Although algae forms the basis of the oceanic food web, a small number of species of phytoplankton — the microscopic single-celled algae that floats free in the water — can be poisonous or even lethal to marine life, birds and humans. When certain environmental conditions are met, blooms of phytoplankton can attain such high concentrations that they discolor the seawater red, brown, yellow or orange. In some cases the blooms spread over thousands of square miles of ocean.

Historically these events have been known as “red tides,” natural events that have been reported since biblical times (Exodus, Chap. 7, Vs. 20-21) and were well known and understood by Native Americans. The most common red tide organism is a mobile phytoplankton group known as dinoflagellates (having two whip-like flagella or “tails”).

Since these blooms have nothing to do with the tides, and are not necessarily red, the term Harmful Algal Blooms (HAB) is now used to describe them. An HAB can be microscopic or macroscopic. Concentrations of HAB algal cells do not have to be so dense as to be visible. Toxic conditions can exist even with low concentrations. Some HABs create nuisance conditions such as odors or discoloration that affect tourism and recreation. Others have more detrimental effects, including anoxic conditions, overgrowth of bottom habitats and the disruption of normal food chains. Still others have toxic or even lethal effects on humans, marine mammals, birds and fish. HABs can cause detrimental effects to local and national economies.

It is important to remember that of the 5000 living phytoplankton species only 300 species will reach such elevated densities that they will discolor the water. Only 80 to 90 species are harmful. Less than half of these — about 1% of all known phytoplankton species — are harmful to humans.

There are three basic types of HABs.

The first are those that cause indiscriminate kill of marine fauna. This would be due to dense numbers of moribund phytoplankton using up all of the oxygen in the water through bacterial decay. Any HAB is able to cause this phenomenon.
Harmful Algal Blooms continued from page 1

The second type of HAB is selective fish or other marine fauna kills. Some of these are caused by phytoplankton that release toxins into the water. Another cause is diatoms, which have long, siliceous spines. In a bloom with a high density of diatoms, the spines become lodged in the gills of fish and cause suffocation.

The third type causes the most concern to humans: the concentration of toxins through the food web. Filter feeders such as mussels and anchovies accumulate toxins, then pass them on to higher level feeders such as birds, marine mammals and humans.

Paralytic Shellfish Poisoning (PSP) is one such affliction, caused by a saxitoxin that is found in at least 18 forms in the PSP neurotoxin family which is released by the dinoflagellates *Alexandrium tamarense* and *A. catenella*. There is no specific antidote for saxitoxin and the protein itself is heat stable, so cooking does not degrade the poison. Mussels will retain the toxin for as long as three weeks, the butter clam for one year and the rock scallop for up to 18 months.

One of the most serious neurotoxins is produced by a pennate diatom, *Pseudo-nitzschia multiseries*. This diatom was first noticed on the west coast in 1991 with the death of more than 100 sea birds, mostly corromors and brown pelicans.

In the spring of 1998 massive deaths of marine mammals occurred when more than 400 sea lions, fur seals, sea otters and marine birds were poisoned by Domoic Acid (DA), a toxin produced by *Pseudo-nitzschia*. On the east coast, three human deaths and 100 illnesses were reported the same year. DA accumulates in filter-feeding shellfish, zooplankton such as copepods and planktivorous fish such as anchovies and sardines in a process known as bioaccumulation. In humans, poisoning from this neurotoxin can cause short-term memory loss — DA is also called amnesic shellfish poisoning — and disorientation which can become permanent. Symptoms observed in marine mammals include vomiting, diarrhea, confusion, disorientation, seizures, coma and death.

Disorientation in sea lions can be very noticeable and it appears that many affected sea lions are unable to even locate the direction to the sea. In December 2003, a 258-pound male California sea lion came ashore in the marine reserve on the beach below the end of Weinke Way in Moss Beach. The Marine Mammal Center was called and the sea lion was put into an animal carrier container for rescue. This sea lion was so disorientated that it had no idea that four of us were trying to stuff it into an animal carrier, let alone which way the ocean was. The sea lion eventually recovered and was released by the Marine Mammal Center eight months later at a secluded location in Marin County.

The causes of HABs are not well understood and research is ongoing, but nutrients such as garden fertilizers carried into the ocean by runoff seem to play a part in some blooms.
The Unusual Urchin

by Debbie Rogers

The fascinating, mysterious-looking sea urchin is an unlikely creature, and the purple sea urchins (*Strongylocentrotus purpuratus*) that inhabit Moss Beach defy logic. They appear round like a tennis ball, yet are covered with needle-like spines. Although they look as if they can be easily tumbled around, they seek out and thrive on the reef’s rocky surfaces, exposed to pounding, sweeping, destructive surf.

