zine editors to do a story on the cave invertebrates. David spent seven weeks in the parks with the goal of photographing all of the new species. He nearly succeeded and created an amazing series of photos. David patiently set up what amounted to a small photo studio in each cave. We would find the arthropods and bring them to him. He photographed each animal dozens of times in a polished Petri dish with lighting from multiple angles. This created dramatic photographs with only the animal on a white background.

A final meeting between Zara and the Park helped us develop a database with results of the inventory work and to prepare us for monitoring these animals for the long term. We worked for several days on the Access database and protocols for future monitoring work that is now on-going at the park.

This is hardly the last chapter in the story of cave invertebrates at Sequoia and Kings Canyon National Parks. Recent analyses have shown that usually it takes 10 or more trips to a cave to find all of the taxa present (Krejca and Weckerly 2007). Most caves at the parks were visited one to two times during this study. Most of the new species we identified in Table 1 are not described, they lack full taxonomic workup and specific names. We also know nothing of these animals' populations, ecology, preferred foods and reproduction. While at first it would appear that cave animals in a national park would be well protected, that may not always be the case. Animals in Crystal Cave, our tour cave, suffer many impacts from the tens of thousands of visitors to the cave each year and the associated infrastructure inside the cave. Recent fire suppression actions in the parks also threaten the aquatic cave species because fire suppression chemicals are toxic. We hope for a long, productive and interesting future for park cave invertebrates and the research on these fascinating animals.

***Taracus* sp. in Forsyth Cave Yosemite National Park**

Undescribed japygid dipluran in Soldiers Cave

Reference

Krejca, J.K. and B. Weckerly. 2007. Detection probabilities of karst invertebrates. Report prepared for Texas Parks and Wildlife Department. 27

Return to Santa Cruz Island

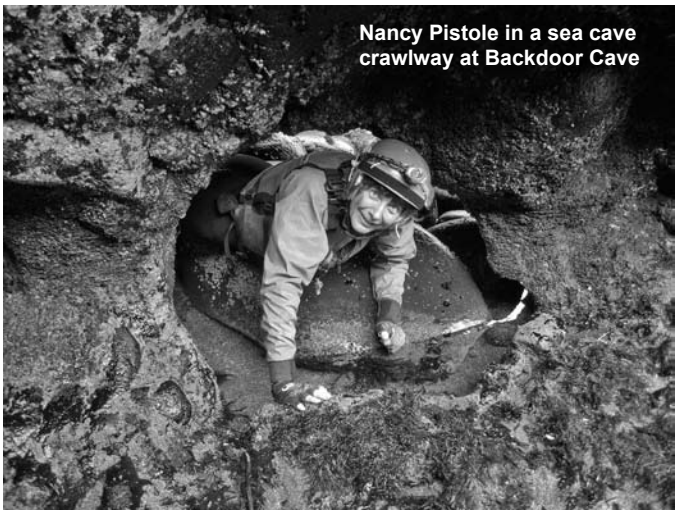
text and photos by Dave Bunnell; maps by John Lovaas

Peeling out of our wetsuits after a full day of sea cave hunting, photography, and survey, a beautiful sunset spread before us in the sheltered waters of Forney Cove. Just as we all scrambled to find our cameras, a distant sailboat came into view, and we all waited as it lined up perfectly in a notch among a group of sea stacks. We had just crossed some of most turbulent seas around the island, the dreaded "Potato Patch," but were now anchored in tranquil waters. It was a great ending for our last full day on Santa Cruz Island.

This was the second trip in two years that I'd organized as part of a renewed survey of the sea caves there. Santa Cruz is to sea caves what Kentucky and TAG are to solution caves. There are few places in the world that have the abundance of major sea caves that this island has. Prior to this renewal of our survey work, from 1982 to 1988 we had mapped 112 caves for a total of over 5 miles of passage. With the addition of some large new caves surveyed on these two, there are now 28 caves over 300 feet long and 49 over 200 feet long on the island.

