what information is necessary and sufficient to manage marine ecosystems.

One key unresolved issue is that there are no measurements of larval spillover downstream or near protected reefs. Spillover recorded to date applies only to adult fish (2–4). Although this illustrates the need for more targeted research on connectivity (5, 6), it also makes it more difficult to argue for more and/or larger no-take reserves at stakeholder, manager, and governmental levels. Even if larval subsidies from MPAs are present, they may have little measurable effect on recruitment because of fewer recruitment habitats in unprotected or degraded reefs. Thus, marine reserves may be necessary but not sufficient for marine conservation (7).

Given our scientific uncertainty, managers should pursue other locally supported measures such as limiting fishing to specific sizes of fish, banning exports, or eliminating certain fishing methods. Our failure to effectively manage marine ecosystems may have less to do with gaps in our science than it does in get-

ting buy-in from stakeholders. A diverse and locally adapted management toolbox may be more effective than creating more no-take areas where compliance will be low (8).

ROBERT S. STENECK,^{1*} ROBERT K. COWEN,²
CLAIRE B. PARIS,² ASHWANTH SRINIVASAN³

¹School of Marine Sciences, Darling Marine Center, University of Maine, 193 Clarks Cove Road, Walpole, ME 04573, USA.

²Division of Marine Biology and Fisheries, ³Division of Meteorology and Physical Oceanography, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, FL, 33149, USA.

*To whom correspondence should be addressed. E-mail: steneck@maine.edu

References

1. A. Pérez-Ruzafa, M. González-Wangüemert, P. L'enfant, C. Marcos, J. A. García-Charton, *Biol. Conserv.* **129**, 244 (2006).
2. C. M. Roberts, J. A. Bohnsack, F. Gell, J. P. Hawkins, R. Goodridge, *Science* **294**, 1920 (2001).
3. G. R. Russ, B. Stockwell, A. C. Alcala, *Mar. Ecol. Prog. Ser.* **292**, 1 (2005).
4. G. R. Russ, A. C. Alcala, A. P. Maypa, *Mar. Ecol. Prog. Ser.* **264**, 15 (2003).
5. R. K. Cowen, G. Gawarkiewicz, J. Pineda, S. Thorrold, F. Werner, Report of a Workshop to Develop Science Recommendations for the National Science Foundation (National Science Foundation, Arlington, VA, 2003).
6. P. F. Sale *et al.*, *Trends Ecol. Evol.* **20**, 74 (2005).
7. G. Allison, J. Lubchenco, M. H. Carr, *Ecol. Applic.* **8**, 579 (1998).
8. S. C. Jameson, M. H. Tupper, J. M. Ridley, *Mar. Pollut. Bull.* **44**, 117 (2002).

TECHNICAL COMMENT ABSTRACTS

COMMENT ON "On the Regulation of Populations of Mammals, Birds, Fish, and Insects" IV

Elizabeth Peacock and David L. Garshelis

Sibly *et al.*'s (Reports, 22 July 2005, p. 607) contention that density dependence acts strongly on low-density animal populations irrespective of body size contradicts many long-term studies of large mammals. Their findings were distorted by harvest records, which may poorly reflect population trend. Omitting unreliable data, their massive data set is reduced to only one case for large mammals.

Full text at www.sciencemag.org/cgi/content/full/313/5783/45a

RESPONSE TO COMMENT ON "On the Regulation of Populations of Mammals, Birds, Fish, and Insects"

Richard M. Sibly, Daniel Barker,
Michael C. Denham, Jim Hone, Mark Pagel

Our conclusions are unaffected by removal of the time series identified by Peacock and Garshelis as harvest data. The relationship between a population's growth rate and its size is generally concave in mammals, irrespective of their body sizes. However, our data set includes quality data for only five mammals larger than 20 kilograms, so strong conclusions cannot be made about these animals.

Full text at www.sciencemag.org/cgi/content/full/313/5783/45b