

March 31

Greg -

Good to have you aboard! I have added your basic info to the alphabetical list of participants, and will eventually send the updated list to all. List has been pretty quiet lately. Please feel free to contribute your thoughts, concerns, insights, questions. I'll be visiting with Dave Foreman in Albuquerque next week, whose book "Rewilding America" will be published later this year, and who was until recently the publisher of Wild Earth magazine. Should be interesting! I will report on it to the list.

For Torreya,
Connie

In a message dated 3/29/04 10:37:33 AM, gseamon@tnc.org writes:

<< Connie,

Thanks for the list of participants attached below. I would only like to add that I have been on the list since the beginning and was not included on your list. Just trying to not get lost in the shuffle. Thanks.

Greg Seamon

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April 2 from Peter Wharton

Dear Connie,

Firstly, thank you so much for including me in your *Torreya* Discussion Group - I am honoured indeed. I have been in the final throws of completing a book for publication, so I have not been in a state to respond to some of the many fascinating comments of others on the panel. I shall read all of them in the near future and respond. I shall have to read Hazel Delcourt's book and other literature cited in these messages. I have also much preoccupied and exhilarated recently by the work of Dr. Alan Rabinowitz, Director of the Wildlife Conservation Society, based at the Bronx Zoo. His work has led to the establishment of a number of huge conservation areas in northern Burma. The Northern Triangle Forests are famous for their fauna (tigers, elephants, rhinos) and perhaps the richest temperate forests still extant in the world. The proximity of north to south highlands allowing 'sustaining lines of retreat and advance' in Southeast Asia is pivotal of course to understanding the floral dynamics of this region during the Pleistocene. Again, this is a vital paleo-issue with *Torreya* in eastern North America. It appears increasingly obvious to me (and others in the group!), from scanning the group's discussions so far, that the '*Torreya* question' is a door to immense issues relating to how we facilitate global 'floraforming' of vegetational zones in a warming world. It is another layer of responsibility for those of us who have a passion for forests and naturally wish to promote the ecologically sensitive reforestation of so many degraded forest ecosystems worldwide. Finally, I would question that the onset of Pleistocene glaciations is always gradual - I am sure I have read the view that the onset of glaciations can be as rapid as within a 100 years. Can we substantiate this? Perhaps you are in touch with top notch paleoclimatologists that could answer this question. This is also a vital issue to me, as you can imagine, in my studies of the southern Chinese/northern Vietnam Pleistocene paleo-environment. Anyway I defer further comments until I have read through all the correspondence. Terrific stuff.

Many, many thanks -

Kind regards,

Peter

--

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April 5, 2004

John -

Sorry it has taken so long for me to respond. I've been blissfully off email for 9 days while travelling from TN to where we are now, south of Tucson, in Paul Martin's vacation home, with hummingbirds buzzing. Stopped by and visited with Dave Foreman in Albuquerque for a couple hours. He confirmed my sense that rewilding folk thus far are mostly animal-trained or centric. The plant people aren't much in it yet, but should be. He has no problem at all with rewilding *Torreyia*, and he gave a good additional reason: just in case civilization falls apart, it is important to have species thriving in a number of areas to ensure that they don't go down too. Certainly, relegating *Torreyia* to botanical gardens is not a good way to prepare for such a crash!

Later this week, I will send to all plus the listserve archive the latest round of communications I've been getting in. Great bio statement of yours! I look forward to including it in the updated list of whose who. I view your experience and outlook as a vital contribution to our community conversation, which is heavily weighted to academic and institutional.

In a message dated 4/5/04 3:43:24 PM, johnjEF@bledsoe.net writes:

<< Hi Connie,
the *Torreyia* talk is very exciting. how do i get on the listserve for more?

also, i have started Hazel's book and am about 3 chapters into it.

Carol Kimmons here at SVI was a little down on the idea of *Torreyia* replacing Hemlock. i still think it is a valuable rationale, tho i like Peter White's response that folks want to save it just because. i'm still into planting it here at SVI. since we know the land well enough, i think we could plant it in several different microhabitats and have a long term observation experiment going on. if we wanted to get real radical, we could guerilla plant it on up the gulf on the

industrial land adjacent to us. (by industrial i mean land that is used for timber, coal and surface rock extraction).

Hopefully the beetles will take care of the Hemlock Woolly Adelgid, but i think Torreya as a back up plan is good insurance for the creek ecosystems.

Also, i agree with you that the corridor concept is biased towards big critters. as with most things (conservation, diet choices, listing on the esa, etc...) plants get the short end. yet they are an important part of our lives. i just reread Eisley's essay on "How Flowers Changed the World". lets give the plants room to do their thing!

as for a bio, here is one: (its a little self depreciating 'cause i'm way outta my league here)

john johnson - john is a radical environmental activist with Katuah Earth First! in Southern Appalachia. After a few years of activism "from the brain", john has fallen deeply in love with the greater Southern Appalachian bioregion and is trying to learn as much about it as possible. john is Assistant Program Director and the wannabe Staff Naturalist at the Sequatchie Valley Institute at Moonshadow (www.svionline.org) where he lives on the side of the Cumberland Plateau at the mouth of Cartwright Gulf (aka Lane Cove on USGS "Daus" Quadrangle). In his desire to learn more about the ecology of Southern Appalachia, john has decided to rediscover science and go back to college and pursue a BS in Forestry with a minor in Botany at UT Knoxville. He will be relocating to Knoxville sometime in the latter half of '04, but will remain engaged in educational efforts at the Sequatchie Valley Institute and advocacy efforts with Katuah Earth First!. He doesn't capitalize his name because he doesn't believe in capitalism. john likes homebrew, anarchist social theory and wildflowers. He is a founder and on the Board of Directors of the Dogwood Alliance (www.dogwoodalliance.org), one of the South's

leading forest protection organizations. He has been published in the Earth First! Journal, Wild Mountain Times and Earth Matters. Currently john is also a part time laborer and has worked the last two summers as a research assistant with a Phd candidate at UNC Chapel Hill.