The initial work here was all presented in a book I published in 1988, *Sea Caves of Santa Cruz Island*. Maps of most of the caves, descriptions, and photos were published in this guidebook to the island caves. The book has been helpful for biologists studying the marine and avian inhabitants of the caves, and also became popular with sea kayakers as this sport has grown in popularity. At the time I felt like we had found most of the caves, but a few visits in subsequent years suggested there was lots of stuff we may have missed. The book has now been out of print for almost a decade. In 2006 we did the first survey trip to the island in almost two decades, in anticipation of my making a revised version of the book, which would include maps of new caves, maps of the few caves we'd explored but been unable to map, and photographs of all the entrances

John Lovaas begins sketching in the surge channel leading into Backdoor Cave



Nancy Pistole in a sea cave crawlway at Backdoor Cave

to help identify them. It will also incorporate new information from wildlife biologists on which caves to avoid and when, to protect the birds that nest in the caves. Generally speaking, fall is the best season to not only avoid run-ins with nest builders, but also to have the calmest sea conditions.

The 2006 trip consisted mostly of scouting for new caves, shooting entrances, and sorting out exact locations for some of the caves in the book. Conditions were on the rough side, so we only mapped one new cave, one that is unusually difficult to spot for a sea cave. Instead of the typical opening, the cave was visible from the sea only as a tall fissure blocked with rocks. Only by scaling a 15-foot climb was the cave beyond visible. The survey of this cave yielded 233 feet of the most linear cave I've seen, even for a sea cave. It also had a huge tide pool full of lobster in the back. A map and photos were published in the *California Caver* (#237, Summer 2006)

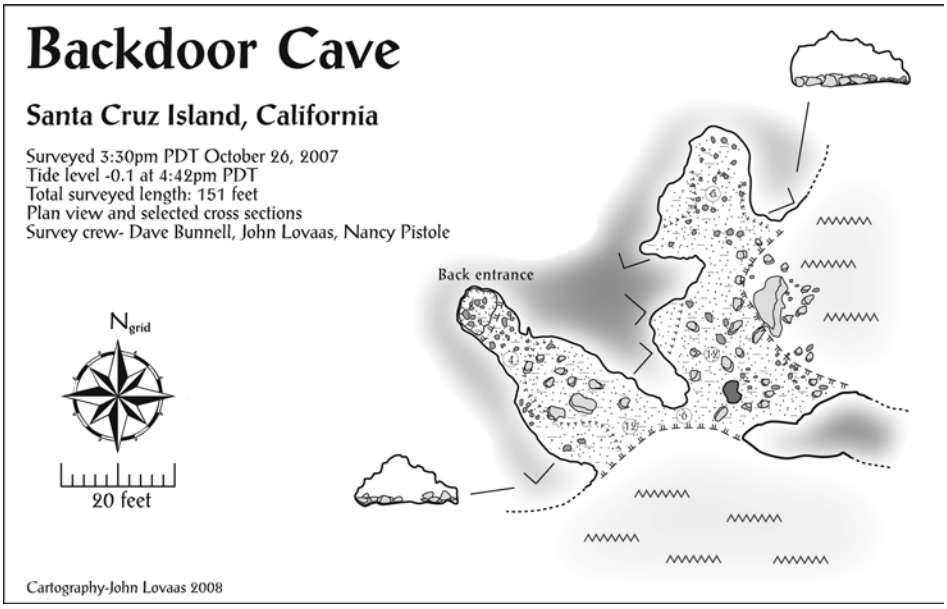
In late October 2007, Dan Clardy, John Lovaas, Nancy Pistole, and I headed out once again to seek high adventure in the sea caves of Santa Cruz Island. We were in Dan's 43-foot tri-hull, a roomy sailboat without a sail but able to cruise at a whopping 6 knots with its inboard diesel engine. So it took several hours to make the 25-mile crossing from the harbor in Santa Barbara. This time I was armed with a bunch of cool printouts made from Google Earth showing all the known caves, leads spotted on previous trips, and some new leads evident from perusing GE alone. Happy is the caver whose project area is covered in a high level of detail… After a hiatus of almost two decades, technology was giving our sea cave survey a boost.

