



# Center for Environmental Research at Hornsby Bend



## MISSION

### Urban Ecology and Sustainability

- Community
- Education
- Research

## PARTNERS

- Austin Water Utility
- University of Texas
- Texas A&M University

## RESEARCH AREAS

- Soil Ecology, Sewage Recycling and Reuse
- Hydrogeology of the Alluvial Aquifer
- Riparian Ecology and Restoration
- Avian Ecology



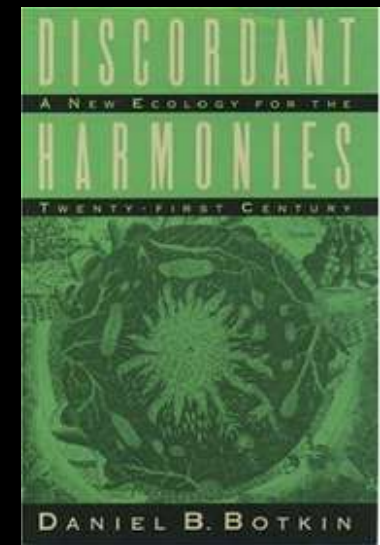
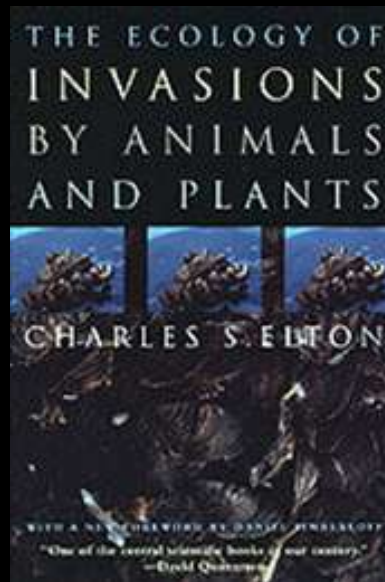
50 YEARS OF BIRDING



AUSTIN, TEXAS  
*Hornsby Bend*  
1959-2009

# The History of Natural History: Contemporary

Kevin M. Anderson  
Austin Water Center for Environmental Research



## 20<sup>th</sup> Century Natural History

Evolution and Genetics: - The Modern Synthesis

Biology, Ecology, and Natural History

Nature writing and Environmental writing



## The Rise and Fall of Biotic Nativeness: a Historical Perspective (2011)

Matthew K. Chew and Andrew L. Hamilton

Arizona State University School of Life Sciences

### NATIVENESS CODIFIED

As biogeographical studies accumulated and floras and faunas were documented, it became common practice to signify additions to existing lists with an Asterisk.

Asterisks identified doubtful botanical claims the way they now identify sports records achieved by 'performance enhanced' athletes.

Asterisks increasingly denoted suspicion of human dispersal, and were routinely applied to agricultural weeds and relict cultivars.

In 1835, Cambridge botany professor John Henslow proposed adding two more standard symbols: the degree ( ° ) denoting obviously introduced plants, and the dagger ( † ) for uncertain cases.

In 1847, Hewett (H.C.) Watson, dissatisfied with daggers and asterisks, published his intention of establishing ' the civil claims and local situation of [British plant] species in accordance with a scale of terms '. In an apparent first, he named his categories, producing an ad hoc botanical redefinition of native , alien, and three additional, fully codified categories of intermediate establishment and/or uncertainty:

'Native : Apparently an aboriginal British species; there being little or no reason for supposing it to have been introduced by human agency.

Denizen : At present maintaining its habitats, as if a native, without the aid of man, yet liable to some suspicion of having been originally introduced.

Colonist : A weed of cultivated land, or about houses, and seldom found except in places where the ground has been adapted for its production by the operations of man; with some tendency, however, to appear also on the shores, landslips, etc..

Alien : Now more or less established, but either presumed or certainly known to have been originally introduced from other countries.

