A Guidebook to the San Andreas

Geology Fieldtrips on the World's Most Famous Fault

By Clarice Nassif Ransom

USGS scientist Philip W. Stoffer leads a public field trip in Sanborn Park on the San Andreas Fault. (Photo by Leslie Gordon)

When Philip W. Stoffer, geologist for the USGS in Menlo Park, Calif., learned he had lymphoma, or cancer of the lymph system, in 2004, he was not sure if he was going to live. The statistics for surviving were grim. He knew he had to do whatever he could to try to survive.

For four months during the summer of 2004, Stoffer underwent rounds of chemotherapy and a stem cell implant while in isolation at the Seattle Cancer Care Association. At the same time, he authored a first draft of *Where's the San Andreas Fault? A Guidebook to Tracing the Fault on Public Lands In the San Francisco Bay Region*, which was unveiled in April by USGS and the National Park Service (NPS).

The book features more than 50 destinations along the 800-mile fault, including 20 different hiking trips in national and local parks. Stoffer wrote the field guide as part of cancer survival therapy and to encourage people to live life, not just through maps, books, television or the Internet, but in person.

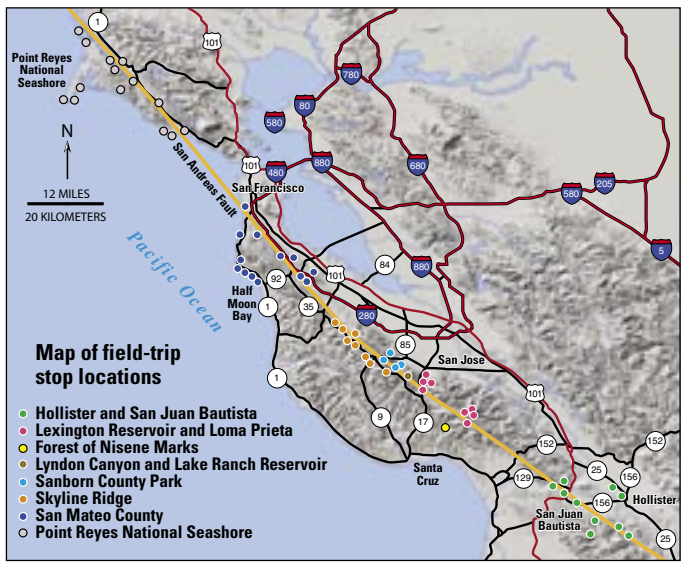
"Phil was hospitalized for weeks during the transplant," said Stoffer's good friend and colleague John Vogel, a USGS scientist in Tucson, Ariz., who spent many weeks with Stoffer during his recovery. "He worked every day, except for the a few days when he was most sick from the chemotherapy. I don't mean eight hours a day. If he was awake, he was working. It was amazing. He wasn't watching TV. He wasn't reading books or magazines. He was working. I would say that having something productive to do, to focus on, was therapeutic — make that incredibly therapeutic."

"I love to hike and explore," said Stoffer. "The whole experience of having cancer changed my outlook on life. I am someone who was not just treated for cancer, but cured from cancer. I had to give something back. You never know how much time you have left, and I had all of these pictures of different places along the San Andreas Fault that I had compiled over the years and a project I was going to get to, 'one day.' When I was in the hospital, I was motivated to write the book and get it done. I had a field trip to go on when I got out of the hospital."

Stoffer encourages everyone to see an aspect of the San Andreas Fault in person. The field guide provides detailed information about the geologic diversity of the landscape and also describes the cultural and historical aspects of the area. Loaded with colorful photographs and detailed road maps, the guide describes the natural setting in which Bay Area residents live. The guide should interest a wide spectrum of the public, from serious hikers and geology students, to casual strollers and earth science novices.

"The National Park Service relies on the organizations like the U.S. Geological Survey to provide scientific information to help make informed decisions and to help educate the public," writes Don Neubacher, park superintendent, Point Reyes National Seashore, in the preface to the guidebook. "This field guide is an example of collaboration between the two federal agencies. Our hope is that this guidebook will help enrich public understanding and encourage exploration of our natural and cultural heritage."

"The [guidebook] is the best thing since the invention of ice cream!" said David Boore, a docent with the Midpeninsula Regional Open Space District. "This publication is a fantastic resource for those interested in the geology of the San Francisco Bay Area. It's well-written, detailed, up-to-date, includes useful background information about earthquakes and faults, contains lots of color photos and maps, and the price is right."



Tom Brocher, a seismologist with the USGS, added, "This guidebook is a great educational resource for learning about the geology and natural environment along the coast in the Bay Area. What I love about the guidebook is that it offers several different tours of the San Andreas Fault that cater to diverse educational interests and hiking abilities. Everyone can find something of interest in it."