These little echinoderms, which grow to approximately three inches in diameter, are mesmerizing to watch, especially when they are in a tide pool waving their spines and tube feet through the water. The motion is continuous and rhythmic, and though it is purposeful for the urchin, it appears to be a hypnotic, slow-motion dance to the observant tide-pool viewer. The spines are hard and sharp, can move in all directions and are made up of many tiny rods of chalky calcium carbonate. The spines help the urchin protect itself from predators, but they are multi-purpose tools which also help the urchin feed, move around the reef and even burrow into rock.

Purple urchins are not usually found along a sandy shore but rather on the outer edge of the reef. Here they have access to their main food source, leafy greens such as sea lettuce and other plant matter. Urchins feed by chewing up the vegetation with their Aristotle’s lantern jaw which is made up of five sharp, pointed teeth located on the underside of the animal. They browse and scrape vegetation off the rocks. They can also move their spines to trap food drifting in the water and pass it around to the mouth where it is chewed up and swallowed.

Moving the spines also gives the urchin a slow form of locomotion, so that it can move around the reef, centimeter by centimeter, finding food and evading predators.

A most intriguing use of the spines is that they are used in conjunction with the teeth to scrape out indentations on the rock’s surface so the urchin can nestle in, improving its ability to withstand the powerful waves washing over it. Urchin “condominiums” that house dozens or hundreds of the small purple creatures can be seen covering large areas of rocky surfaces on the exposed portions of the reef.

In between the spines and working in conjunction with them are very soft but strong, important tube feet which work by hydraulic action. Some are used for breathing and others have adhesive tips which help the animal move around, capture food or anchor itself to the rocks.

When an empty “test,” the skeleton of an urchin, is found, it is always clean, without any algae clinging to it, due to a feature which is also common to sea stars. There are tiny *pedicellariae*, small stinging structures that consist of little stalks with three-clawed-pincherers. The urchin uses these stingers to nip invaders, parasites and anything that might cling to its body. These *pedicellariae* are easily visible around the mouth. They may create only a tingling sensation to a human hand that comes in contact, but the toxin is potent to its intended marks.

*continued on page 4*
Among the urchins’ predators are gulls, snails, sea stars, crabs, sea otters and people. Even though urchins are able to wedge themselves between or under rocks for protection, these other creatures are able to pull them out and feast on the highly nutritious innards.

Sea urchin roe is a highly prized food consumed in great quantities, especially by the Japanese in sushi. Other countries such as Korea and Chile also consume the reproductive organs and do a big business exporting urchins to Japan. Divers at sea say that when they get cold or exhausted, they search for an urchin, break open the shell and slurp the nutritious insides to regain their strength. So humans are high on the list of urchin predators!

In the Monterey Bay area, the ecosystem’s balance has been tipped because of the great decline in numbers of sea otters, which are primary or “keystone” predators for the urchins. The declining population of sea otters has been unable to keep up with the growing population of urchins, and as a result, the urchins have devastated the kelp forests.

Because urchins are single sex, they release their eggs (several million at a time) and sperm into the sea, and the tiny larvae swim around as zooplankton. It takes several months for the juveniles to form and two to five years for them to become reproductive adults.

The urchin has been a standard subject for biology studies in embryology, and due to the increased interest in human fertility in recent decades, urchin sperm have been launched into space (January and May of 1997) for experiments on sperm movement at near-zero gravity. The sperm were flown on shuttle flights “to examine how sperm are signaled to move – a critical step for fertilization.” (University of Kansas Medical Center – Sperm Study)

These unusual creatures, appearing so quiet on the Moss Beach reef, are sources of endless wonder and delight to visitors of all ages.

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**The Unusual Urchin continued from page 3**

Divers at sea say that when they get cold or exhausted, they search for an urchin, break open the shell and slurp the nutritious insides to regain their strength.

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**Join Us for Coastal Clean-Up Day**

**Saturday, September 16** is Coastal Clean-Up Day 2006. Become one of the thousands of volunteers who turn out to clean up California’s beaches, lakes and waterways. The Friends need help with the following:

- Checking in volunteers
- Beach clean-up duty
- Handing out information

When: **8:30 am to noon**

Where: **Mirada Surf/Surfers Beach in El Granada.**

Contact Ranger Sarah Lenz at 650-728-3584 to sign up!
Volunteer Naturalists Help FMR Educate the Public

by Ranger Steve Durkin

Over 3,865 people visited FMR between January and June 2006! Most, but not all, were school children.

