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The Journal's the Thing: Teaching Natural History and Nature Writing in Baja California Sur

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The skills of making informed observations, synthesizing those observations, and communicating them effectively are central to the naturalist. Developing university courses that optimize instruction in these skills simultaneously can, however, be a challenge. Here we describe a program at Santa Clara University comprised of two integrated co-requisite courses, Writing Natural History (ENVS 142) and The Natural History of Baja (BIOL/ENVS 144). Lectures through the 10-week winter quarter expand students' knowledge of the ecosystems and biodiversity of the Baja Peninsula and help them to develop descriptive writing skills. The courses culminate in a ten-day expedition to the Baja Peninsula and Isla Espiritu Santo in the Sea of Cortez, where students explore local ecosystems and journal about their experiences. The result is a program in which students expand their skills in natural history and develop their own voices as writers and natural historians. We describe the structure and philosophy of this program and provide details on associated lecture topics, logistics, exercises, and readings.

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A broad-based education must include opportunities for engagement with the natural world. A useful approach, especially for students in the natural/environmental sciences, can be made through foundational instruction on how to observe and how to record these observations effectively. Students often take courses that promote these skills individually, but the short timeframe of individual courses—be they in creative writing, technical writing, biology, or the earth sciences—sometimes limits the instructor's ability to focus on both.

As discussed by others (Gilligan 2009, Fleischner 2011), instruction in natural history, with its focus on observation, understanding of place, and effective communication about these observations, is an excellent way to develop these key skills in an integrated fashion.

Here we discuss a pair of upper-division courses taught at Santa Clara University in California. The two courses, Writing Natural History and The Natural History of Baja, are taught collaboratively; students are required to register for both concurrently and to take part in all activities of both courses. Lecture periods in both courses take place each week during the 10-week winter quarter, with students reading key works on the natural history of the Baja Peninsula, drawn from a variety of sources and eras, as well as reading peer-reviewed scientific literature on ecological research in Baja (Appendix 1). Students complete a number of writing exercises throughout the quarter, honing their skills in descriptive writing while drawing inspiration from the works reviewed. The courses culminate in a ten-day sea kayak expedition in the Sea of Cortez, during which the students must complete daily writing assignments for both classes.

One of us (JSF) has been involved with this program for six years, teaching the writing course and directing the overall program. The other (CDB) has been involved in natural history instruction in other courses, but has twice served as the expedition's naturalist and has taught the Baja natural history course once. While we come from somewhat divergent disciplinary backgrounds—one of us having studied the environmental humanities, the other having been trained as an evolutionary ecologist—we share interests in natural history and writing.

We feel that the program takes its uniqueness from its interdisciplinary approach, and we attempt here to provide insights about this approach for those interested in developing natural history programs that cross disciplines.

Developing Powers of Observation

Within higher education, writing instruction tends to focus on analytical writing and argumentation. As was pointed out by Smit in *The End of Composition Studies* (2004), "the most common rationale for introductory writing courses in colleges and universities is that they prepare students to read and write academic discourse" (p. 147). Students feel most comfortable writing persuasive essays and usually take multiple courses that highlight critical thinking skills. The downside of this emphasis, however, is that at collegiate levels descriptive writing is largely ignored with the exception, perhaps, of creative writing courses.

For the naturalist, the ability to describe an organism, a behavior, or the environment itself is a requisite skill. Adeptness in description links directly to the ability to observe, and we find this prerequisite lacking among some of our students when they enter the program. An entire class, for example, may observe a shorebird through binoculars for the better part of a minute, after which time not a single student is able to correctly describe the color of the bird's feet.

Likewise, in the classroom at the beginning of the course, we ask students to describe a pattern of simple geometric shapes to a classmate in such a way that the listener can replicate the pattern without seeing it, and the students are often unable to complete the exercise successfully.

We attempt to remedy weaknesses in the observing/describing process by presenting students with two short writing exercises in each class. For example, on a windy day we might take the class outside and direct them to describe a landscape entirely from auditory cues. While on the surface this may seem like an overly simplistic task for collegiate juniors and seniors, we celebrate how often we hear such feedback as, "I never realized that different types of trees make different sounds in the wind."

During the field portion of the program, the observing/describing process is complicated by the additional task of interpretation, especially in the form of species identification. We ask for more than species lists, prompting the students to make observations about behaviors and the habitats in which they discover organisms. At the same time, students are assigned daily writing prompts for each course, with the expectation that they write for at least two hours per day.