Incognita : Reported as British, but requiring confirmation as such. Some ... through mistakes of the species ... others may have been really seen [as] temporary stragglers from gardens ... others cannot now be found in the localities published for them ... some of these may yet be found again. A few may have existed for a time, and become extinct.  
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## The Rise and Fall of Biotic Nativeness: a Historical Perspective (2011)

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Nativeness is an organizing principle of numerous scientific studies and findings, and the *sine qua non* invoked by many management policies, plans, and actions to justify intervening on prevailing ecosystem processes.

It is important to be clear about what these concepts mean.

Is nativeness conceptually defensible?

Does it accomplish any theoretical work?

In answering, we conclude that its categorical meaning and significance both dissolve under scrutiny.

Biotic nativeness is theoretically weak and internally inconsistent, allowing familiar human desires and expectations to be misconstrued as essential belonging relationships between biota, places and eras.

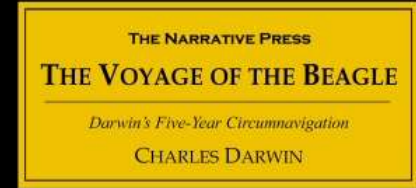
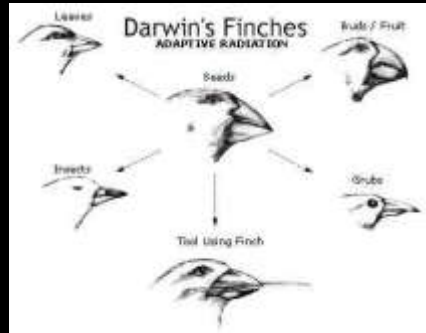
We believe much well-intended effort is wasted on research contrasting 'native' and 'alien' taxa, and by conservation projects focused primarily on preserving or restoring natives.

# Natural History and Evolution

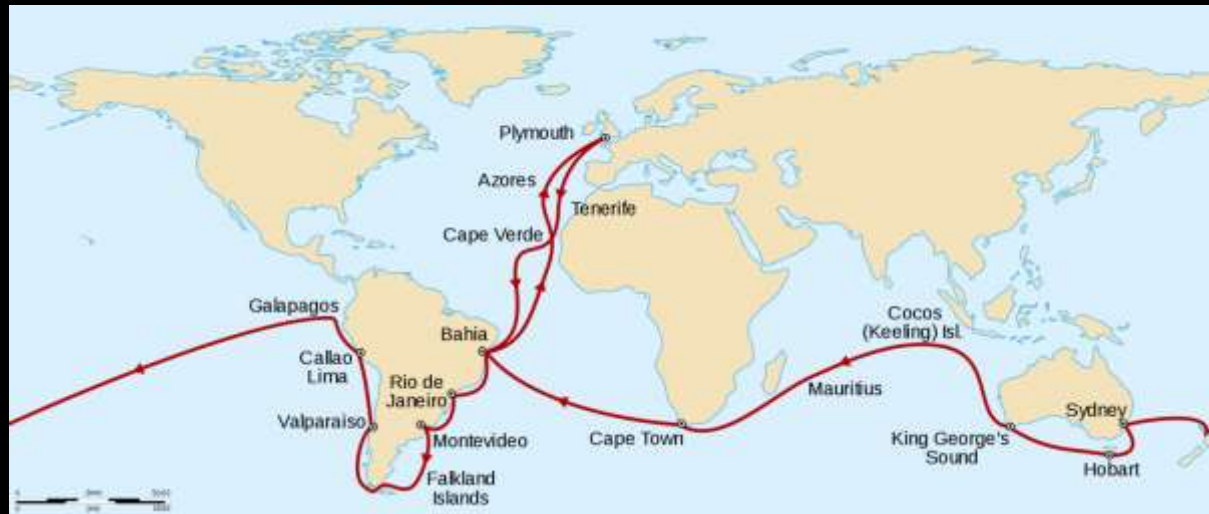
## Charles Darwin 1809-1882

He established that all species of life have descended over time from common ancestry, and proposed the scientific theory that this branching pattern of evolution resulted from a process that he called natural selection in *On the Origin of the Species* (1859).