The low tides during daylight hours brought many organized groups to FMR in this period and it would have been nearly impossible to get through those busy months without the help of our dedicated volunteers.

The Friends of Fitzgerald Marine Reserve (FFMR) assists Fitzgerald Marine Reserve (FMR) with our mission to protect the natural resources found within the reserve through education and research. One of the most important things FMR does is provide us with trained volunteer naturalists who can answer visitor questions and take visitors on tours of the reef.

These dedicated volunteers have a special connection to this amazing environment, and provide an invaluable service interpreting the marine environment and the diverse plants and animals that call the reserve home.

We currently have 68 naturalists who have completed docent training. Naturalists can sign up for scheduled tours during which they will guide a small group of visitors, or they can rove out on the reef among visitors to answer questions.

Each scheduled tour lasts for about two hours, and when I add in about an hour for each volunteer’s preparation and commuting time, I estimate that these dedicated volunteers put in about 933 hours in the first half of 2006.

Because we no longer allow self-guided tours at FMR fill up fast. The tour schedule is set months in advance, based on low tides and hours of daylight. If you are interested in booking a tour, you can find information online at www.fitzgeraldreserve.org.

Of course, not all visitors arrive in large, organized groups. Especially on weekends and holidays, our reefs are explored by families from all over the Bay Area and tourists from all over the world. Some of our volunteers function as “roving docents” to help educate these weekend explorers, and from January to June of this year, they put in 141 volunteer hours of unscheduled tours.

Without the help provided by our naturalists, it would be hard to ensure a safe and enjoyable experience for reserve visitors.

Each year, FFMRF offers a training class to educate new volunteer naturalists. The course covers several weeks and usually occurs between January and April. Upcoming course dates, times and location will be published in this newsletter. The class is a lot of fun and gives you a great excuse to spend time outside exploring our spectacular reserve. The best part comes after graduation when you get to take groups of kids out and share in their excitement when they spot their first harbor seal or touch a real live sea star.

I want to thank all of our wonderful naturalists who came out to FMR during 2006’s busy tour months. I would also like to encourage everyone to come on out to FMR, to explore and study our marine environment. Maybe you’ll get inspired about passing on our knowledge to the next generation and join our next training class. I hope to see you on the reefs!
New Park Aide Jessica Donald Joins FMR
by Ranger Steve Durkin

I would like to introduce our newest Park Naturalist Aide, Jessica Donald. Jessica began working at FMR in June of 2006. A native to the San Mateo County coastside, Jessica knew at an early age that she would study and work towards the protection of our marine environment.

She is starting her third year as an undergraduate student in marine biology at San Francisco State University. Her goal is go on to graduate school and then work in the area of marine science that studies and protects the ocean's hydrothermal vents.

Jessica loves the natural world and enjoys scuba diving. When asked what she liked about working at FMR, Jessica replied, “I like the office I get to work in, you know, roving along the reefs of the reserve, helping to protect this environment by educating visitors who come out to FMR.” Jessica will continue working at FMR as she pursues her academic goals.

“\[\text{I like the office I get to work in, you know, roving along the reefs of the reserve, helping to protect this environment by educating visitors who come out to FMR.}\]”

Junior Rangers Learn Science and Stewardship the Fun Way
by Jenna Kinghorn

Eleven campers signed up for the 2006 Junior Rangers program. The camp ran the week of July 10. In addition to daily explorations of the tide pools, activities included:

- Learning about sharks and their relatives from the Gulf of the Farallones National Marine Sanctuary’s “Shark Mobile”
- Learning about sea otters and sea turtles from Lt. Brian Arnold of the Department of Fish and Game
- Exploring an “Un-Nature Trail” of man-made objects hidden by park staff to challenge their observation skills
- Discovering what the senses of smell, touch, hearing and taste could tell them while taking a blindfolded hike
- Taking part in a scavenger hunt
- Observing and sketching birds

Ranger Sarah Lenz (left, front row) ran the 2006 Junior Rangers Summer Camp with a lot of help from Park Aides Jessica Donald and Ivan Parr (far right, front row).
Sightings for Summer 2006

Photo by FMR staff – Sketch by Kelly Huber

One of the amazing things about visiting FMR is coming upon rarely seen animals that have died and washed ashore. Although the encounters can evoke emotions that range from sadness about a life's ending to disgust about how a decomposing animal looks and smells at various stages, reserve staff and volunteer naturalists make the most of these opportunities. They give us a chance to study animals that when alive would stay clear of humans. And they also give us a way to remind visitors that in the interconnected web of life inhabiting the reef and the ocean beyond, the death of one creature may provide important sources of food and shelter to others.