We maintain flexibility about the field writing prompts to accommodate the serendipities of the field experience. For example, if while kayaking our path intersects that of a pod of bottlenose dolphins, the students are probably going to write about dolphins that evening even if a writing prompt urges them to attend to observations made during a subsequent activity on marine benthic ecology. There are days when echinoderms don't get to be the stars.

We have a specific learning outcome we attempt to achieve by the end of the program, as well as a way of assessing whether we have accomplished our goal. On our final day in Baja, students are instructed to describe the intertidal zone of the last beach on which we camp in such a way that, were they to return ten years hence, they could refer to their field notes to determine whether local ecosystems were healthier than they had been during this first visit.

From the "History" of Natural History to Application

The ongoing history of exploring the Baja Peninsula unfolds as a story. We are not the first expedition of naturalists ever to visit Baja; that we can learn from the literary natural histories of those who have gone before us becomes our pedagogical starting point. By reading through these chronicles from the older to the newer, we develop a sense of historical ecology, highlighting the landscape as a place where human culture interacts with the non-human environment.

Student naturalists quickly discern that the Baja encountered by naturalists in the remote past is not precisely the same place to which they will be traveling. Where William Beebe, writing in 1938, describes "the superabundance of life in these waters" (p. 125), we will likely discover evidence of overfishing. Much of the content of literary natural histories is timeless, however. For example, when John Steinbeck and Ed Ricketts wrote in 1941, "It is advisable to look from the tide pool to the stars and then back to the tide pool again" (p. 217), their message is timeless.

We find it profitable early in the program to discuss the question, "What is a naturalist?" We prefer to take a liberal approach to the question, recognizing that while most naturalists tend to approach natural history via avenues of science, there are alternative footpaths. As an example, we point to Joseph Wood Krutch, a theater critic holding a PhD in English, who in 1961 wrote *The Forgotten Peninsula: A Naturalist in Baja California*, in which he was able to claim, "Having no responsibility to science, my own tendency is to notice first of all the

beautiful and the novel, both of which are to be found so abundantly in Baja" (p. 63).

Students seem to enjoy the mix of the literary natural history they read for one class and the peer-reviewed scientific literature they read for the other. Whenever possible, we strive to pair the readings in complementary sets. For example, they might read a chapter about tidepooling from Zwinger's *A Desert Country Near the Sea: A Natural History of the Cape Region of Baja California* (1983) for a Tuesday class prior to reading current research about Baja intertidal ecology for a Thursday class. Ruminations on island life are supported with studies on island biogeography theory, while reflection on mangroves will be supported by research on mangrove biomass production and climate change. In either case, students are urged to read with a critical eye toward both the author's approach and methodology, whether that methodology is literary or scientific.

We have found that there is something fundamentally interdisciplinary about the type of interpretation in which naturalists engage. When a class takes to the field, especially a class that originated in the classroom, it naturally gravitates toward the big picture. This process of contextualizing the landscape cannot be replicated in the lab.

In this regard, we approach natural history as much as a method as an academic discipline. The major movement in this method, regardless of discipline, is how observation leads to description. As such, the process of describing becomes the point of convergence between our respective disciplinary enterprises, that of the writer and that of the ecologist.

Centrality of the Journal

One of the primary ways we encourage the development of natural history skills is by fostering the discipline of taking field notes. The first few times we ran this program we made suggestions as to what sorts of notebooks were preferable, but it was up to the students to supply their own materials. Whether because of budgetary constraints or personal taste, they often came to the expedition with notebooks that did not adequately facilitate the task at hand. To solve this problem, we now purchase Moleskine® notebooks for the group, handing them out on the first day of class. It is our way of emphasizing the importance of having the right tools for the job, and the primacy of the journal in the naturalist's toolbox. In past years we have also used Rite-in-the-Rain notebooks, as they are water resistant, but the Moleskine notebooks tend to promote more prolific engagement with the writing prompts as well as more legible handwriting.

We have found it helpful to invite working naturalists to visit the class and "show and tell" their field notes. For example, Dr. Michelle Bezanson, a primatologist on our faculty who runs a field station in Costa Rica visited the class briefly and allowed the students to browse through selected notebooks, commenting on how sketching was an important method for recording field observations. During that time we also passed around a copy of Canfield's *Field Notes on Science & Nature* (2011), which provided exquisite examples of field notes composed by naturalists from various disciplines.