i look forward to more on this,
j- >>

April 8 FROM ROBBIN MORAN NYBG

Robbin -

Wonderful response, thanks! I very much look forward to your forthcoming Natural History book of ferns. My mail is forwarded from my sister's house:

c/o Koenigsberg
15206 263rd Ave. SE
Issaquah, WA 98027

And I will absolutely follow up with Kim Tripp. Thank you for the suggestion! I hope your time to the south was as biologically rich as you might have hoped! I'm enjoying world-class hummingbird watching at a home feeder where we are staying now on a writing retreat, south of Tucson AZ.

For Torrey,
Connie

In a message dated 4/8/04 10:16:45 AM, rmoran@nybg.org writes:

<< Dear Connie,

Please forgive me for such a tardy reply to your message. I was in Ecuador for five weeks and returned early March, then ten days later left for a one-week trip. So much piled up during the time I was away that I am still digging out from under it all. Your message was accidentally moved to my delete folder with a ton of junk mail, and it laid there unnoticed until

this morning.

Enough excuses. I appreciate your thinking of me in connection with this project, but I don't have the time it deserves to contribute to such an interesting endeavor. I wonder, however, whether NYBG's Director of Horticulture, Dr. Kim Tripp (ktripp@nybg.org) might be interested. Two reasons why I think she might be: First, she wrote a book about conifers and has put a lot of effort into improving the conifer collection here. Second, the conifer collection has been revamped and is set to open soon; I don't know the exact day (remember we visited it and there was a lot of construction going on?). You might write her with specifics about how NYBG could participate in the project and ask whether she would be interested in getting involved.

On another matter, my book, *A Natural History of Ferns*, will be published by Timber Press in September. It's not a field guide, but a book about what ferns are doing in nature, how they grow and reproduce, evolve and adapt, and their relationship to people. I'll mail you a copy when it comes out.

Best wishes,

Robbin

Robbin C. Moran >>

April 24, 2004 TO TORREYA FROM CONNIE

MEETINGS WITH PAUL MARTIN AND DAVE FOREMAN

Hello Torreya Group -

This is Connie Barlow. I apologize for my long absence from email. I will report here on meetings I had with Dave Foreman in Albuquerque and with Paul Martin in Tucson, while my husband and I were on the road in the southwest (right now we are in Colorado). In a separate email I will share the emails I have received from various parties participating in the Torreya conversation.

MEETING WITH DAVE FOREMAN in Albuquerque: Dave is the founding publisher of Wild Earth magazine and co-founder of the Wildlands Project. He is now associated with the "Rewilding Institute", along with Michael Soule and Brian Miller (zoologically based conservation biologists). Dave's book, "Rewilding North America" will be published by Island Press later this year. Previously I had forwarded Dave some key emails from our Torreya discussion.

(1) YES TO ASSISTED MIGRATION OF TORREYA. Dave was supportive of the the "assisted migration" idea for Torreya, and he added one new reason in support of it: Given the possibility that civilization may collapse, it is best to have as much biodiversity thriving in multiple spots in the wild as possible. Botanical gardens simply are no hedge against species extinctions in that circumstance. Also, "rewilding" connotes not just survival of species in captivity but thrival of species in the wild. It is restoration in a big way.

(2) SPECIAL NEEDS OF PLANTS IN CLIMATE CHANGE. Dave also understood how the wildlands corridor concept may be less than fully effective for plants in the years ahead if climate change is rapid. The wildlands corridors concept has been shaped with a strong emphasis on restoring viable populations and genetic exchange among carnivores as focal species vital for the ecological role they play in controlling populations of herbivores. Plants are beneficiaries of thriving populations of carnivores in this way, but plants have not been the focus per se. It is my understanding that the corridors concept was developed initially as a means to connect isolated populations of carnivores, especially once scientists

realized that existing islands of habitat were in many cases not large enough to prevent future extirpations of large carnivores in those areas. It is my understanding that the corridors concept was, in a way, "pre-adapted" for an important role to play in conservation during this time of global warming, especially given that North American mountain ranges trend north-south. But the fact that the animals have the capacity and the habitat connectivity to adjust fairly quickly to climate change does not ensure that plants will be able to do so, especially if key long-distance dispersers (e.g. passenger pigeons?) may be missing and thus may not be able to move plants across unfavorable elevational, soil, or aspect regimes.

MEETING WITH PAUL MARTIN: I met with Paul Martin and talked *Torreya* while we were staying at his weekend home outside of Tucson. Paul's book, "Overkill," a summary of his life work as a Pleistocene ecologist, will be published by Univ Calif Press in 2005.

(3) IS *TORREYA* POLLEN DISTINGUISHABLE? Paul's recollection from his palynology days is that one cannot distinguish *Juniperus* from *Cupressus*, and that one can't distinguish pollen among *Taxaceae*, *Cupressaceae*, and *Taxodiceae* (which is therefore categorized as "TCT" when encountered). If this is true, then would *Torreya* pollen simply have been counted as "TCT" and therefore not have been distinguished? HAZEL DELCOURT'S input is vital for this question.