The release of the guidebook also coincides with the 100th anniversary of the Great San Francisco Earthquake. On April 18, 1906, the earth ruptured for about 300 miles along the San Andreas Fault through Northern California, both on land and where the fault extends offshore. The earthquake and fires that followed caused catastrophic damage to cities and towns throughout the region and had a dramatic impact on the culture and history of California. The event also initiated national interest in the study of earthquakes and disaster prevention. The field guide can be accessed online at http://pubs.usgs.gov/gip/2006/16/.

Story written with contributions from Tom Brocher.

Stoffer's Favorite Bay Region Places to Visit:

The High Peaks area within Pinnacles National Park.

■ **Pinnacles National Monument** (San Benito and Monterey Counties) — This monument features high, rugged mountain scenery (an ancient volcano), boulder-covered slot canyons and many miles of well-maintained hiking trails.

Point Reyes Headlands in Point Reyes National Seashore.

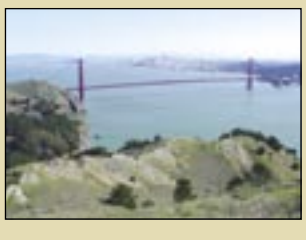
■ **Point Reyes National Seashore** (Sonoma County) — This national park features unrivaled coastal sea cliffs and coastal prairie scenery.

California poppies growing near the top of Mount Wilson in Henry Coe State Park.

■ **Henry Coe State Park** (Santa Clara County) — This is the second largest state park in California and has hundreds of miles of trails throughout the central Diablo Range.

The valley of the Arroyo Seco Canyon in the Ventana Wilderness.

■ **Arroyo Seco Canyon** (Ventana Wilderness, Monterey County) — This wilderness area features a perennial stream that cuts through gorges in the Santa Lucia Range. The lower valley usually has unrivaled spring wildflowers.



The Marin Headlands portion of Golden Gate National Recreation Area.

■ **Marin Headlands, Golden Gate National Recreation Area** (Marin County) — This park provides spectacular views of the San Francisco Bay and has many miles of excellent hiking and riding trails.

Elkhorn Slough harbors the largest tract of tidal salt marsh in California.

■ **Elkhorn Slough** (Santa Cruz and Monterey County) — This is a kayaking, wildlife-viewing wonderland.

The seacliffs at Cove Beach in Año Nuevo State Park.

■ **Año Nuevo State Park** (San Mateo County) — Año Nuevo is host to large seasonal population of elephant seals and other marine mammals, and also has scenic beaches and access to coastal mountain hiking.

The rugged sea cliffs along the coast trail in Wilder Ranch State Park.

■ **Wilder Ranch State Park** (Santa Cruz County) — This park has many miles of hiking and riding trails, including trails along an undeveloped 4-mile stretch of sea cliffs.

The outcrops of limestone on the top of Black Mountain.

■ **Black Mountain** (Mid Peninsula Open Space Preserve, San Mateo County) — This is an exceptional hiking area within the central Santa Cruz Mountains.

Two large, fire-scorched Coastal Redwoods in Big Basin State Park.

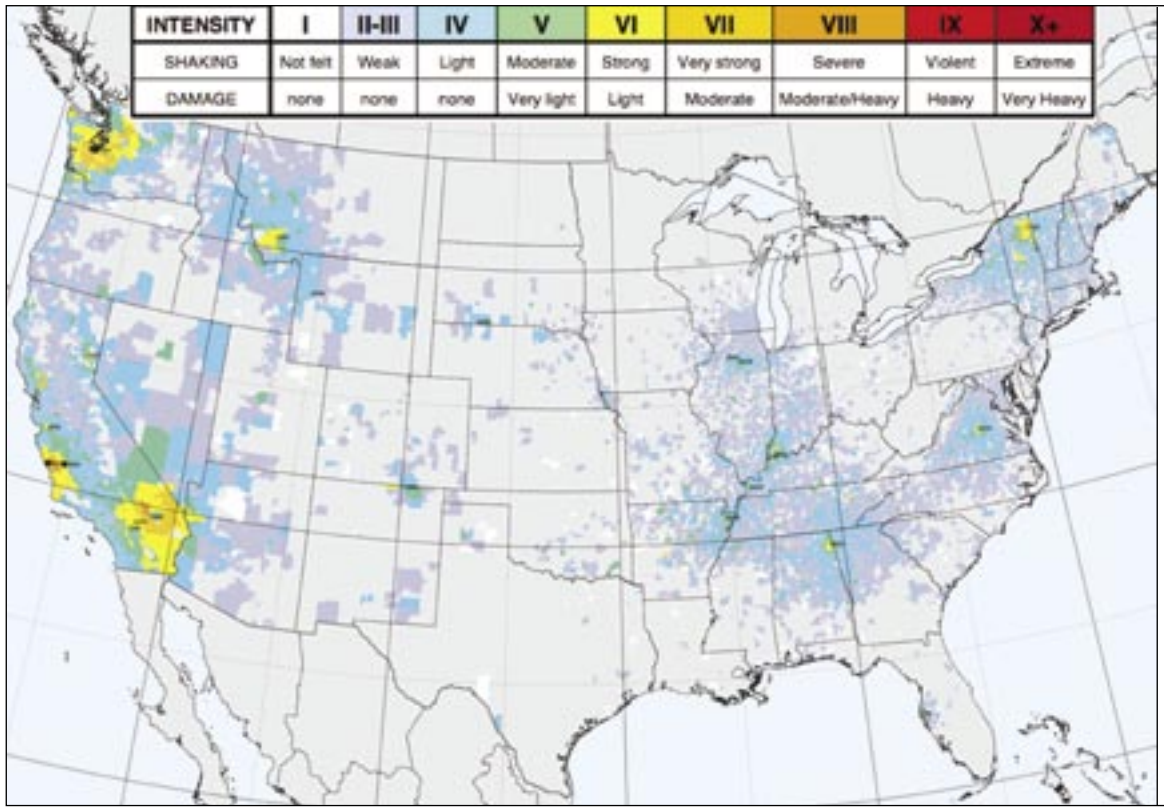
■ **Big Basin State Park** (Santa Cruz County) — This has a relatively untouched stand of great coastal redwoods, but the park also has many miles of hiking trails that extend from the crest of the Santa Cruz Mountains, near Castle Rock State Park, to the coast at Año Nuevo.

