From: **Connie Barlow** conniebarlow52@gmail.com
Subject: Torreya taxifolia case study shows cheap way to de-list plants
Date: September 7, 2018 at 3:45 PM
To: Leah.Gerber@asu.edu
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CB

Leah -

It was thrilling to come upon your PNAS 2016 paper today ("Conservation Triage") and thereby learn you are helping USF&WS improve how it allocates limited taxpayer funding for endangered species. (I learned of that paper by reading the 7 Sept 2018 feature in Science journal "Should It Be Save?", by Warren Cornwall.)

I am founder of Torreya Guardians and coauthor with U AZ Pleistocene ecologist Paul S Martin of 2004 advocacy paper, "Bring Torreya taxifolia North Now!"

I see in your 2016 paper that T. taxifolia is "underfunded." Necessarily, in a broad data-base analysis, that would seem the conclusion. However, knowing how this endangered subcanopy tree has actually been managed through the years, leads me to disagree.

RECOMMENDATION: Look closely at Torreya taxifolia as a case study, as it may suggest a way to tremendously re-allocate funds away from some endangered plants such that recovery (and de-listing) is actually enhanced by diminished funding. Here is why:

SCIENCE FOUNDATION: The above recommendation stems from the likelihood that other endangered plants south of peak-glacial ice advance in the eastern states may, as with Florida Torreya, signal relict populations that (for a variety of reasons) were unable to track Holocene warming poleward. This is indisputably the case for Torreya taxifolia, and has been since science publications described it as such beginning in 1905 (also the 1984 Federal Register listing as endangered, the 1986 recovery plan, and the 2010 plan update).

POOR MANAGEMENT CHOICES, NOT INADEQUATE FUNDING: We Torreya Guardians used a loophole in the ESA (just for plants) to acquire seeds from horticultural specimens in North Carolina and begin assisted migration on our own in 2005, but with minimal seed numbers. The problem is that not until the 2010 recovery plan update was "assisted migration" northward even considered as a possible management strategy within the drafting of the official plan; however the "pilot project" offered by USF&WS staff was voted down by the science advisors + stakeholders, with only two of us Torreya Guardians in the mix voting yes.

POLICY RECOMMENDATION: **Farm out all "glacial relict" plants to The Nature Conservancy and other land trusts** expressly for citizen/landowner-led plantings in states northward of the historically known native range. Cease all USF&WS internal or external funding of "research science" for these plants. Instead, designate an appropriate amount of funds for nothing more than within-agency "management," with an emphasis on USF&WS communicating with citizen planters (via their land trusts) and encouraging documentation, evaluation, and sharing of results by the land trusts or other NGOs toward the **goal of identifying ideal latitudes and habitats** for species health and reproduction — while aiming to minimize the need for continued human interventions (hence, culminate in de-listing).

HOW TO IDENTIFY GLACIAL RELICTS:

1. NATIVE RANGE IS A KNOWN PEAK GLACIAL REFUGE: Any southeastern USA species or subspecies residing only within or near one of the premier "glacial refuges" at the downstream ends of the major rivers draining to the Gulf or Atlantic should automatically be deemed a glacial relict. The three major refuges are (Tunica Hills for Miss. River), Apalachicola (end-point of Chattahoochee River), and Altamaha River.

2. SOLUTION TO THE PALEOECOLOGICAL "REID'S PARADOX" suggests there may be many more small glacial refuges for eastern temperate plants, distant from the coasts of the Big Three. If a plant seems limited to a particular habitat type disjunct in geographically isolated locations, and if its seed is not wind-dispersed, then it may be a "left-behind" glacial relict.

3. DOCUMENT HORTICULTURAL SPECIMENS IN NORTHWARD HABITATS. Torreya Guardians is unique not only in engaging in the numerous "assisted migration" experimental plantings in 10 northward states (as we are trying to discern, too, the northward limits of species' thrival, anticipating ongoing climate change). We also **prioritize finding and image-documenting long-ago horticultural plantings** — especially those that produce seeds and where such seeds have produced seedlings and saplings with no human interventions. Such documentation offers a way to ensure (a) species thrival at that location and (b) species non-invasiveness. Conservation biologists who have published papers critical of "assisted migration" in the aggregate have pointed to (a) possible waste of money re failed outcomes and (b) possible invasiveness as the two main bases for their opposition. This point is so important that I recently posted a new page on the Torreya Guardians website to aggregate the **"historic grove" documentation of our species** (as far north as Pennysylvania for this "Florida" native!). Please take a quick look at it: http://www.torreyaguardians.org/historic-groves.html

HOW RESEARCH FUNDING CAN BECOME ANTI-CONSERVATION. In recent years, several initiatives by the implementing institutions have held back recovery of Torreya taxifolia: Research was conducted by Atlanta Botanical Garden to try to dry or cryopreserve T. taxifolia seeds for "preservation of genetic material" as as means to "prevent extinction." Torreya seeds are big and recalcitrant, however, leading to the discovery that "somatic embryogenesis" is the only way to "cryopreserve" genetics (just the embryos). Meanwhile, prolific seed production at one of the two ex-situ plantings in northernmost Georgia (s. Appalachians) were left uncounted and allowed to "go to the squirrels" (while we were denied access to the seeds). I filed a **Freedom of Information Act** request this year, which formally confirmed that **ex-situ seed production was uncounted and therefore presumably unvalued**

request this year, which formally confirmed that **ex situ seed production was uncounted and therefore presumably unvalued**. Communications I have had with officials confirm that species "recovery" is viewed as not possible at this time because (a) money is insufficient and (b) (by implication) it is pointless to continue trying to return seeds or seedlings to their native Florida range until a **University of Florida forest pathology lab genetically engineers** (using CRISPR) fusarium-disease resistance into the Torreya genome. And there is no other range designated as the locale for recovery.

Meanwhile, **the efforts of Torreya Guardians in assisting this species is ignored by the implementing institutions**, but not by the press nor by academics publishing on methods (such as assisted migration) for climate adaptation of a great range of species, including common forest canopy trees. (I was contacted by a New York Times journalist early this morning.)

REQUEST: When you have a chance, please call me for a short phone call on this matter. Three upper-level people in USF&WS are aware of my criticism of the official management of Torreya taxifolia. Two have been very open to hearing my perspective. Do consider that our group's record of tremendous citizen enthusiasm for welcoming an endangered plant onto private lands could be a helpful antidote to the negative publicity that will surely arise re the Oct 1 U.S. Supreme Court proceeding on the Dusky Frog critical habitat case. In case you prefer to contact those two staff people first, I list them in the cc line above. I would like to file win-win suggestions by the Sept 24 deadline for ESA comments, and I would like to forge a degree of citizen-agency teamwork into the future, if possible. Hence, this email to you.

Do know that I fully support the importance of your work in advising pragmatic and effective management of endangered species in the USA. Please consider the successes and failures of 14 years of Torreya Guardians efforts as a crucial case to study within the parameters of your consultation for the U.S. Fish and Wildlife Service.

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