## The Voyage of the Beagle 1831-36 – Galapagos ground finches

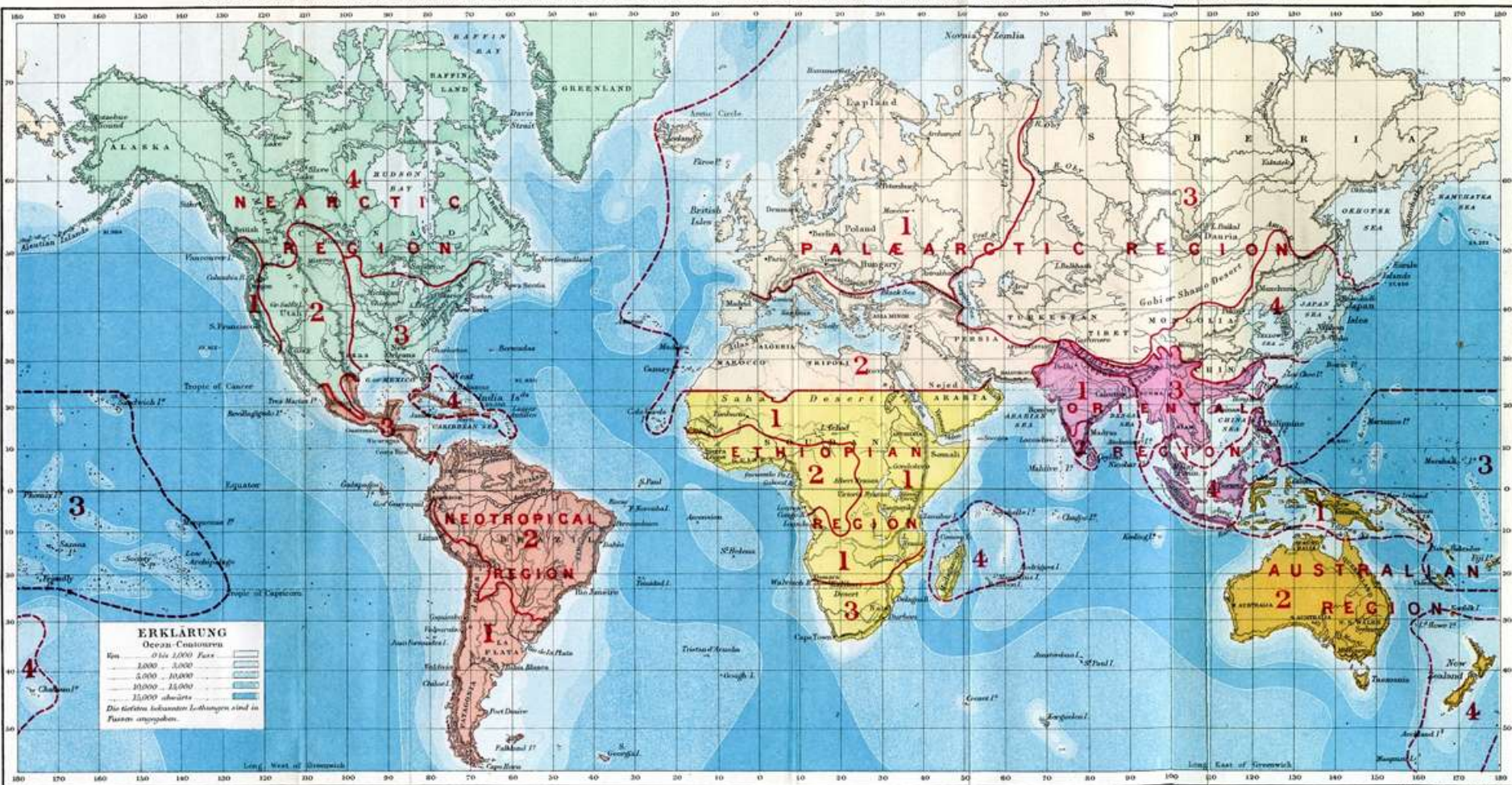


NUMBER 51 IN THE HISTORICAL ADVENTURE AND EXPLORATION SERIES



# The Geographical Distribution of Animals (1876)

DIE ERDE IN MERCATOR'S PROJECTION MIT DEN ZOOGEOGRAPHISCHEN REGIONEN UND DEN APPROXIMATIVEN SCHWANKUNGEN DES OCEAN-BETTES