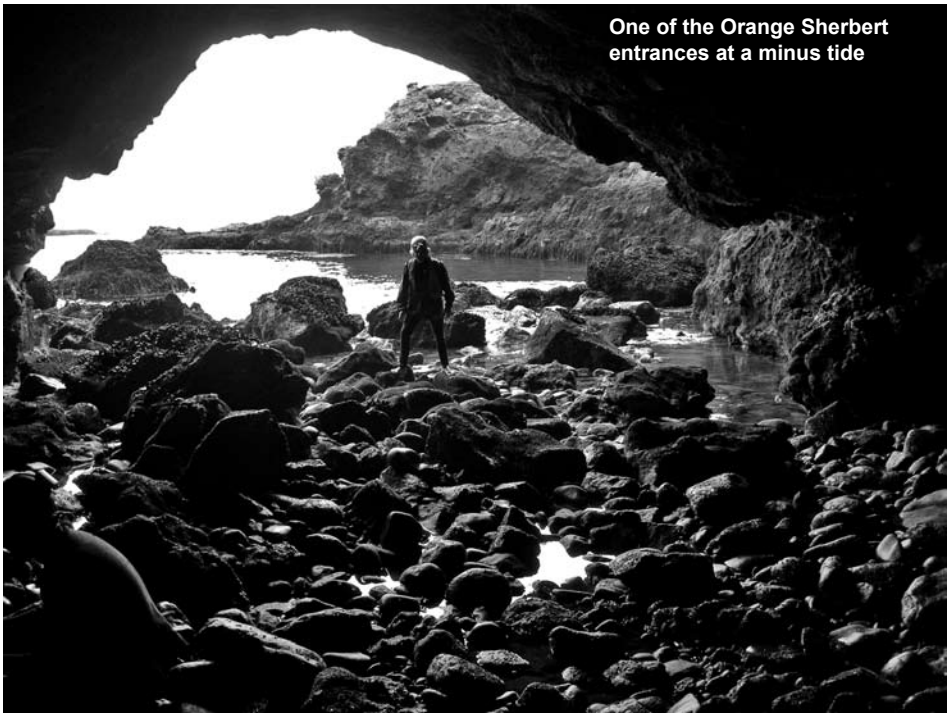
Day 1: East End

The east end of Santa Cruz Island is administered by the National Park Service as part of Channel Islands National Park. There is a great anchorage at Little Scorpion Bay amongst cave-studded islets, and here we made our home for the first night. As is usual in sea caving, our surveys were planned for the periods of a couple of hours before and after the low tide. Only then can you be certain of getting access of most of the cave, and even then, portions of a cave may be accessible only with SCUBA gear. Since the low tides for the days of our trip occurred in mid to late afternoon , we would typically spend mornings moving the boat into position, scouting caves, and photographing and confirming entrances of caves mapped in the 1980s. After a morning of scouting from the main boat, we then headed out in sea kayaks for closer looks and were prepared to survey any new finds. With the sea kayaks one can pop into a cave opening for a better look than from the big boat. We found some interesting new caves on the east side of the island, after rounding San Pedro Point. The surf wasn't exactly calm but conditions were better than on the north side of the island. As the low tide approached, we picked a complex area that appeared to have several caves to work on. Landing was a bit tricky as the shoreline was a rocky shelf—so we did a "seal landing," basically riding a swell up and plopping onto the shelf. A failed seal landing typically ends with one flipping their boat and dumping, but the most experienced of us managed with no problems. Not so our novice sea caver… Scouting the closest entrances, we entered a nice chamber with two seaward entrances separated by a pillar. The tide was now quite low, and it was clear from the organisms encrusting the ceiling that this cave pretty much opened up only at low tide. The floors were covered with a nice variety of purple urchins, giant green sea anemones, and some large keyhole limpets. One surprise here was an entrance in its far end that emerged up on to dry land, so we named it Backdoor Cave. Another unusual feature was a surge channel on one side of the cave, with a keyhole in one wall that one could crawl through into an adjacent cove with a huge cave entrance, probably 100x50, but this led only into a shallow cave with a series of high ledges obviously popular with birds.