QUESTION FOR NICHOLSON, SCHWARTZ, or others: It is often reported in *Torreya* articles and papers that the last fossil evidence of genus *Torreya* in eastern North America was 100 million years ago in North Carolina. Is that evidence a macrofossil (that is, not pollen)? In fact, are all fossil instances of *Torreya* that have been reported in the literature macrofossils?

(4) DID *TORREYA* SPREAD NORTHWARD DURING PREVIOUS INTERGLACIALS? If *Torreya* pollen is indistinguishable, then an absence of evidence would not imply an absence of *Torreya* in the southern Appalachians during previous interglacials. This is an important question, because if *Torreya* has in previous interglacials been able to expand its range beyond its full-glacial pocket

refuge(s), then something is different about this particular interglacial. What would that difference be? Paul reminded me that the the Sangamon interglacial (the one previous to the present one) was at least as warm, if not warmer, than now. So if *Torreya* die-off during the last 35 years in its pocket refuge is attributed to warming and bouts of drought beyond a threshold viability, such that commonplace fungi would impact it, then presumably *Torreya* would also have died off from the Apalachicola during the Sangamon, surviving somewhere to the north in more favorable microclimates.

(5) PLAUSIBILITY OF A HUMAN ROLE IN TORREYA'S ISOLATION: If the above flow of argument (beginning with pollen indistinguishability) holds, then it can be argued that the "something different" about this interglacial that has prevented *Torreya* from heading north is people.

(5a) HUMAN-CAUSED EXTIRPATIONS OF DISPERSERS. Local or regional extirpations of dispersers (squirrels and tortoises) by paleoIndians who could survive overhunting of small game simply because they could continue to survive on a diet of nuts would be a plausible cause. In my own book, I have cited a paper on the widespread extirpation of box turtles in historic times in eastern North America, attributed to Native American over-harvesting, and Paul is coauthor of a recent paper that finds strong evidence of local and regional overharvesting of game in the journals of the Lewis & Clark expedition.

(5b) HUMAN-CAUSED FIRE AS BARRIERS TO DISPERSAL. Paul also sees a very strong argument that unintentional and intentional increases in the fire as an ecological presence would have been correlated with paleo- as well as recent Indian occupation of the continent, and thus hindering the spread north of *Torreya* (and presumably Florida yew). I sense that this is a point in which Paul Martin and Hazel Delcourt may largely disagree. Yes? (P.S. to Hazel: I gave your page proofs of your forthcoming humans-and-fire book to Paul.)

ALL THE ABOVE ISSUES AND QUESTIONS ARE IMPORTANT FOR HOW A CASE IS MADE FOR ASSISTED MIGRATION OF TORREYA. But I get the sense that no matter what the cause(s) of *Torreya*'s imperilment today (and whether those can ever be satisfactorily known), most of us on this internet discussion would

be counted as favoring assisted migration to the southern Appalachians. Let's hear from Hazel Delcourt and Mark Schwartz and Rob Nicholson and Peter White and Paul Martin and others on the questions raised above. Once we have assembled all the core arguments on WHY Torreya is in trouble and WHERE it may or may not have been in the past, then we can all be more clear on WHAT SHOULD BE DONE.

WHAT SHOULD BE DONE has two aspects: (a) publishing papers and articles proposing assisted migration, and (b) ensuring that assisted migration happens.

(6) PUBLISHING PAPERS AND ARTICLES.

(6a) WILD EARTH. Josh Brown at Wild Earth magazine is expecting something(s) to come from this discussion for publication in their fall issue. Hazel Delcourt has a draft of a background document that can be used to provide a basic understanding of Torreya in time (though she/we may wish to amend it once we discuss the pollen distinguishability and fire issues raised by Paul Martin). Hazel has requested that her share in this joint endeavor be pretty much concluded by the beginning of May. Ideally for Wild Earth, we would have an edited version of Hazel's article for background, and then a PRO assisted migration advocacy piece with several coauthors (and perhaps, like a Supreme Court document, with short individual statements at the end for which the entire pro-group could not agree but which nonetheless need to be said. (There, for example, would be where Paul Martin and Hazel Delcourt might each post disparate views on the role of human-cause fire in Torreya's plight.) It would be helpful and fascinating to also have a CON assisted migration statement, to point up all arguments against. If nobody steps forward to take that on, then perhaps one or more of the authors of the pro-assisted migration statement might step forward to assemble a CAVEATS piece that could be appended to the main article. Else all those points could presumably be raised in the short individual statements that followed the PRO article. Does anyone wish to step forward as FIRST AUTHOR OF A PRO-PIECE? My personal preference (and I know Paul Martin's is too) is to be a co-author, as I would rather have PETER WHITE, MARK SCHWARTZ, OR ROB NICHOLSON take the lead, owing to their credibility on this issue in particular.

(6b) CONSERVATION BIOLOGY? A much longer and more thorough piece on assisted migration of *Torreya* should also be done for something like *Conservation Biology* journal. I would drop out at that point. But I would love to see it happen because assisted migration proposals are going to become very important in the next few decades I imagine, and I can't see any plant that would garner a more compelling and expeditious case than *T. tax.* I would hope that, even if Hazel drops out of the mix at that point, her argument that the the small beech population in the Apalachicola deserves attention be included, as she told me in conversation that the genotypes there might prove crucial in having a more warm-adapted beech available for rewilding far to the north as global warming happens. An interesting distinction might be made there: YES to ensuring that the beech genotypes in the Apalachicola do not wink out but perhaps NO to ensuring that the herbaceous *Croomia* genotypes don't wink out (*Croomia* is no longer sexually reproducing in the Apalachicola, but populations of the same species are doing just fine in the southern Appalachians).

