LETTERS

This intermittent stream in Colorado would benefit from EPA protection for temporary waterways.

Edited by **Jennifer Sills**

Protecting U.S. temporary waterways

Protecting the ecological health of rivers relies on maintaining intact flows from source areas to downstream navigable waters (*1*). Yet the U.S. Environmental Protection Agency (EPA) intends to rescind legal protection of tributary rivers, streams, and wetlands that do not have year-round flows (temporary waterways) and whose surface waters contribute flow to permanent navigable waters (*2*). This decision would severely damage the condition and uses of many U.S. waters, both temporary and navigable.

Temporary waterways provide many ecosystem services, including water provision and purification, that contribute substantially to securing water quantity and quality (*3*–*5*). Fifty-eight percent of all waterways that provide drinking water to the continental United States are temporary or headwater streams, which support more than one-third of the United States's population (*6*). Furthermore, temporary waterways harbor important biodiversity (*5*) and imperiled species (*7*) and underpin global carbon and nutrient cycles (*8*). Even when dry, they provide ecosystem services such as providing groundwater, attenuating toxicants, buffering floods, and providing habitat for unique biodiversity (*5, 9*).

A comprehensive scientific review (*10*) of all the services provided by temporary waterways led to the decision in 2015 to recodify the definition of "waters of the United States" to include temporary waters hydrologically connected to navigable waters. This provided protection to many temporary waterways under the U.S. Clean Water Act and was hailed as a wise, well-informed decision (*4*). However, the recodification has not yet been implemented because the legal process is incomplete, and now reversal of the decision is expected (*2*).

We urge the EPA to uphold its 2015 decision and to ratify the legal status and protection of temporary waterways. This would provide U.S. temporary waterways with a level of protection similar to that in other countries, such as Australia (*5*). Failure to do so sets a poor global precedent and, more importantly, risks costly (*11*) and potentially irreversible harm to the ecosystem services supported by temporary waterways in the United States, including the provision of secure potable water.

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12. To view or to add to a list of signatories in support of this letter see: https://docs.google.com/document/d/1AS5ew4S3CI3C-5TECAmNgi4cu8O48BY4WI1AqqIKpog/edit?usp=sharing.

10.1126/science.aav0839

Privacy and genetic genealogy data

Law enforcement use of genetic genealogy has recently led to identifications of missing persons and suspected criminals (*1*). These successes have prompted discussions about the genetic privacy of individuals whose DNA data are used in these investigations, particularly with regard to control over the usage of one's data and the sensitivity of the information that is obtained ["Genealogy databases and the future of criminal investigation," N. Ram *et al.*, Policy Forum, 8 June, p. 1078, and (*2*, *3*)]. As policies for law enforcement use of genetic genealogy are contemplated, several factors that mitigate the threat to privacy should be considered.

First, only data voluntarily uploaded and explicitly made public are searched. Direct-to-consumer DNA testing companies, from which most data arise, do not voluntarily participate in law enforcement investigations. Although it is possible for investigators to compel such companies to disclose user information, neither Ancestry.com nor 23andMe has turned over genetic information to law enforcement (*4*, *5*), and forensic genetic genealogy has not involved acquiring data in this way. Instead, investigations have relied on data that individuals have chosen to download from a testing company's database and upload to GEDmatch, a public genealogy database. GEDmatch is open to anyone, including law enforcement, who wants to check the database for indications of kinship with DNA data in their possession (including data from crime-scene or victim samples). Before allowing a new or existing user to access the site, GEDmatch prominently displays the full text of the Terms of Service and Privacy Policy, which advises individuals that GEDmatch can be used "by third parties such as law enforcement agencies to identify the perpetrator of a crime, or to identify remains" (*6*).

Because no one is legally required to contribute to a genetic genealogy database, and because the samples are not in the possession of government agencies, these searches are substantially different from familial searching of law enforcement databases (*7*). Jurisdictions that prevent or limit familial searching of those databases (*8*–*12*) should not automatically adopt identical restrictions on genetic genealogy investigations of publicly available databases.

Another factor that lessens privacy concerns is that raw genetic data are not disclosed to law enforcement. Raw data contain highly personal and health-related information. Search results display only the length and chromosomal location of shared DNA blocks, which are used to determine approximate kinship relationships between individuals. The raw data cannot be accessed; only the possible genetic kinship among individuals is shown. Customer relations create an incentive for testing companies and GEDmatch to maintain current policies of not releasing raw data without consent.

Finally, genetic genealogy is for lead generation, not conviction. Genetic genealogy leads are tested by direct DNA matching to samples from persons of interest using standard forensic identification loci; only matches obtained with these well-established methods will result in continued investigation.

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COMPETING INTERESTS

E.M.G., C.M., and S.L.A. are employees of Parabon NanoLabs, Inc., which provides genetic genealogy services to law enforcement.

10.1126/science.aav0330

Chile's salmon escape demands action

After heavy winds and stormy conditions, about 650,000 salmon recently escaped from a net-pen aquaculture facility in southern Chile (*1*). This unintentional influx of salmon, a potentially invasive species in Chile (*2*), is just the latest of many escapes of farmed salmon and trout (*3*). The escape of these non-native species highlights the risk that such aquaculture facilities pose to native ecosystems (*3*, *4*).