In the past our shores have seen such wonderful specimens as common dolphins, sea otters, giant Pacific octopus and the deep water ratfish. In June and July of 2006, we had three more such finds.

The best find of them all was a bird that Ranger Steve Durkin had only seen in videos or on postcards, a horned puffin. California Department of Fish and Game took the body in order to do a necropsy to learn the bird's sex, how old it was, and how it may have died. They learned that it was an immature female, most likely in its second-year plumage.

The bird was emaciated, reflecting starvation as cause of death. This beautiful sea bird is normally found off shore from Canada and Alaska. The puffin was in such good condition when we found it, the young bird most likely came ashore alive, then passed away on our beach.

The second find is one that occurs often, though rarely one of this magnitude: an adult male California sea lion that measured over 98 inches. Full-grown males usually range from six to eight feet long and can weigh up to 1,000 pounds. We were unable to get the full length measurement of this bull, due to the way the surf had wedged it into the rocks. The massive sea lion had tags fixed to its forelimbs that identified it as having been studied by the Oregon Department of Fish and Wildlife. We contacted their main office to advise them that California sea lion tag C562 had died and was found on the shores of FMR. Exchanging this type of information gives researchers new insights into the lives of marine mammals.

Finally, the nearly three-foot-wide carcass of a skate, which is related to sharks and rays, washed ashore. This find allowed us to examine the skate’s mouth structure, which has

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You might spot this fish if you are on a voyage with Captain Nemo in The Nautilus!

www.fitzgeraldreserve.org • August 2006
The (Annual) Return of the Giant Mussel Worm

by Ivan Parr

Almost every May, visitors and naturalists find exhausted meter-long giant mussel worms, Neathes brandti, washing ashore to die. For most of the year, this predatory worm, a type of annelid called a polychaete, lies hidden beneath mussel beds and cobble fields. Shy but active, it shimmies around on bristly parapodia that line its sides. Its strong jaws shred seaweed and small animals for food, and nip the fishermen who hunt them for bait! Naturally solitary, sometime between its first and third birthdays, the giant mussel worm debuts for its first and only night of social life as a “heteroneireid” — a wormy debutante.... Moonlight on a perfect high tide lures it like a moth to the open water, where it joins a boiling “orgy” of fellow worms. Once the females have released their eggs — a green slime that pours out of them if you pick them up — into the encircling males’ clouds of sperm, the worms have nothing more to live for, and wash ashore to die. Their eggs will develop into new mussel worms within nine days of fertilization. Look for dead mussel worms in late spring on Moss Beach North, or in the sandy cobble fields just southwest of Nye’s Rock and at South Seal Cove.

Sightings for Summer 2006 continued from page 7

evolved to prey on crustaceans living on the ocean’s sandy bottom.

Earlier this summer, a volunteer naturalist leading a school tour group found a gumboot chiton (Cripto-chiton stelleri), the largest chiton in the world. Two ochre stars were eating the chiton, which was still alive! The naturalist told the kids that the gumboot chiton was a rare creature here at the reserve. The naturalist and her students had a good discussion of their dilemma: save the rare chiton from the predators, or let the stars finish their meal? They finally decided to allow nature to take its course and not disturb the feasting sea stars.
The Friends March in 4th of July Parade

by Linda Ciotti

Marching in the Annual Fourth of July Parade in Half Moon Bay was a great way to celebrate July 4th. For those of you who did not heed the call to join us, boy did you miss out on a lot of fun! Fifteen smiling volunteers arrived in Half Moon Bay on Tuesday morning prepared to march in the parade. Naturalists dressed in the Fitzgerald Marine Reserve green jackets or sweatshirts and rubber boots we wear out on the reef. Park staff wore their working uniforms. We carried a “Friends of Fitzgerald Marine Reserve” banner so that the parade watchers would know what organization this crazy brigade represented.