Once in Baja, the students are tasked with developing voice in the pages of their journals. While the instructors provide writing prompts based on each day's locality and our point in the trajectory of the trip, the students are expected to compose individually. Students are encouraged to interpret a number of different topics (e.g., descriptions of local ecosystems such as mangrove and intertidal communities, in-depth studies on animal behavior, soundscapes at different times of the day, how their own bodies respond to the demands of the trip) and to record their observations through imagery (e.g., drawing a map of the island as we circumnavigate it, drawing an illustration of an animal and plant encountered, drawing at least one landscape view), providing a full account of their experiences on the island.

We attempt to provide journaling time in the schedule each day, though students will take opportunities to write at a variety of times, and are encouraged to experiment with different writing habits for the field.

The journal is the centerpiece of the Baja experience, and what the students write is used as the primary assessment when the program is completed. As the students are taking two integrated courses, they are given writing assignments for each of the courses, and keep a set of separate journal entries for each course. When assessing journals we do not write in them or mark them in any way; each student is provided with an evaluation sheet with feedback on their writing and on their attainment of course goals. These are returned to the students along with their journals.

Developing Natural History Expertise: The *Amigos*

Most of the students have never visited the Baja Peninsula before and have no background knowledge of the ecological communities or the species present in the region. Becoming familiar with the flora and fauna of a

new bioregion is a challenge; getting to a point where one can confidently identify species takes quite a bit of time and effort, but developing a genuine knowledge of the unique ecological, evolutionary, and behavioral attributes of a large number of species can be a life-long endeavor. Through assigned readings, the students are given background information on the ecosystems they will encounter, but it would be impossible for them to become putative experts on all of the animals and plants of the region in preparation for the trip.

To address this, the students are assigned *"Amigos"* early on in the lecture portion of the courses. These are species found in Baja (usually 4-5 per student) that each student is responsible for researching. The students are tasked with gathering the following information on each of their species:

- Scientific name of the *Amigo*, as well as the common English and Spanish names;
- Images of the *Amigo*;
- Biogeographic range;
- Typical habitat, and where it might be encountered on the expedition (e.g., Peninsular mainland, Isla Espiritu Santo);
- Conservation status, human use (food, medicinal, etc), other interesting facts; and
- Relevant ecological interactions.

The students give a five-minute presentation on each assigned species during the opening lecture periods of each course. Through this process, each student becomes the expedition expert on a small group of species, and all of the students are introduced to a large sample of species common or endemic to the Baja Peninsula and the Sea of Cortez.

During the expedition, the students are tasked with finding their *Amigo*s and identifying them for their fellow students. They are then given an opportunity to present their research on this species again, but this time in the context of the group having actually encountered the *Amigo*. These presentations are done in the field if possible, although this can be difficult if the *Amigo* is observed, for example, while crossing open water in kayaks.

In recent years we have begun holding an "*Amigo* Happy Hour" each evening on the beach just before dinner. The entire expedition gathers and anyone who has encountered an *Amigo* will present research and observations. Other students will then take notes and incorporate their observations of the species into their journal entries. This successfully encourages the students to be on the lookout for new species: students tend to be highly motivated to find their *Amigo*s, and as a group they build a body of knowledge on the plants and animals of the region spanning at least 75 species.

Each student is required to bring at least one field guide on the expedition. As a standard text, we recommend the excellent new third edition of the *Baja California Plant Field Guide* by Rebman and Roberts (2012). We also suggest that they bring alternative guides, depending on their personal interests. Our preferred guides include *The Sibley Field Guide to Birds of Western North America* (2003), Gotshall's *Sea of Cortez Marine Animals* (1998), Gotshall and Laurent's *Pacific Coast Subtidal Marine Invertebrates* (1979), and McPeak's *Amphibians and Reptiles of Baja California* (2000).

Field Logistics

After arriving by plane from San Francisco to San Jose del Cabo, we begin our time abroad in Baja in the Sierra de la Laguna Mountains above Santiago. We stay for two nights at a remote ranchero without power or running water, spending the days experiencing the tropical dry forest biome, primarily in thornscrub but paying particular attention to riparian areas while visiting numerous cascades and waterfalls. Since this trip comes at the end of finals week for the students, we spend equal amounts of time swimming, hiking, and ecologizing, allowing time both to blow off the accumulated steam of a hectic winter quarter and to become familiar with an unfamiliar landscape.