(7) ENSURING THAT ASSISTED MIGRATION HAPPENS. I bet that even if we pretty much agree that assisted migration should happen for *T. tax.*, we are all over the map as to when and how it should take place. I would expect the botanical gardens (especially Atlanta Botanical Garden) that are propagating seeds born from clones of the actual plants still living in the Apalachicola in the late 1980s (thanks to Rob Nicholson's cloning work) would have to act conservatively in the use of their seed stock and would have to do some paperwork to be able to have those seeds or seedlings made available for planting in the "wild" in the southern Appalachians. But there already is a lot of seed simply becoming squirrel food, or squirrel-planted seedlings pulled or mowed at the Biltmore Gardens in Asheville. For years Bill Alexander at the Biltmore has been trying to induce more use of those seeds. And I understand *T. tax.* can be bought on the commercial market, too. Am I right, therefore, to conclude that, assuming the cooperation of Bill Alexander at the Biltmore, there is nothing to stop anyone from THIS FALL harvesting Biltmore seed and taking that seed to PRIVATE properties in the southern Appalachians or Cumberland Plateau and "rewilding" *Torreya* -- with or without scientific protocols for oversight and study?

Enough for now. I hope this stimulates discussion and that we can very soon move beyond discussion of the merits (and demerits) of assisted migration for Torreya and begin writing the papers and forming the implementation plan(s).

Together for Torreya,
Connie Barlow

April 22 from Peter Wharton

Dear Connie,

As promised I have responded to some of the messages that have been posted by your esteemed group. Thanks so much for the info. regarding the Frugivory 2005 Website / Dr. Ronda Green, Griffith University.

Here goes -

26.03.04 Peter White:

I concur with much of Peter's well reasoned discourse. We can with the noble intentions save species. As humans we have done this through out our history, generally for non-altruistic reasons. The 'saving' of *Torreya taxifolia* is a laudable goal and we should of course proceed with the actions that are in motion. If nothing else it will assist us to develop appropriate methods and protocols in assisting species on the brink, some of which will no doubt will be applicable when we address whole ecosystem challenges. As we all realize the environmental/climatic ground beneath us is shifting so rapidly, that I think a broader ecosystematic approach to extinction problems is warranted and should be a priority. The greatest obstacle here is of course the immense complexity of dealing with a host of dynamic interorganismal relationships. The conservation goal for a single taxa is fine, yet from the correspondence it is interesting to see how complex this single goal is turning out to be. We might in the end have to face the unpalatable fact that *Torreya taxifolia* was 'meant' to become extinct. I know I can be accused of being the bearer of evil tidings. Yet, I look at the extinction record of conifers in Asia, North America and Europe during the Pleistocene, and the unpalatable fact remains many conifers are on a long term track to extinction.

03.24.04 Paul Martin:

This is great stuff Paul. The more I think about the problems of climate

change and ensuing massive regional vegetational dislocations - the more vital interrelationships, between plant to plant, plant to animal etc. are key to maintaining biodiversity whether in a stable or unstable natural world. Single species studies must be integrated with a broader ecotypic approach.

On a general note - Connie's book has sparked my interest in dispersal syndromes. I am a complete neophyte in this field, yet my travels in China, viewing large tracks of diverse forests have made me think closely about the impact of Pleistocene climate change, the rise of man's influence on the biota and changing faunal dispersal systems.

The *Torreya* Group: 10 questions for discussion.

Really thought provoking stuff. As a 'west coaster' I really should not comment on issues and field knowledge I know little about, so I defer!

It should come as no surprise to anyone that your work with *Torreya* in a sense follows in the steps of those that rescued *Ginkgo biloba*! Take heart!

Kind regards,

Peter

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April 24 TORREYA TO KIM TRIPP NYBG, DIRECTOR OF HORTICULTURE

ktripp@nybg.org

Hello Kim Tripp -

This is Connie Barlow, author of "The Ghosts of Evolution: Nonsensical Fruit, Missing Partners, and Other Ecological Anachronisms." Robbin Moran suggested I contact you.

For about half a year, an expanding group of botanists, horticulturalists, conservation biologists, etc. have been discussing the merits (and practicalities of implementation) for "assisted migration" of *Torreya taxifolia* to appropriate habitats in the southern Appalachians / Cumberland Plateau. The idea is that *T. tax* has, for one reason or another, been unable to make the move northward from its "pocket refuge" on its own as the interglacial proceeds. I discussed this idea with Bill Alexander several years ago at the Biltmore Gardens in Asheville, as both he and I had been independently advocating it. When I had the opportunity to read Hazel Delcourt's book, "Forests in Peril: Tracking Deciduous Forests from Glacial Refuges into the Greenhouse World" I was remotivated to pursue the idea, first by contacting her. She is very interested in the idea. From there, an internet discussion has grown of people somewhat or whole-heartedly in favor of thinking/working towards testing or full-scale implementation of assisting *T. tax*'s re-entry into natural forest environments in habitats where climatic conditions are presumed to be more to its liking (than its current habitat along the Apalachicola of northern Florida).

This internet discussion is important not only for this particular species, but also as we all sense that *T. tax* would simply be the first of many such "assisted migrations" that would have to take place in conditions of rapid global climate change, especially given the impoverishment of dispersal agents in modern times and the island nature of many of the existing botanical preserves. People playing an active role in discussions include Hazel Delcourt, Paul Martin (Pleistocene ecologist, Univ Az), Peter White, Rob Nicholson (Smith College, who cloned *T. tax* branches and distributed to bot. gardens), Mark Schwartz

(author of many T. tax papers), Peter Wharton (curator Asia Garden UBC), a number of Nature Conservancy folks in northern Florida, Ron Determann & Carol Denhoff (doing the Torreya and Florida yew propagation at Atlantic Botanical Garden).