Day 2: Platt's Harbor Caves

The next morning we moved the boat west about 10 miles to Platt's Harbor. We had located several promising-looking leads here on our last trip, using the kayaks. Today we were due for a very low tide, -0.9. The most intriguing region was a point that appeared riddled with 7 or more entrances. A large swath of orange lichen covered the sea cliff above, later lending the name Orange Sherbert Complex for the cave we found. Landing near some of the smaller entrances, we dragged the boats over barnacle-studded rocks exposed by the receding tide. Two small entrances connected up inside into some smallish tunnels that then opened into a very large chamber, over 100 feet across, about 90 feet wide, and with ceiling heights up to 25-feet high. The tide pool life in this chamber was stunning: most of the large cobbles were covered with sponges in various hues of orange, yellow, red, and blue. One rarely sees sponges in tide pools outside, as they seem to prefer more subdued light. Sea caves with permanent dark zones, however,



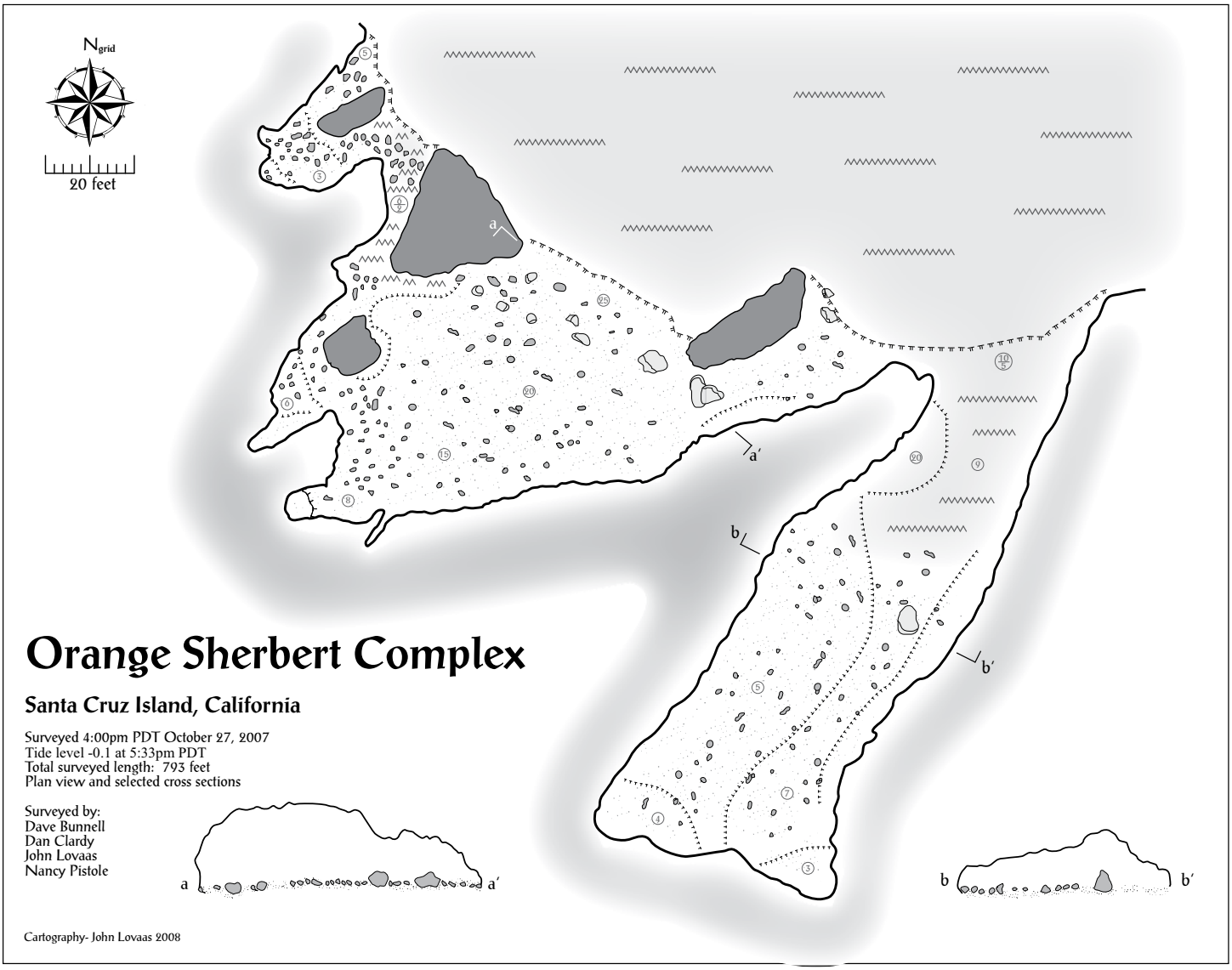


One of the Orange Sherbert entrances at a minus tide