The third day we travel to La Paz and cross by boat to Isla Espiritu Santo, the beginning of a week-long circumnavigation of the archipelago. During daily paddles we cover from 5 to 11 miles, making camp each night on one of the beaches on the island. Beyond time spent on the water, days could include hiking into the interior of the island, exploring mangals, snorkeling through reefs, tidepooling, and swimming with the California sea lions at the colony at Los Islotes on the northernmost end of the archipelago. After a week on the water, a night is spent in a backpacker hotel in La Paz where we take our first showers in ten days. We return to campus the following day, clean and happy.

We work with the same outfitter every year, Baja Outdoor Activities, and almost invariably the same two local guides, one of whom holds EMT certification, and

both of whom are certified in Wilderness First Aid and as kayak instructors. Over the years, these gentlemen have come to appreciate the uniqueness of our program, where education never takes a back seat to adventure, and where safety always comes first. They understand that one of the primary objectives for the students is to compose field notes, often filling out a dozen pages in their journals daily. The guides work together with the faculty to provide greater exposure to the island's natural history, sometimes leading activities such as tidepool or mangrove trips. The guides have also come to learn when it is time to just let the students write.

Under the leadership of a Teaching Assistant who participated as a student in the previous year's expedition, the students are responsible for the day-to-day chores of running the camp, including setting up tents; setting up the kitchen and the shade tarps; preparing meals; washing dishes; and caring for the boats and equipment. The guides are not there to serve as caterers; they are there to guide. The faculty, likewise, are there to teach, not to marshal the students.

The TA serves as camp director, independently making such decisions as to who sleeps in which tents, the overall cooking/dishwashing schedule, and who paddles in which kayaks. This can be an important decision since we use an assortment of single and double kayaks. Pairing students of dissimilar paddling aptitudes in the doubles becomes a key to keeping the expedition together on the water, a vital safety consideration. Whenever paddlers are too slow or too fast, it becomes the TA's job to remedy the disparity, even when this entails swapping boats while out on the water. Over the years we've learned this to be far more effective than merely begging the students to stay together.

We cap the program at 16 students, not counting the TA, and we have run the program for six consecutive years under its current "expeditionary" format. Because of the program's popularity, we have become selective with respect to enrollment. We give priority to seniors and juniors majoring in environmental science, biology, or environmental studies, and for the past two years have been unable to accommodate all the juniors who apply. Sophomores are advised not to apply, but occasionally apply anyway in the hope that being rejected once increases their chances of being accepted into the program their junior year.

We receive a significantly higher number of female applicants than male; indeed, we have had expeditions comprised of 12 females and 4 males. Students and faculty alike seem to prefer a more balanced male/female population, but we've not yet had a 1:1 ratio.

In the early days—when we would encourage a wider range of majors to participate, not to mention sophomores—we had difficulty maintaining the standards of a true upper-division course. Having to explain such terminology as "ecosystem services" or "trophic level" to a history or English major made the course seem too facile for students who had already participated in foundational courses in the natural sciences. While we regret having lost disciplinary diversity among our students, course evaluations indicate that our primary audience appreciates a more challenging curriculum.

A valid critique of the program, nonetheless, is that because we make a conscious decision to reserve the courses for the upper-division level, many students experience a natural history curriculum too late in their undergraduate careers to pursue it more deeply prior to graduation. Seniors returning from Baja usually only have a single ten-week quarter left to their studies, and they've already signed up for those classes prior to departure. The preferable alternative would be to offer a separate lower-division course in which students from other disciplines could also participate, but this would require a significant commitment of teaching resources at the departmental level, which is currently not feasible for our university.

Our safety measures for a program like this are considerable, and to expand upon them here would take us beyond the scope of this paper. We work extensively with our university's Risk Management Office in concert with the Associate Provost for Global Engagement. The university requires us to carry a satellite phone during the expedition, and we carry medical/evacuation insurance as a standard university procedure for classes studying abroad. Our outfitter, similarly, goes to great lengths to deal with possible emergency situations. That said, we inform our students diligently about the inherent risks of desert sojourns in wilderness situations.

Placing These Courses in Context

While we do our best to prepare the students intellectually for the trip, there are many topics that can only be learned through experience. Discovering a blue-footed booby colony and observing the booby's mating dance is a completely different experience than giggling through a classmate's PowerPoint presentation over the species' common name. No YouTube video can capture the thrill of a mobula ray somersaulting close enough to splash your kayak. Swimming with California sea lions

at Los Islotes is better than reading about an environmental journalist doing the exact same thing. And the experience of going ten days without cell phones or the internet or flush toilets… these are the moments that no amount of lecturing can simulate for the student, and which we hope they will capture in their journals.