One of the unusual rock formations along the trail system at Castle Rock State Park.

■ **Castle Rock State Park** (Santa Clara and Santa Cruz Counties) — This park straddles the crest of Castle Rock Ridge in the central Santa Cruz Mountains and provides exceptional hiking and rock-climbing opportunities.

Did You Feel It?

Citizen Science Goes Seismic



This map shows responses for ZIP codes in the conterminous United States since Did You Feel It? started. More than 500,000 individual responses have been measured. Earthquakes have been felt in all 50 states and in the U.S. territories.

By Heidi Koontz and David Wald

Have you ever been through an earthquake? Did you know that reporting your experience during an earthquake can help save lives and property during future quakes?

As a result of work by USGS with the cooperation of various regional seismic networks, the world can log in on the Internet and tell USGS scientists what they felt during an earthquake.

By logging on to the USGS Earthquake Hazards Program Web site (http://earthquake.usgs.gov) and clicking on the "Did You Feel It?" link, the public can help provide information about the extent of shaking and damage during earthquakes. These "citizen scientists" may also provide specific details about how their area may respond to future earthquakes.

Did You Feel It? and ShakeMaps have revolutionized the way earthquakes are reported and how emergency responders take action.

USGS scientist David Wald knew these tools could help communicate post-earthquake information. But when he wrote a computer program on a whim in the late '90s, he had no idea how pivotal these instruments would become to citizens, a.k.a. Net-izens, and emergency responders.

"We wanted to make the science tangible and allow the users to tell us in simple terms how the quake impacted them, so we could in turn create something user-friendly for emergency personnel to rely upon," said Wald, who created the software along with Vincent Quitoriano and James Dewey.

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Not too long ago, the first thing that most people did after feeling an earthquake was to turn on their television or radio for information. Recently, more and more people turn to the Internet instead, not only to obtain information, but also to share their experience of the earthquake.

Users enter their ZIP code and answer a list of questions, such as, "Did the earthquake wake you up?" and "Did objects fall off shelves?" These responses are compiled into a database, and within minutes, a map to take shape on the Internet. In a couple of hours, with several thousand responses at times, a Community Internet Intensity Map shows where and how strongly the earthquake was felt and where damage has been reported.

The maps are then continuously updated as additional data are received. Did You Feel It? Summarizes the responses, and an intensity value is assigned to each ZIP code received. The intensity may change as more questionnaires are submitted, and the map reflects these modifications. ZIP code areas are color-coded according to the intensity scale that accompanies the map. From the user's perspective, Did You Feel It? is interactive, providing instantaneous feedback on the individual's intensity along with a link back to the maps.

During the past five years, more than 500,000 reports for earthquakes ranging from magnitude 2.0 (New Jersey, April 2004) to magnitude 7.9 (Alaska, December 2001) have been logged via the Did You Feel It? Web site. Events have been felt in every state in the nation, as well as in Puerto Rico, Guam, the Virgin Islands and other U.S. territories. What's more, other phenomena, often initially perceived as earthquakes, have been widely reported with Did You Feel It?, including sonic booms from the space shuttle, other supersonic aircraft and even meteors! Recently, the system went worldwide; and numerous responses for earthquakes felt around the globe, including reports within thousands of miles of the magnitude-9.1 2004 great Sumatra tsunami earthquake, were documented.