We are ultimately moving toward some subset of us (a) publishing something on this in the fall 2004 issue of Wild Earth journal and probably a much longer paper in Conservation Biology, and (b) various forms of implementation and testing.

We would welcome your input. If you would like to participate in this internet discussion, I will be happy to email you (in 2 separate attachments) the archive of correspondence we have had thus far.

Together for Torreya,
Connie

Early June 2004 –

Email response from MARK SCHWARTZ, then PETER WHITE, followed by the email from Connie that generated it, followed by the email from JOSH BROWN that generated Connie's email:

Connie, Peter, others;

I would be happy to write a contrarian piece. On balance, I am more opposed than supportive, to assisted migration in *Torreya taxifolia*. I think that there ought to be high standards set before conservationists embark on assisted migration. *Torreya taxifolia* is somewhat unusual in that I think that we have a long time (e.g., 50 years) to make sure that we meet these standards before a rash decision is made. In many other cases, we do not have such time, and I think that I would probably also fall out on the pro-biodiversity side as Peter puts it. Thus, I am not necessarily opposed to assisted migration. Nevertheless, I feel very strongly about the potential negative consequences of assisted migration in general and in this specific case. My views on this are, in no small part, a consequence of caring about biodiversity over conservation of historical artifacts. I would be happy to begin working on articulating those for later this summer. I am happy to have my views critiqued by this group and to put it into the context of *T. taxifolia*. I think that this species provides a good case study from which to argue the more general issues.

As an aside, I am not particularly troubled by the lack of recent historical evidence. The fossil record on *Torreya*, in general, is very poor. The pollen grain is thin-walled and lacks distinguishing characteristics (a trait shared by *Taxodium* and *Taxus* and a few other things). In addition, there are relatively fewer lakes in the Appalachian region and a sparser fossil record in general. Thus, it is hardly surprising that there is no fossil record from the last 100,000 years. There is no fossil pollen evidence of *Torreya* anywhere, to my knowledge, and that includes sites closest to its current distribution.

The macro-fossil evidence is older, but similarly sparse. Other *Torreya* species, I believe, also share a somewhat invisible recent history owing to having no pollen record to speak of. I think that it can be taken as a given that *Torreya* was, at some point, in the Appalachians.

Thus, a con article I would write would not focus on NO NATURAL PRECEDENCE nor NO ABILITY TO RESTORE THE PAST, but on: (1) Clear need - have we exhausted the potential to recover the species within its current distribution? (I don't think so.) and (2) Risk to the recipient community - we need to be very cautious about intentional introductions, as the whole of the US and the current problems with invasive species tells us. That said, I can readily imagine cases where these two concerns I describe are met and assisted migration would be warranted.

Mark

-----Original Message-----

From: Peter White [mailto:peter.white@unc.edu]

Sent: Sunday, June 13, 2004 12:08 PM

To: Cbtanager@aol.com

Cc: Schwartz, Mark; RNICHOLS@email.smith.edu; josh@wildlandsproject.org

Subject: Re: *Torreya* article(s) for Fall Wild Earth jrnI

I think that the pro and cons positions hide a range of rationales that ought to be explored in the article. By the way, the argument is both important and general--in NC we are currently wrestling with whether nurseries and the state DOT should be able to distribute rare plants, Johnny Appleseed like. Anyway, I come out at Pro-Biodiversity rather than Pro-Restoring the Natural.

Con:

NO NATURAL PRECEDENCE: It isn't natural, it was never there, there is no

naturalness to restore (what about extinct seed dispersers?).

NO ABILITY TO RESTORE THE PAST: Even if once there, the river has moved

on, you can't step into the same river twice. The new populations will be in a different climate with different friends and enemies than they once had.

THE ORIGINAL PATTERN REFLECTS INTERESTING EVOLUTIONARY PROCESSES:

Movement is erasing the original biogeographic pattern. Evolution is constrained by process that work in time and space. Local endemism and restricted distributions are one of the surprises and delights (building

a local uniqueness and sense of place) that nature produces. We want rare species to persist somewhere, but we don't want rare species to become common.

MOVEMENT INVOLVES RISK: Moving a species can lead to unexpected and sometimes negative outcomes. Species behave differently in different environments and coevolutionary contexts. A new species becomes dominant and excludes other species. This seems to happen mostly when you move things great distances and across huge barriers, so one might use distance of movement as a predictor of risk.

Pro:

RESTORING THE NATURAL: Assisted migration is based on historic precedence, naturalness, and restoration. Past activities of people are

implicated in the current distribution, so present activities of people can be used to remedy the situation.

BIODIVERSITY IS THE ISSUE, NATURALNESS IS A MOOT AND UNIMPORTANT POINT:

In a world of climate change, the larger the number of populations established the better and they ought to be in general, to the N (in the

N hemisphere) and at higher elevation than existing populations. In the

extreme this is ex situ conservation (tending the sp in gardens, which is already happening for *Torreya* in the NC mts) and at the other extreme, some of these populations persist naturally (but not

necessarily because they were once there and "ought" to succeed). One danger is that the introduced species has a negative effect on local ecosystems...these are somewhat unpredictable and in general might be thought to be correlated with distance moved. This is unlikely for *Torreya*, for instance, but in general the problem could be analyzed through risk assessment.