Participants included Julie Barrow, Linda Ciotti, Tom Ciotti, David Crisp, Mary DeLong, Park Aide Jessica Donald, Carol Ferguson, Darlene Fong, David Haase, Kelly Huber, Ranger Sarah Lenz, Janine Miller, Park Aide Ivan Parr, Peggy Ruse and Betty Sills.

Natural Bridges State Park in Santa Cruz loaned us two reef critter costumes for the event, so Julie Barrow donned the crab costume while Carol Ferguson was our “shining star” – sea star, that is! Both Julie and Carol were fabulous critters and the kids along the way LOVED them.

After completing the parade route, most everyone gathered for lunch to celebrate our first Fourth of July Parade, and decided that we definitely want to make it an annual event. Lots of ideas for costumes for next year were shared. Apparently we have a lot of creative and talented volunteers in our midst and I know I am looking forward to next year’s event.

Editor’s Note: Linda’s usual “Volunteer Spotlight” column will return next issue.

F r i e n d s  o f  F i t z g e r a l d  M a r i n e  R e s e r v e

Membership Secretary, P.O. Box 669, Moss Beach, CA 94038

Contribution Levels:

☐ $25  ☐ $100  ☐ $1000
☐ $50  ☐ $500  ☐ Other ______

☐ I want to double the value of my gift through my employer’s matching gift program (please enclose the matching gift forms).

☐ Please contact me about volunteer opportunities.

Name ____________________________
Address ____________________________
City ___________ State _____ Zip_______
Email ________________________________
As summer moves on into fall, all of us at FMR continue to work toward the protection of our marine friends and the education of our human ones. Here’s a roundup of things that are going on.

**FMR Volunteers Recognized**

Two of our volunteers, Kumi Ishida and Sandi Meyer, have been recognized for their service as volunteer naturalists at FMR.

On April 21, at the Monterey Bay Aquarium, Kumi Ishida was one of five recipients of the Ocean’s Hero Award awarded by the Aquatic Protection Agency. She was also awarded a Congressional Recognition Award by Congressman Sam Farr. Kumi is certainly one of our heroes for her many hours of volunteer work at Fitzgerald, Ano Nuevo, and the Snowy Plover Watch.

Sandi Meyer was honored for her outstanding work in the community by her law firm, Heller Ehrman. She was the winner among five nominees. Sandi has been a volunteer since 2002 and she was very active in our census a few years back. Heller Ehrman made a generous cash contribution to the Friends as part of Sandi’s award.

It is very rewarding to have our volunteers recognized by others outside the reserve and in turn spreading the word of what a magical place it is.

**Organization Name Change**

The Friends Board has decided to end years of confusion about our name. We are now Friends of Fitzgerald Marine Reserve (FFMR). We are discontinuing the use of Friends of Fitzgerald Marine Life Refuge.

**Departing and New Board Members**

We have some board member changes to report as well.

Longtime board members Maryann Danielson and Bill Gomez left the board earlier this year. I would like to thank them both for their many years of insight and vision for the reserve.

Maryann was one of the founders of the Friends of Fitzgerald and gave us twenty years of dedicated service. She was our resident bird expert, and wrote the bird chapter for *The Natural History of the Fitzgerald Marine Reserve*.

Bill Gomez has also resigned from the board. While he pursues his many other interests and continues traveling, he will still be doing tours as his schedule allows. Bill trained as a docent in 1994 and joined the board a few years later.

We now have two new board members, Pam Larkin and Hope Suchsland.

Pam brings us 25 years of experience in environmental education. While earning a BS in Environmental Science from UC Davis, she spent her summers as a naturalist at environmental education camps and in Yosemite National Park. She was an environmental educator at Richardson Bay Audubon Center for three years, and later developed and wrote education materials at the Monterey Bay Aquarium for 10 years. Most recently she was the science coordinator at an elementary school where she developed and taught science curriculum. Today Pam lives in Menlo Park with her husband, David, and their three boys ages 5, 6 and 14. She is currently spearheading the board’s efforts to revise our goals and lay out our roadmap for achieving them.

Hope Suchsland will take over duties as treasurer from Mary DeWolf. Hope was transferred from Connecticut to the Bay Area in 1981, and currently lives with her husband, Brian, in Belmont. It was there that she learned from her neighbor and walking buddy Betty Cosgrove just how rewarding volunteering at FMR could be, and decided to try it herself. Hope trained as a volunteer naturalist in 2005 and leads her walks with lots of enthusiasm. She has worked in finance and accounting for over 20 years. Presently, she works as a Controller for

*continued on page 7*
various venture funds and private equity startup companies. Hope’s other interests include traveling, photography and reading.