Chile's US$4.6 billion aquaculture industry has positioned the country as a global provider of salmon and trout food products (*5*), and government institutions have contributed to this success (*6*). However, the Ministry of Environment, Superintendency of Environment, and National Fisheries Service, which are responsible for safeguarding biodiversity and fishery resources against potentially invasive species, have failed to coordinate with the aquaculture industry to provide the necessary short- and long-term monitoring of the escaped salmon (*7*).

To balance industry development with protection of native ecosystems and species, Chile must initiate new measures and invest critical institutional funding. The government should begin by passing legislation requiring industry to limit escapes and develop enhanced biosecurity technology to prevent them [e.g., (*8*)]. Chile should also allow catch and commercialization of escapees by local fishers and provide testing for antibiotics to determine whether the catch is suitable for human consumption. Finally, to mitigate the impacts of salmon aquaculture, Chile should implement ecosystem approaches recognizing that aquaculture affects other stakeholders and multiple ecological goods and services (*9*). Chile's public is largely resistant to salmon farming because of the environmental risks (*10*), whereas the government and industry focus instead on the opportunities aquaculture provides for jobs and development. All sides need to come together if there is to be a future for salmon aquaculture in the region.

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ACKNOWLEDGMENTS

Funding to Núcleo Milenio INVASAL was provided by Iniciativa Científica Milenio from Chile's Ministerio de Economía, Fomento & Turismo.

10.1126/science.aau7973

TECHNICAL COMMENT ABSTRACTS

Comment on "Innovative scattering analysis shows that hydrophobic disordered proteins are expanded in water"

Robert B. Best, Wenwei Zheng, Alessandro Borgia, Karin Buholzer, Madeleine B. Borgia, Hagen Hofmann, Andrea Soranno, Daniel Nettels, Klaus Gast, Alexander Grishaev, Benjamin Schuler

Riback *et al.* (Reports, 13 October 2017, p. 238) used small-angle x-ray scattering (SAXS) experiments to infer a degree of compaction for unfolded proteins in water versus chemical denaturant that is highly consistent with the results from Förster resonance energy transfer (FRET) experiments. There is thus no "contradiction" between the two methods, nor evidence to support their claim that commonly used FRET fluorophores cause protein compaction.

Full text: dx.doi.org/10.1126/science.aar7101

Response to Comment on "Innovative scattering analysis shows that hydrophobic disordered proteins are expanded in water"

Joshua A. Riback, Micayla A. Bowman, Adam Zmyslowski, Catherine R. Knoverek, John Jumper, Emily B. Kaye, Karl F. Freed, Patricia L. Clark, Tobin R. Sosnick

Best *et al.* claim that we provide no convincing basis to assert that a discrepancy remains between FRET and SAXS results on the dimensions of disordered proteins under physiological conditions. We maintain that a clear discrepancy is apparent in our and other recent publications, including results shown in the Best *et al*. comment. A plausible origin is fluorophore interactions in FRET experiments.

Full text: dx.doi.org/10.1126/science.aar7949

Comment on "Innovative scattering analysis shows that hydrophobic disordered proteins are expanded in water"

Gustavo Fuertes, Niccolo Banterle, Kiersten M. Ruff, Aritra Chowdhury, Rohit V. Pappu, Dmitri I. Svergun, Edward A. Lemke

Editors at *Science* requested our input on the above discussion (comment by Best *et al.* and response by Riback *et al*.) because both sets of authors use our data from Fuertes *et al.* (2017) to support their arguments. The topic of discussion pertains to the discrepant inferences drawn from SAXS versus FRET measurements regarding the dimensions of intrinsically disordered proteins (IDPs) in aqueous solvents. Using SAXS measurements on labeled and unlabeled proteins, we ruled out the labels used for FRET measurements as the cause of discrepant inferences between the two methods. Instead, we propose that FRET and SAXS provide complementary readouts because of a decoupling of size and shape fluctuations that is intrinsic to finite-sized, heteropolymeric IDPs. Accounting for this decoupling resolves the discrepant inferences between the two methods, thus making a case for the utility of both methods.

Full text: dx.doi.org/10.1126/science.aau8230

Editor's Note: To expedite publication, we have decided to post some Technical Comments before their responses, which will run in a later issue.

Comment on "Unexpected reversal of C_3 versus C_4 grass response to elevated CO_2 during a 20-year field experiment"

Ming Nie, Junyu Zou, Xiao Xu, Chao Liang, Changming Fang, Bo Li

Reich *et al.* (Reports, 20 April 2018, p. 317) reported that elevated carbon dioxide (eCO_2) switched its effect from promoting C_3 grasses to favoring C_4 grasses in a long-term experiment. We argue that the authors did not appropriately elucidate the interannual climate variation as a potential mechanism for the reversal of C_4-C_3 biomass in response to eCO_2.

Full text: dx.doi.org/10.1126/science.aau3016

Protecting U.S. temporary waterways

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Science **361** (6405), 856-857.
DOI: 10.1126/science.aav0839