Peter

Cbtanager@aol.com wrote:

>Hello Mark Schwartz, Rob Nicholson, and Peter White:

>

>I recently got an email from Josh Brown at Wild Earth journal, which I have

>pasted in below. Josh would like to plan a "Forum" for the fall Corridors

>issue of Wild Earth, that has our *Torreya* considerations in it. He lists three

>ways to possibly go on this, below. What do you think? My druthers are these,

>but I am open to all suggestions too:

>

>I would like to see a much shorter OPENING ARTICLE that gives the background

>and natural history of *T. tax* in the context of the question of should

>assisted migration be undertaken, and if so how. For such an article, one crucial

>piece of information is still lacking, which Paul Martin brought to my

>attention: Hazel Delcourt conveys that there has been no fossil evidence of *T. tax*

>being in the Appalachians in previous interglacials. But Paul brought to my

>attention that the pollen of *T. tax* may be indistinguishable from *Taxodium* and some

>cypress and thus may have been impossible to separately detect. To my mind, I

>find this question central for background understanding.

>

>From what I recall, only Sharon Hermann outright opposes assisted migration

>for T. tax, and she has not written extensively justifying that position in any

>email. Overall, I don't think we can get a thorough oppositional piece, but

>I think we can get a lot of caveats attached to a positive piece. Thus my

>preference would be to have A VERY SHORT PRO-ASSISTED MIGRATION STATEMENT written

>that virtually everybody can sign on to, and then we have those that wish to

>submit their own focused elaborations that are either further support or voice

>concerns or caveats or lay out parameters under which it should be undertaken

>or that wish to expand and put this in the context of forest-wide assistance

>that might be needed in the face of global warming and isolated refuges, etc.

>

>I would be grateful if Mark, Ron, and Peter could reply to all. And if Josh

>Brown would send us all an email giving the time sequence for the issue's

>development that we would need to fit our contributions into. I have a solid 10

>days in mid-July set aside simply to do creative work, including T. tax.

>

>Your for T. tax,

>Connie Barlow

>

>Dear Connie,

>

>I hope this note finds you and Michael well and continuing with your
>extraordinary work telling the Great Story.

>

>I am writing to check-in about the evolution of the T. tax article(s)
for

>Wild Earth. We are starting to put together a more detailed table of
>contents for the fall issue and I hope that we can develop a Wild Earth
>Forum on the pros and cons of "assisted migration" for T. tax. Though
I

>haven't received any updates since late April, the terrific
conversation

>that you galvanized on-line about this question seemed like it would
>generate a good material for our "connectivity" theme issue.

>

>Some options:

>

>1. I just re-read the draft essay, "Is the current range of T. tax. its
true

>native range?" that Hazel Delcourt, you, and co-authors put together in
the

>spring. It is very interesting, and with some editing to trim a few of
the

>technical details and a few other tweaks--such as a new title and
slight

>shift in emphasis that makes a more direct focus on assisted migration
and

>connectivity-- this could run as a stand-alone piece in the fall theme
>section.

>

>2. Cut this essay down considerably to form a neutral introduction to
the

>plight of T. tax. and generate two contrasting advocacy pieces for and
>against assisted migration of the tree. In your email of 4/24/04 you
had
>mentioned being a co-author with hopes that Peter White, Mark Schwartz,
or
>Rob Nicholson would take the lead. Any updates on this idea? Do you
>recommend that I contact one of these guys directly? Who could write
the con
>article? Mark Schwartz? or has he fully come over to the pro camp?
>
>3. Generate a group of very short pieces that take a range of positions
and
>discuss several issues within the broader question about assisted
migration
>for T. tax. and plant translocation generally.
>
>I'll look forward to hearing from you soon and developing a more
detailed
>plan. This debate seems like a leading edge of conservation thinking
and it
>would be great for the readers of Wild Earth to be be part of it.
>
>warmly,
>Josh

JUNE 20

Hi Mark and Peter and Rob and Josh -

I am very happy to hear that Mark Schwartz and Peter White will be writing articles for Wild Earth. Excellent! I told Josh Brown, editor at Wild Earth, that henceforth he should communicate directly with Mark and Peter (and with Rob, if Rob decides he would like to participate too in some way). I will look forward to serving as a fast turn-around peer review, and also to make our *Torreya* list available to Josh as another way for a quick turnaround peer review. Josh may decide that he will want to expand the forum by listing salient comments from such a peer review, along with the main Forum pieces.

Mark - Thank you for the explanation of *Torreya* pollen identification problems. That answers for me a crucial question: although there is no evidence that *T. tax* made it north into the Appalachian Mountains during previous interglacials, a lack of evidence is in no way evidence of absence. And it is very useful that you will step forward and offer a "con" piece to the assisted migration question.

Peter - I understand your pro-biodiversity stance, as I share it. You mention, however, that you are NOT "Pro-Restoring the Natural." I believe that I am to some degree, though from a deep-time perspective that makes my baseline time for North America not pre-Columbian but pre-Holocene, and thus, of course, severely limits the places where such full-scale restoration attempts would actually take place. As I know that you have published from a deep-time perspective (on *Aralia spinosa* and American holly spininess, following Janzen & Martin 1982), I hope you will give some attention to the deep time aspect of *T. tax*'s plight -- that is, the possibility that the Apalachicola is native range (pocket refuge) for *T. tax* during a glacial, but not during a peak interglacial. If you don't want to go there, then I can always chime in with that possibility in a short commentary to follow your main piece. And Paul Martin probably will too. (He, for human-induced fire as a block to northward migration and me for loss of seed dispersers as possible contributor.) Again, I find it very interesting that *T. californica* and presumably all the Asian species of *Torreya* could easily travel altitudinally up as local climate warmed, whereas *T. tax* would have had to move latitudinally a great distance.