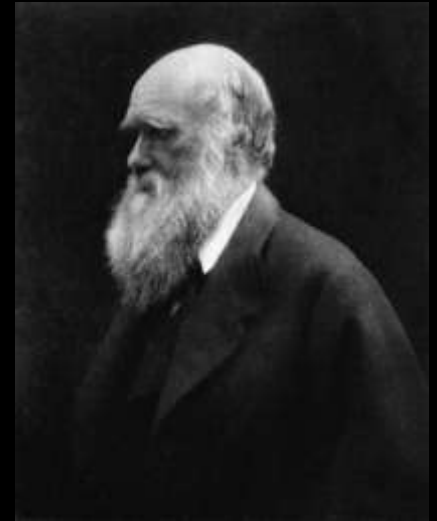


## Natural History to Biology - 19<sup>th</sup> Century Legacy

Evolutionary Biology - Natural Historians/Biologist studying populations

Physiological Biology - Anatomists/Physiologists studying structure and function

Development of Ecology – systems and populations

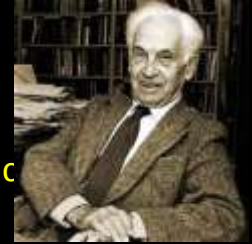


# Evolution and Genetics: The Modern Synthesis

## The genetics of population change

– speciation, evolutionary trends, systematic hierarchy can be explained in terms of genetic theory

Theodosius Dobzhansky, *Genetics and the Origin of the Species* (1937) natural selection and evolution  
- *Drosophila*



Ernst Mayr, *Systematics and the Origin of the Species* (1942) natural history perspective and geographic variation  
- ornithology  
- biological species “groups of actually or potentially interbreeding populations, which are reproductively isolated from other such groups”

Julian Huxley, *Evolution: The Modern Synthesis* (1942) natural history perspective

George Gaylord Simpson, *Tempo and Mode in Evolution* (1944) paleontology and fossil record

G. Ledyard Stebbins, *Variation and Evolution in Plants* (1950)

The unification of biology – Random mutation, recombination, and selection drives evolution

Natural History – describe the living world and discern its order

Modern Synthesis – explained the material basis of evolution and its mechanisms

Evolution – all biological knowledge [embodied in genes] is the result of a historical process



# Development of Ecology – Community Structure and Succession

Ecology – systems and populations

Energy and Economic Model – Ecological Efficiency

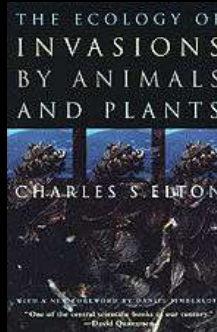
Frederic Clements (1874-1945), *The Development and Structure of Vegetation* (1904), *Plant Succession* (1916)

- Vegetation is dynamic
- Succession and climax stage
- Monoclimax – any region of Earth can have only one mature stage (competition)
- Assumes a natural state with no human interference – natural equilibrium



Charles Elton (1900-1991), *Animal Ecology* (1927), *The Pattern of Animal Communities* (1966)

- Community Structure – an economy of nature
- Food chain, food web
- Plants = producers, Animals = consumers (reducers, decomposers)
- Niche – the status or occupation of an organism in a community
- One species to one niche (competition)



# Development of Ecology – Community Structure and Succession

Ecology – systems and populations

Energy and Economic Model – Ecological Efficiency

Eugene Odum, *Fundamentals of Ecology* (1953)

- The law of organic nature is to bring order and harmony out of chaotic materials of existence
- Nature is a series of balanced ecosystems – the basic functional unit of ecology, and so a need for a unified theory of the ecosystem [a pond, a watershed, a meadow]
- A flow of energy leads to clearly defined trophic structure, biotic diversity, and material cycles within the system
- Rather than climax stage he used “mature ecosystem” – the ecosystem was often disturbed but fluctuated around a single homeostatic point – health = stability