typically have only white sponges. Bright red Bat Stars and orange Ochre sea stars clung to the rocks, while some of the tide pool basins were filled with purple urchins and giant green anemones. We took a series of splay shots to define the room, and while John caught up on the sketch, I took some snapshots with my little Coolpix P5000. The cave was generally well illuminated but headlamps were definitely useful for seeing the floor details and portions of the room were in total darkness. The latter areas showed very little tide pool life.

On the east side of the main room an opening gave access to another passage that was water-filled even at this low tide level, so we grabbed the kayaks to explore it. It taped out to 110 feet long and up to 50 feet wide, with ceiling heights up to 20 feet. We landed inside yet another large cobble-covered chamber. These large cobbles probably act as grinding stones as the surf surges in, tumbling them around and scouring the cave walls and ceiling.

On a roll with this large cave, and about



Purple sea urchins (*Strongylocentrotus droebachiensis*) and Giant green anemones (*Anthopleura xanthogrammica*) in Backdoor Cave. The former mean that stout footwear is advised for sea caving.

Dan Clardy entering Orange Sherbert Cave. Guess who was puling sea urchin spines from his feet later?

Bat Star (*Patiria miniata*) and sponges in Orange Sherbert Cave

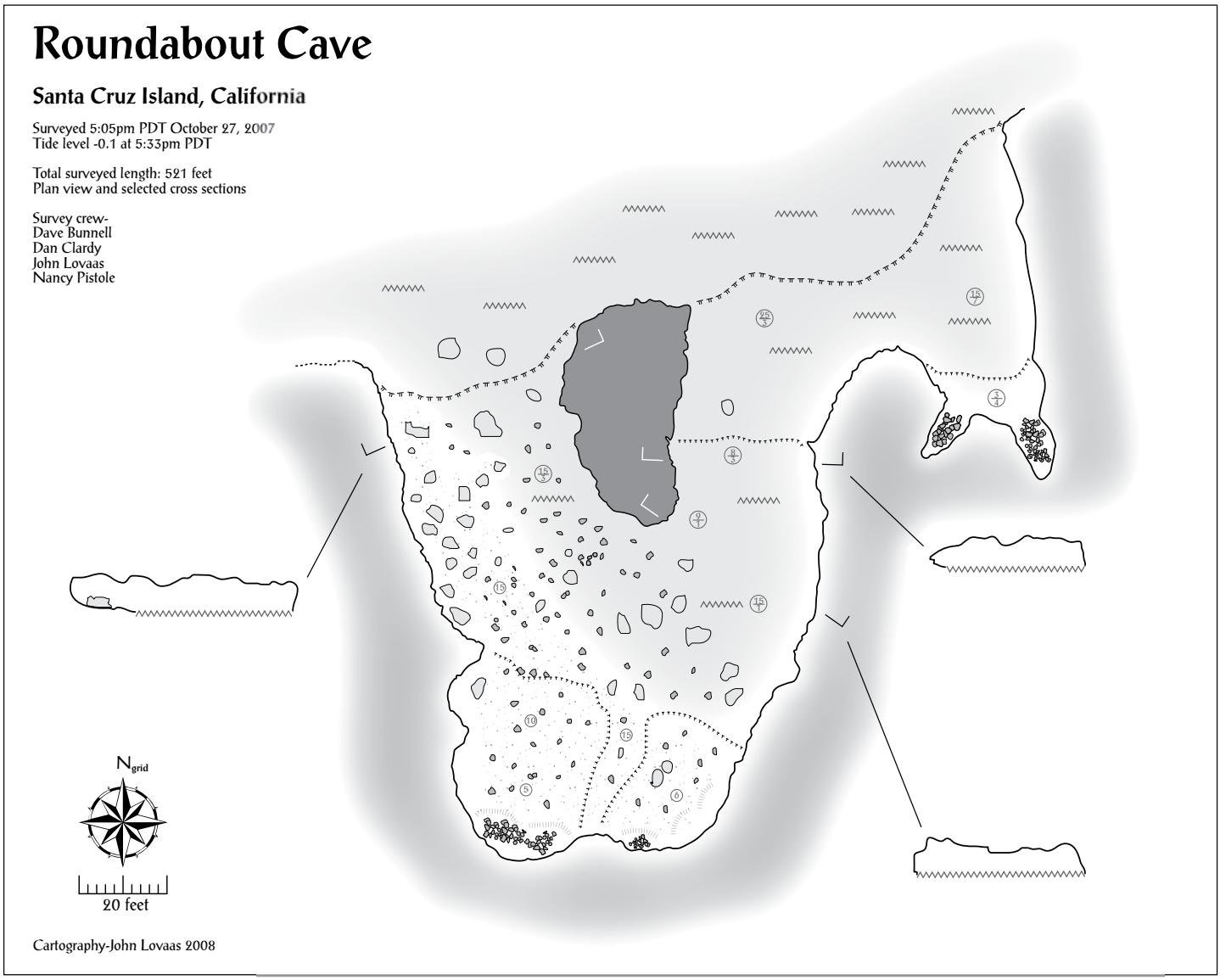
Nancy Pistole at one of the Orange Sherbert entrances