Peter - I have run into several folks in my travels in southern Appalachians and Cumberland Plateau who would happily serve as citizen naturalists in planting *T. tax* on their properties and studying success in different slope aspects, shade, moisture, soil, etc. As global warming continues, I can foresee the importance of citizen naturalists working with botanists -- providing free human services -- not just for studying what the ideal range might be for *T. tax* and other threatened/endangered plants now eking out a living on the edge of range tolerances, but also for serving as multiple biodiversity preserves to further hedge the consequences of

environmental disasters or disease in any one place. I think this is a mid-way solution to the problem of nurseries making seed of endangered plants widely available (as you mentioned in your email) v. a clamp-down in which only authorized scientists and horticulturalists would have access to them.

For Torreya,
Connie Barlow

June 19, 2004
Hi Connie,

A T. tax forum sounds great! Thanks ever so much for all your efforts on this. I'll get in touch with Mark and Peter directly (cc'ing you), to solicit these contrasting articles. I like your idea of an editor's intro.-- probably more extensive than our typical editor's note--that puts the discussion into a larger context about connectivity, gives credit to you, Brian Keel, H Delcourt, others. Perhaps we could use an abbreviated version of Hazel's article as part of the intro.?

Yes, getting the citizen scientist and love of species angles into the forum seems important. Let's see how their two pieces evolve.

Thanks again; I'll be in touch shortly.
best
Josh

> From: Cbtanager@aol.com
> Date: Wed, 16 Jun 2004 00:28:38 EDT
> To: josh@wildlandsproject.org
> Subject: Torreya responses from White and Schwartz
>
> Hi Josh -
>
> Hey, I think you/we have got a forum! Peter White is a Big Gun among
> botanists and Mark Schwartz is the most published expert on Torreya. Between
> the 2
> of them, I think you can probably get a great pair of articles, with prospects
> for others of us chiming in with short pieces on points that may have been
> missed, if you wish. I think it would be great if you wanted to use my
> Torreya

- > list to put out drafts of whatever Peter and Mark individually or collectively
- > come up with, as a kind of quick and dispersed informal peer review. And from
- > that, you might or might not want to add a "responses" section at the end.
- >
- > Hazel Delcourt put in some important work in that preliminary piece laying
- > out the background, but given the credentials of White and Shwartz, I suspect
- > they will want to do their own thing and they are way qualified to do it
- > (especially now that they are both fully into the deep time paradigm). I
- > don't think
- > Hazel will mind this turn of events, as she has been doing this same career
- > for more than 30 years and decisively ended it (by giving away her library!!!)
- > at the end of this school year, to concentrate on raising her teenage girls.
- > In fact, Hazel might be hard to track by email, and she and her husband were
- > really going back to the land beginning in June. She made it very clear to me
- > that any sort of further interaction on moving her initial draft into final
- > would have to happen by the end of May, which has come and gone.
- >
- > I am happy to step aside at this point, because if you can get Peter and Mark
- > to contribute, Wow!, they are both on the leading edge. Let's wait a few
- > days and see if Rob Nicholson chimes in, as he is the person who did the
- > on-the-ground work taking cuttings down in florida and propagating those for
- > botanical
- > gardens to keep the genotypes going.
- >
- > Off the top of my head, the only things I can think of that White and
- > Schwartz between them might not sufficiently cover are:
- >
- > 1. Making sure we credit a PhD student, Brian Keel, for the phrase "assisted
- > migration." He seems to be keen on wanting credit for it, and it will be easy
- > to do. He just gave a poster on it at a botanical garden conference, and
- > gave me the exact cite to use, so we can simply insert that as an editorial
- > note,
- > if neither White nor Shwartz wants to do it directly.
- >
- > 2. Emphasizing the importance of "citizen naturalists" in this endeavor. I
- > am one, for example, and I loved Torreya enough to get this conversation
- > going,
- > even though it is not my job. I also believe that given the time required
- > for plants to mature and the paucity of funding for so many worthy
- > biodiversity

> studies, and the pace of global warming, it will behoove scientists to
> encourage and work with citizen naturalists who would be happy to plant T. tax
> in
> their back 40, on north v. south-facing slopes, varying shade conditions, etc.
> and for them to qualitatively (as well as quantitatively) report on their
> results. For example, from looking at the trees in the Apalachicola and at
> those
> planted at the Biltmore, I could not sense whether they would be a north or
> south-facing slope affinity, and at what latitude and altitude. Yet, it is
> hugely
> clear that a very similar species ecologically, hemlock, is often found only
> on a north-facing or near-bottom part of a ravine.
>
> 3. Evidencing a love for the species. These guys are used to writing
> hardcore science, and that is great. But if you can find a way to have them
> show
> their heart in a final para or so, that would be ideal. I suspect that Peter
> White will prove to be a very engaging writer. Either way, I trust your
> editorial skills in having the Torreya section be a fabulous read, as well as
> stunningly great ideas.
>
> This is really exciting!!!! And the timing seems great for Wild Earth,
> once again, to be making a big contribution in Conservation Biology -- even if
> a
> thorough look at pros and cons just makes us all the more confused and less
> ready for decisive action. I would love to see you or Tom or whomever in the
> editorial introduction to the whole issue or in the editorial introduction to
> the Torreya piece set the Wildlands philosophy context for it, in laying out
> how the very same motives that drove the "corridors" concept for animals
> (especially large carnivores) may foster very different modes of
> implementation for
> rooted plants.
>
> Yours for T. tax,
> connie

TORREYA, from Josh July 21, 2004

Dear Mark Schwartz and Peter White,

I have followed the on-line discussions about *Torreya taxifolia* with great interest over the past few months. (Thanks to Connie Barlow's extraordinary efforts.) Now, if I understand Connie correctly, you have both kindly agreed to weigh in--through the pages of *Wild Earth*--on the debate over the "assisted migration" of this tree species.