Robert MacArthur and Edward O. Wilson, *The Theory of Island Biogeography* (1967)

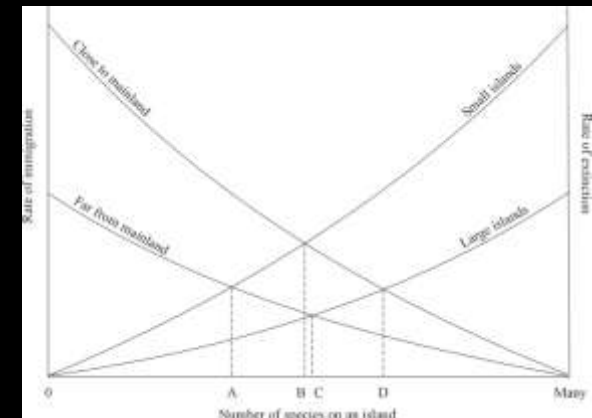
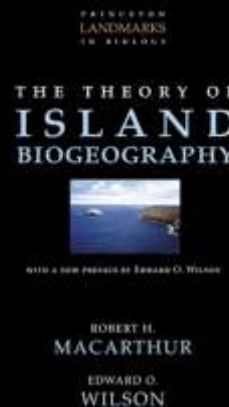
- An ecology that makes no testable predictions is not yet a science
- Mathematical modeling and islands
- The number of species represented on an island depends on size and location
- Number of species always reaches an equilibrium point – species diversity does not continue to develop indefinitely, new colonization must be matched by extinction – community structure focus rather than ecosystem



But is an ecosystem a reality or an abstraction?

Are ecosystems inherently stable?

How do the great disrupters Humans fit in?



## The “new ecology” post-Odum

A.G. Tansley, “The Use and Abuse of Vegetational Concepts and Terms” (1935)

*“It is obvious that modern civilized man upsets the “natural” ecosystems or “biotic communities” on a very large scale. But it would be difficult, not to say impossible, to draw a natural line between the activities of the human tribes which presumably fitted into and formed parts of “biotic communities” and the destructive human activities of the modern world. Is man part of “nature” or not?...Regarded as an exceptionally powerful biotic factor which increasingly upsets the equilibrium of preexisting ecosystems and eventually destroys them, at the same time forming new ones of very different nature, human activity finds its proper place in ecology”*

Anthropogenic climax communities

Robert May, *Stability and Complexity in Model Ecosystems* (1973)

- Mathematical models demonstrate that the more species there were, the more fragile was the system
- Chaos theory and complexity, “Confronted with disturbances beyond their normal experience” complex systems like rainforests tended to crumple.

Instability of biodiversity and invasion biology

Daniel Botkin, *Discordant Harmonies: A New Ecology for the Twenty-first Century* (1990)

- “Nature in the 21<sup>st</sup> Century will be a nature that we make”



The new ecology accents disequilibria, instability, and chaotic fluctuations in ecosystems both “natural” and human impacted