One of the final writing prompts for the field notes is to reflect on what students have learned during the program. The following example from one student shows how creative the journal entries can become while exemplifying a reflective tone that we tend to hear throughout the writing:

What I have learned:

1. Happy hour truly is a happy hour.
2. I enjoy cooking.
3. Not knowing another language shouldn't keep you from exploring the world.
4. I love my classmates.
5. I might be a vegetarian.
6. The stars are more beautiful in the desert.
7. You can survive on an island out of the center hatch of a kayak.
8. I can go to the bathroom anywhere.
9. I don't hate writing.
10. Chapstick is your best friend.
11. I miss [home] a lot!
12. I'm a much better swimmer with fins.
13. Professors are not the enemy.
14. How to set up a tent in less than five minutes.
15. The ocean is a fragile place.
16. A beach is the closest thing to heaven on earth.
17. I hate the smell of sunscreen.
18. Sand can actually become a condiment.
19. I like waking up with the sun.
20. You don't have to know someone to trust them.
21. Journaling makes me think about stuff I'd rather forget or avoid.
22. Fear is easily overcome when you have people to catch you when you fall.
23. All the stereotypes about Mexico are just that.
24. You can make piña coladas without ice or a blender.
25. The desert is not as desolate as I'd assumed.
26. Mangroves are impossible to navigate.
27. Classrooms can't hold a candle to nature.
28. Sometimes it's best just to jump in.
29. Water is a life force.
30. Authors find a way to write beyond what they see.
31. How to appreciate a cold beverage.
32. Life is more exciting outside your comfort zone.
33. Journaling is only as bad as you make it.
34. I write from inspiration.
35. It takes a lot to inspire me.
36. Beer cans make great lanterns.
37. I want to protect things that can't protect themselves.
38. I love DUB poetry.
39. I don't appreciate music enough.
40. I might just be a naturalist at heart.

Our end goal is to encourage our students to be better observers, better writers, and better natural historians. Our students have a range of career interests; some plan to be environmental scientists and conservationists, some to be physicians and dentists, some to work in biotech, and others to teach. We hope they will come away from these courses with an understanding that journaling is an important skill in all of these careers; for some it will be a method for collecting field data, for others a means of tracking observations for a patient history or diagnosis, for still others a means of synthesizing experimental results or communicating with students. Learning to make thorough and informative notes, and learning to write lucidly with an engaging style, are skills they can put to use daily.

One of our intended outcomes for these courses is that the students will see the value in maintaining such a record of travels, research, and experiences, and will make the maintenance of such a journal a personal habit. Another hope is that, regardless of their career path, they will take away a greater appreciation for the diversity of biological life and the value of natural history, be it through vocation or avocation.

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Appendix 1. Combined syllabus for both courses over the 10-week quarter. For readings, "WNH" refers to the course "Writing Natural History," and "NHB" refers to the course "Natural History of Baja." For topics, "L/D" refers to lectures and discussions, and "A/A" refers to assignments and other activities.