This sounds like a very useful conversation to be sharing with our readers and an issue of growing importance within conservation. In particular, the debate seems like it will fit very well with the upcoming theme of the next issue of *Wild Earth*: connectivity.

A few considerations. Our readership is a mixture of academics, agency staff, activists, and interested general readers. Our editorial tone tries to meet this readership by being both informed and friendly; we steer a middle course between the technical journals and the popular magazines.

Also, if your pieces could explicitly address the theme, connectivity, that would be helpful. In particular, we are interested in the role (or lack of a role) that "corridors" and landscape connections play in plant conservation--and how this particular species and its plight illuminates these issues.

Here is the fine print:

1. We need to have our material in hand by mid-August; August 1 would be much better.
2. We will plan to run the two contrasting (though not necessarily diametrically opposed) pieces in our *Wild Earth* Forum department with an editor's introduction (probably drawing on the draft essay penned by Hazel Delcourt et al. We'll wait to write this until we see what you each write.)

3. Desired word count 1800-2400 words. Under 2000 is ideal.

I'll continue to think about drawing in other commentators (Connie, Paul Martin, others) as part of the forum, though space is particularly tight for this issue, so we may need to put follow-up comments into the next issue as letters-to-the-editor.

Let me know if this plan sound reasonable and any other comment or questions you might have. (e.g., I'd be happy to send some back issues with previous Wild Earth Forums marked for your review.) I'll look forward to working with you on developing a forum that explores the merits and problems with propagating T. tax in the wild outside of its current range.

warm regards,
Josh

JULY 6 to Torreya Group

Hello Torreya group!

This is Connie Barlow. Peter White and Mark Schwartz have agreed to write short pieces on Torreya for "Wild Earth" journal, for the corridors theme that will lead the Fall 2004 issue. As I understand, Peter's piece will be generally positive toward the kind of assisted migration this group has been discussing. Mark's piece will be cautionary. I am giving Josh Brown, the editor who solicited this work, the email addresses of the 20-plus people I have on my various Torreya lists, who have been participating in or listening in on the discussion that began last fall, when I first communicated with Hazel Delcourt. I understand that Josh will probably want to distribute the drafts of both contributions to all of us on these lists, in case any of us wish to contribute very brief responses, articulating any important pro or con arguments that Peter or Mark may have missed. (Josh will also likely be using parts of Hazel's original introduction on this issue.)

If any of you are fired up about wanting to ensure that you have a chance to make a response, please email Josh Brown now to let him know that you would like to participate in the review. Together for Torreya! Connie Barlow

I SENT THESE EMAILS TO JOSH BROWN ON JULY 6

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JULY 6 TORREYA FROM BRIAN KEEL

Brian -

I see you and I were both thinking of *Torreya* at the same time, so you know that Wild Earth will be publishing something on this this fall. Your questions below are excellent, and I have no answer to them. I suspect that of all the folks on the *Torreya* list, Peter White at Chapel Hill would be the most knowledgeable and best positioned for such speculation. I am cc-ing Josh Brown, editor of Wild Earth, on this. I am sure he will want to include you on the peer review for the 2 papers he has commissioned on this. And, yes, I would love to hear your response to the 10 questions whenever you have the time on that.

For *Torreya*!

Connie

In a message dated 7/5/04 4:26:45 PM, BGJKeel writes:

<< Hello Connie,

I am presently reading "The Ghosts of Evolution". Although I coined the term "assisted migration" in January 2002, and had been thinking about the concept of moving plants for the tracking of a changing climate for more than a year before then, it is quite obvious you were thinking of assisted migration when you wrote the book. To strengthen my case for the need of assisted migration and to acknowledge your thinking on the concept, I will reference your book in my paper on assisted migration. The paper, and a chapter of my dissertation, is the theoretical development of the concept of assisted migration and you will be referenced in both.

In "The Ghosts of Evolution" you mentioned that *Torreya* is not only in trouble in Florida but plantings on private property surrounding the Biltmore Estate have died of disease. Has it been shown that the same pathogens causing mortality in Florida are also the cause of mortality in North Carolina?

You mentioned in your message of June 2 that "the on-the-ground folks are ready to plant seeds in the s. Appal. next fall". Has migrating *Torreya* north of the Biltmore Estate been considered? If *Torreya* can withstand below freezing temperatures at the Biltmore Estate it might be possible to migrate *Torreya* considerably further north. Since it is suspected that not only plants but fungi are temperature limited, migrating *Torreya* north may move it beyond the northern range boundary of at least some of the pathogens causing mortality.

Although, for my dissertation, I am working with orchids, which have dust fine seeds and are at the opposite end of the seed size continuum from the anachronistic fruits, your book is giving me much "food for thought" (pun intended) about seed dispersal, seed dispersers, seed dispersal systems, seed predators and pulp thieves. This is important because although I plan to specialize in orchid conservation in a global changing environment, I will not hesitate to work as part of a team to try and prevent the extinction of any species, hence my interest in being a part of the *Torreya* Group.

I am finally getting a chance to look at the ten questions you sent to the *Torreya* Group and will send you my thoughts on some of them in the near future.

Brian >>