An Ochre Sea Star (*Pisaster ochraceus*) in Orange Sherbert Cave

This cave on the east end was formed along a contact between the basalt and the agglomerate layers.

A Giant Keyhole Limpet (*Megathura crenulata*) in Backdoor Cave

Sunset in Forney's Cove



an hour of daylight remaining, we paddled around a point to a nearby cave that we had explored on our 2006 trip. On that day, conditions had been much rougher, but we had fun darting into the wide, low cave and doing a through trip out to a second entrance through a small tunnel that intermittently filled and emptied with the swell. Timing was everything then. But now, with the tide very much lower, it was practically a dry survey of this cave, a broad, 10-foot-high chamber again floored with large cobbles. We worked the cave until after dark, and paddled back to the boat via headlamp. We'd also flipped on the boat's anchor lights before leaving, just in case we returned after dark.

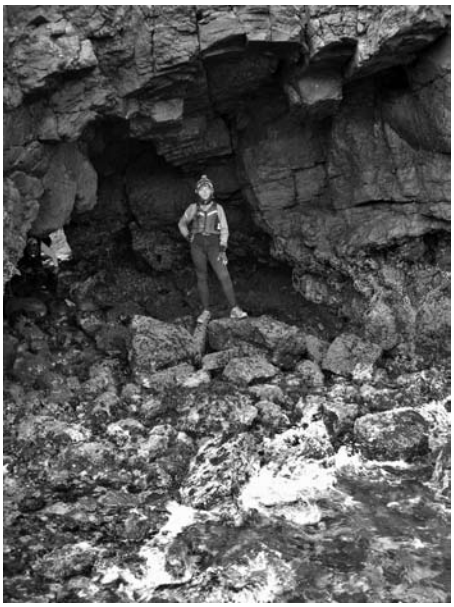
Day 3: Painted Cave

Our third day on the island was a photographic safari to photograph the interior of Painted Cave, the results of which were detailed in the January 2008 issue of the News. We found more surveyable caves that day, but swell conditions had picked up to the point where it seemed too risky to enter some of them. It didn't help that the low tides occurred so late in the day, after the afternoon winds had picked up.

Day 4: Forney's

On our last day we rounded the West End of SCI, an area known for habitually rough seas as it caught the prevailing west swells directly. Years ago, Nancy Pistole, Matt Oliphant and I had mapped 5 huge caves here on an unusual glassy-sea day. This morning, we traversed them in the big boat, the best platform for shooting entrance photos. It was much too sloppy for kayak scouting, so we continued around to Forney's Cove, a well-protected anchorage where I knew of at least one unsurveyed cave. We did a surface hike and located a whole series of caves I hadn't known of, before returning for a gorgeous sunset.

We'd mapped some great caves, and better yet, found even more caves to return to in a beautiful place. What more can one want out of a caving expedition?



Nancy Pistole at one of the Backdoor Cave entrances