E.O. Wilson

Biodiversity and Natural History



Donald Worster

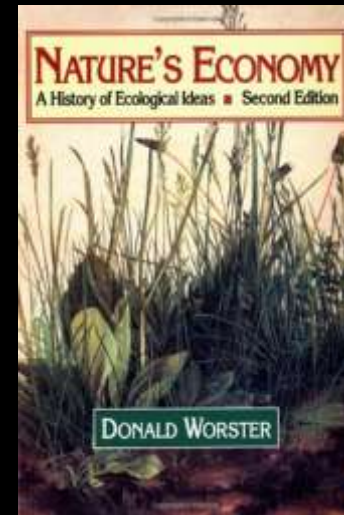
Ecological History and Culture



Stephen J. Gould

Natural History and Culture

**STEPHEN J. GOULD**

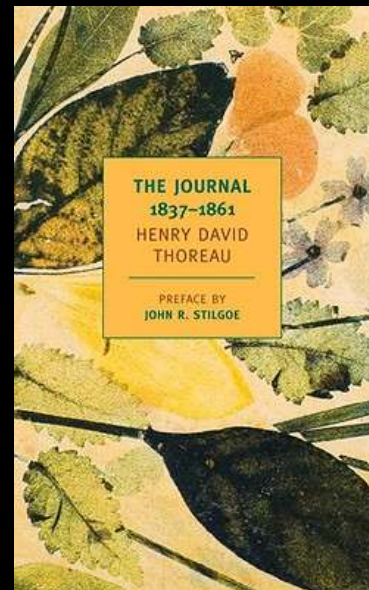
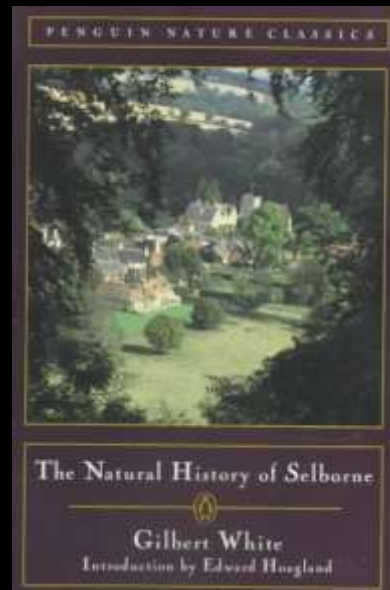


# Natural History and Literature

## The Literary Naturalists

### Gilbert White and Henry David Thoreau

"What impressed me, then and later, was Henry's knowledge of Natural History; a keen observer and great student of things, and a very pleasant talker. He reminded me more of Gilbert White of Selborne than any other character." Edward Waldo Emerson



# Natural History and Literature – Biologist Writers



Aldo Leopold

Wildlife Management

Sand County Almanac (1949)



Rachel Carson

Aquatic Biology and Oceanography

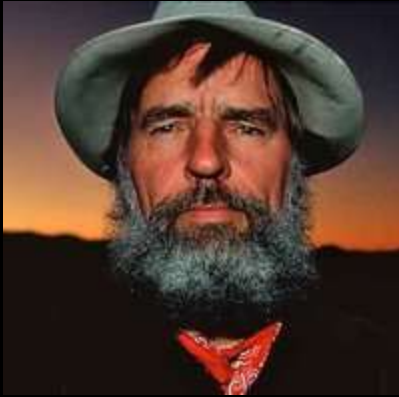
The Sea Around Us (1951)

The Edge of the Sea (1955)

Silent Spring (1962)



# Natural History and Literature

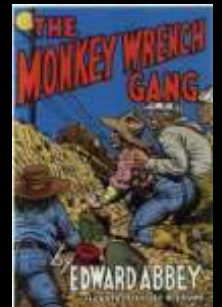
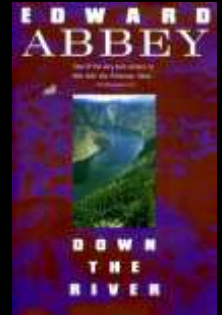
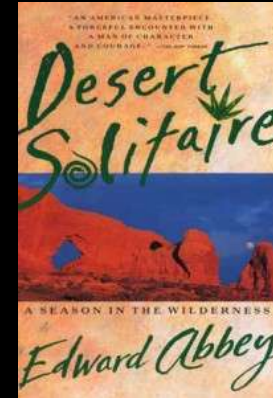


Edward Abbey (1928-1989)

Desert Solitaire: A Season in the Wilderness (1968)

The Monkey Wrench Gang (1975)

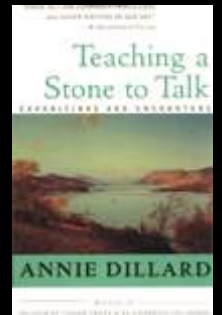
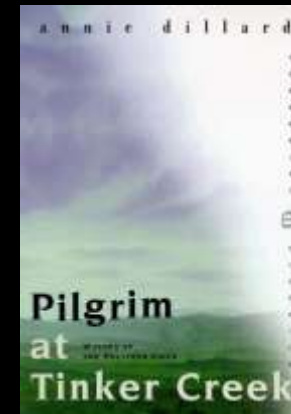
Down the River (1982)