Week	Readings	Topics
1	**WNH:** Krutch, J.W. 1961. *The Forgotten Peninsula: A Naturalist in Baja California*. University of Arizona Press. Chapter 12: "In the Sea of Cortez." **NHB:** Lopez, B.H. 2001. The naturalist. *Orion Magazine*. Autumn 2001: 38-43.	**L/D:** Why Natural History? What is a naturalist? **A/A:** Selection of *Amigo* organisms
2	**WNH:** Baegert, J. J. 1771. *Observations in Lower California.* U. Cal. Berkeley Press. Ch. 4: "Of the Character, Fertility and Barrenness of the Soil of California"; Ch. 5: "Of the Trees, Shrubs, and Thorn Bushes of California"; Ch. 8: "Of the Vermin of California"; Ch. 9: "Of the Peal Fisheries and the Mines of California," Part II, Ch 8: Of the Character, Nature and Customs of California. **NHB:** Ledesma-Vázquez, J., and A.L. Carreño. 2010. *Origin, Age and Evolution of the Gulf of California*. Pages 7-23 in R. Brusca, editor. *The Gulf of California: Biodiversity and its Conservation*. Arizona University Press.	**L/D:** Geology of the Baja Peninsula; How Baja is constructed by its literature **A/A:** Begin research for collaboratively written essays on themes relating to sustainability issues in Baja
3	**WNH:** Short Selections from Early Writers: (1) Ryan, W.R. 1852. *Personal Adventures in Upper and Lower California in 1848-9*. Shoberl of London. (2) Xantus, J. 1859. *Travels in Baja California*. Wayne State U. Press. (3) North, A. 1910. *Camp and Camino in Lower California: A Record of the Adventures of the Author While Exploring Peninsular Mexico.* Baker and Taylor. **NHB:** Sáenz-Arroyo, A., C.M. Roberts, J. Torre, M. Cariño-Olvera, and R.R. Enríquez-Andrade. 2005. Rapidly shifting environmental baselines among fishers of the Gulf of California. *Proceedings of the Royal Society Series B* 272: 1957-1962.	**L/D:** Humans in the Baja; Reflections on cultural hegemony **A/A:** Amigo research essays due; How to access peer reviewed literature; Strategies for writing collaboratively
4	**WNH:** Beebe, W. 1938. *Zaca Venture*. Harcourt Brace. Ch. 4: "A Week in Paradise." **NHB:** LaJeunesse, T.C., H. Reyes-Bonilla, and M.E. Warner. 2007. Spring "bleaching" among *Pocillopora* in the Sea of Cortez. *Coral Reefs* 26: 265–270.	**L/D:** Coral reef ecology; Reflections on historical ecology **A/A:** Journal reflections on scientific vs. literary writing
5	**WNH:** Steinbeck, J., and E.F. Ricketts. 1941. *Sea of Cortez*. Viking Press. Chapters 1, 11, 12. **NHB:** Arreola-Lizárraga, J. A., F.J. Flores-Verdugo, and A. Ortega-Rubio. 2004. Structure and litterfall of an arid mangrove stand on the Gulf of California. *Aquatic Botany* 79: 137-143.	**L/D:** Mangrove environments **A/A:** Journal reflections on developing voice
6	**WNH:** Zwinger, A. 1987. *A Desert Country Near the Sea*. Harper and Row. Ch. 13: "Tidepools"; Ch. 14: "Beneath the Sea." **NHB:** Littler, M.M., and D.S. Littler. 1981. Intertidal macrophyte communities from Pacific Baja California and	**L/D:** Life in the intertidal zone **A/A:** Journal reflections on narrative descriptions

	the Upper Gulf of California. *Marine Ecology Progress Series* 4: 145-158.	
7	**WNH:** Janovy, J. 1992. *Vermillion Sea: A Naturalist's Journey in Baja California*. Houghton Mifflin. Ch. 8: "Rock Pelicans"; Ch. 9: "The Gastropod's Gestalt." **NHB:** Case, J., and D.T. Bolger. 1991. The role of interspecific competition in the biogeography of island lizards. *Trends in Ecology & Evolution* 6: 135-139.	**L/D:** Concepts in biogeography **A/A:** Journal reflections on developing a sense of place
8	**WNH:** Meloy, E. 2005. *Eating Stone.* Vintage Books. Ch. 5: "January." **NHB:** Siminski, P. 2000. *The Desert Adaptations of Birds and Mammals.* Pages 367-372; Van Devender, T. R. 2000. *Adaptations of Desert Amphibians and Reptiles*. Pages 529-531 in S.J. Phillips and P.W. Comus, editors. *A Natural History of the Sonoran Desert*. University of California Press.	**L/D:** Adaptations to life in the desert **A/A:** Field excursion to Elkhorn Slough
9	**WNH:** Deming, A.H. 1996. In B. Lopez, editor. *The Future of Nature*. Milkweed Editions. Ch. 13: "The Edges of the Civilized World."	**L/D:** Baja resource use; Ecotourism **A/A:** Sustainability essays due
10	**WNH:** Beatty, C.D. 2011. *Tracking the River Cruiser*. Pages 108-111 in J.L. Li and M.T. Barbour, editors. *Wading for Bugs: Exploring Streams with the Experts.* Oregon State University Press. **NHB:** Bogan, M. 2011. *Riding the Current for the Riverine Backswimmer*, pages 127-131; Miller, M.P. 2011. *Secrets of an Infrequent Flyer.* Pages 132-136 in J.L. Li and M.T. Barbour, editors. *Wading for Bugs: Exploring Streams with the Experts* Oregon State University Press.	**L/D:** Freshwater ecology **A/A:** Group presentations on sustainability issues