**Parks Funding Initiative**

One project we are enthusiastic about is The San Mateo County Parks and Recreation Foundation’s *Parks for the Future* initiative. *Parks for the Future* is an effort to secure dedicated funding to support the parks of San Mateo County. Funding of programs, improvements, and personnel at FMR is always an issue, so the Friends of Fitzgerald Marine Reserve hope the voters of San Mateo County will support *Parks for the Future*. It is projected to cost the average person $18.00 per year. For the cost of a few lattes, we can enrich the lives of everyone.

This issue will be on November’s ballot. Voters will be asked to increase San Mateo County’s local sales tax by 1/8th of one percent. The projected revenue will be $15 million dedicated to San Mateo County Parks, the 20 city Parks and Recreation Departments located within the County, the Ladera and Highland Recreation Districts and the Midpeninsula Regional Open Space District.

Because tax revenues are flexible, the funds can be used for what we need most. The Master Plan for FMR recommends six rangers at Fitzgerald, and we’ll need funding to fill those staff positions. We could also use money from these revenues to fund capital improvements in the reserve.

Most other counties have dedicated funding systems in place and their parks are not at the mercy of the general budget. For more information about *Parks for the Future* and what you can do to support it, visit www.supportparks.org.

**Read More About FMR**

The July-September 2006 issue of *Bay Nature* magazine includes a nice article about exploring our FMR tide pools, accompanied by some beautiful photos, some provided by our own talented volunteers and staffers. You can see an excerpt at www.baynature.com, or pick up the entire current issue at a newsstand. See an excerpt below.

And at long last our very own newsletter is now available online! Beginning with the May 2006 issue, *Between the Tides* can be viewed in PDF format online at our web site: www.fitzgeraldreserve.org/newsletter.html. Be sure to tell to your friends and family.

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“*We drove to the beach the night before. We slept in the car. My mother woke us in the chilly darkness. At eight years old, I was doubtful about this expedition...*

Early that morning at what is now Fitzgerald Marine Reserve, an exceptionally low tide and a full moon would make the reef and its inhabitants more visible than they had been on any of the day trips we’d taken to the tidepools...*We climbed out of the car and walked to the beach. The doubts I felt during a night spent in a cramped car vanished immediately...We walked out to the reef, where life was so thick it was like a layer of rain forest painted on the rocks.*”

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Excerpt from *Bay Nature* magazine article by Susan McCarthy, July, 2006

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San Mateo County parks would benefit from a tiny increase in the county’s sales tax.

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In Last Child in the Woods: Saving Our Children from Nature Deficit Disorder, author Richard Louv contends that “Today, kids are aware of the global threats to the environment — but their physical contact, their intimacy with nature, is fading.” And the consequences of that detachment are multifold.

In 323 pages, Louv makes the case for restoring children’s connection with nature, explains the forces working against this reconnection, and ultimately provides us with hope.

Louv stresses good mental health as the primary reason to encourage children (and all of us) to spend time in nature. He discusses how for years now gardening and pet therapy have been recognized as beneficial for stress management. “The woods were my Ritalin. Nature calmed me, focused me, and yet excited my senses,” he writes of his own childhood.

He emphasizes that intellectual development is stimulated by contact with nature, and shows how time spent in nature helps a child develop the ability to pay attention. He relates the central role that childhood exposure to nature played for some of the great creative thinkers of our culture — not just the obvious John Muir, Jane Goodall, and E.O. Wilson, but also Mark Twain, Thomas Edison, and Eleanor Roosevelt.

Louv’s description of the forces arrayed against children getting out into the natural world is sobering.

Schools driven by test scores teach students about the destruction of rainforests, but don’t take the children out into the neighborhood to study the local flora and fauna. And while the children get an intellectual understanding of an ecosystem, the emphasis on catastrophe may actually make them fear or distance themselves from the natural world.

When the media turns its attention to natural history, it presents dramatic and exotic stories, making backyard nature seem comparatively boring.

Louv sees hope for the future in the form of green spaces being included in urban planning, and the hint of a return to place-based, hands-on classroom experiences. But his message is clear: “Parents can encourage institutions to change, but cannot wait for them.” We must lead the way at home, and consider taking our children outside to experience nature not as yet another item on the family to-do list, but rather as a stress-busting antidote to the to-do list.