Annie Dillard

Pilgrim at Tinker Creek (1974)

Teaching a Stone to Talk (1982)



## Natural History and Literature – Biologist Writers



Robert Michael Pyle – Lepodopterist

The Audubon Society Field Guide to North American Butterflies (1981)

Wintergreen: Listening to the Land's Heart (1987)

The Thunder Tree: Lessons from An Urban Wildland (1993)

Chasing Monarchs: A Migration with the Butterflies of Passage (1999)

Nabokov's Butterflies. Edited and annotated by Pyle and Brian Boyd (2000)

Walking the High Ridge: Life As Field Trip (2000)

Mariposa Road: The First Butterfly Big Year (2010)



Gary Paul Nabhan – Ethnobotanist

The Desert Smells Like Rain (1982)

Gathering the Desert (1985)

The Forgotten Pollinators (1996)

Cultures of Habitat (1997)

Where Our Food Comes From – Retracing Nikolay Vavilov's Quest to End Famine (2008)

# NATURAL HISTORY NETWORK

*Natural History*—exploring the stories of nature by attending to and representing the natural world. This practice, focused from the organism to the landscape, is the link between our species and the rest of the world. Promoting natural history is our mission and our passion.

JOIN US »

<http://naturalhistorynetwork.org/>

ABOUT  
WHAT WE DO  
GET INVOLVED  
JOURNAL

« *Get Story* by Emily Eng  
Emily M. Eng is a freelance artist and graduate from the Science Illustration Graduate Program at California State University, Monterey Bay. Prior to illustration, Emily worked across the country as a naturalist and outdoor educator. She also studied biology, environmental studies, studio art and religious studies as an undergrad. Emily's passion to make science accessible drives her illustrations today.  
[www.emilyeng.com](http://www.emilyeng.com)

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## Natural History Gatherings!!

We're excited to announce that, beginning this summer, we'll be coordinating a series of regional naturalist gatherings—great opportunities to connect with fellow naturalists and powerful landscapes. Save the dates: **Eastern Sierra Nevada/ Mono Lake/ Yosemite August 10-12 Lake Champlain, Vermont August 24-26** More details to follow soon!



### The Natural Histories Project

LISTEN TO CONVERSATIONS ON THE  
FUTURE OF NATURAL HISTORY

Featured conversation:  
**A predictive science**  
Gary Paul Nathan & Josh Tewksbury

### Journal of Natural History Education & Experience

Recent articles:

7. John Steinbeck's *The Log from the Sea of Cortez*  
Stephen C. Trumbull

6. Alexander Skutch's *A Naturalist on a Tropical Farm*  
John G.T. Anderson

Linked Through Story:  
Natural Science, Nature Writing, and Traditional Ecological Knowledge  
John Talmadge

Applause



# Questions?





# Center for Environmental Research at Hornsby Bend



## AWU-CER Lunchtime Lectures February – December 2012

Each talk begins AT NOON Waller Center [625 East 10th Street – between I-35 and Red River] Room 104  
The 1<sup>st</sup> Tuesday of the Month! Free and Open to the Public – bring a lunch and learn

### 2012 - A Year of Natural History: Origins, Practices, and Examples

**February 1** - The History of Natural History: Origins to 19<sup>th</sup> Century [Room 105]

**March 7** - The History of Natural History: 19<sup>th</sup> and 20<sup>th</sup> Century Science and Literature [Room 105]

**April 3** - The History of Natural History: Contemporary Natural History

**May 1** - The Natural History of the Americas: Discovery and Transformation

**June 5** - The Natural History of Texas: Biological Survey and Ecological Change

**July 3** - The Natural History of Austin: Biological Context and Urbanization

**August 7** - Urban Natural History: Life in the City

**September 4** - The Natural History of an Urban Creek: Waller Creek

**October 2** - The Natural History of an Urban Vacant Lot: Tannehill Urban Wild Woodland

**November 6** - The Natural History of an Urban Wasteland: Hornsby Bend

**December 4** - Natural and Unnatural History: The Path Forward