



SALTSPRING ISLAND SAILING CLUB

# TellTales

VOLUME 23 • NUMBER 3 • March 2004

## The count-down has started!

The planning for the 30th Annual Round Saltspring race on May 22 and 23, is well under way. The committee of Kevin and Wendy Vine, David Wood, Phyllis Waltra, Bill Bull and Commodore Russ have been meeting and planning the race. I am pleased to report that our 8 local sponsors are on board again.

The advertisement is in place and the poster completed. In the next couple of weeks Registration forms will be sent to all those who raced last year. Posters and Registration forms will be sent to about 15 local clubs reminding their racers of the race. Since over the last three years the race has grown from 80 boats to over 100, and last year 120 plus, we are preparing for a busy weekend. The feedback from the racers has been that it is a great race and weekend. With this type of personal advertisement, we expect another good turn out.



There has been a slight change in prices to meet rising costs, but we want to keep the weekend affordable. One of the major changes is our requirement now to charge a \$10 surcharge for those boats who do not have a valid PHRF-NW certificate.

At this time, we would like to remind all our club members that the planning is on-going and we will be calling on volunteers to help.

—Bill Bull, *Committee Chairman*



### **It's there!**

### **It's in place...**

says Rear Commodore Derek Barrio, with relief in his voice. And what a major job of designing, organising and implementing the installation of the new breakwater and float it was. In the photo at right, Derek is explaining the tasks of the day to all the willing volunteers.



## As there may be SOCIAL EVENTS

lined up for March  
—plans for which have not been solidified at this time—  
please contact Staff Captain, Rick MacKinnon at 537-1352 or check the clubhouse door for further details

## Racing schedule

Sunday, 21 March  
**SPRING ONE-DAY REGATTA**  
1000 h start  
Short around-the-buoys  
courses

Sunday, 4 April  
**WALKER ROCK RACE**  
1000 h start, TL 1830,  
distance 17.3 NM  
Start - Welbury Spar (P)  
- Walker Rock (P)  
- Welbury Spar (S) - Finish

## On the docks

It's there! It's in place, with all the pilings driven; and it looks great! Well, it will look better when the plumbing and electrical services are completed, but for now let all those members involved with the installation of the new B-dock and breakwater revel in the satisfaction of a job well done.

Considering the magnitude of the job the project went very smoothly with all the pieces assembling together without too much heartache. Without a doubt, the glory must go to a dedicated group of members who worked for approximately 10 days taking B-dock apart before the arrival of the new concrete floats. Then a further 12 days after delivery of the floats to see the docks in place. The teamwork between our various crews was brilliant. Cooperation with Island Marine's pile drivers went smoothly thanks to a very professional crew on the pile-driving barge who consulted us at each step of the work.

As the person responsible for the new B-dock project, I want to thank the following members for their tireless dedication (and patience) to the project: Marc Lalonde, Terry and Sheryl Ison, George Manners, Ed Shaske, Brian Swinburne,

*Continued on page 3*

**Deadline for the next  
TellTales is 9th April**

## Spring into cruising!

Following Lorne Shantz' 'Virtual Broughton' cruise we have a shorter Shake-Down cruise.

### April

Friday, 23rd - Hugh on the Rocks

A casual cruise among, but not on, the 'best rocks around these parts' with a knowledgeable and entertaining guide. Owing to the nature of this cruise numbers are limited! Details in the Yearbook.

Book in at 653-9253, with a note at the clubhouse 'cruising' box, or email Neil at meadow@saltspring.com.

### May

Saturday, 8th - Land Cruise on Saltspring, with Hugh Greenwood. A limited number of participants. Book in early!

Tuesday 25th - Proposed leave date for the Broughton Archipelago. Planning meeting date/time will be posted in April TellTales.

Cruisers are also encouraged to race. It's not so fearsome and a racer is usually around to hitch a ride with if you can't get up the steam to unfurl your own sails—and we practise reciprocity! Racers can cruise! It's not so fearsome either.

—Neil Buchan, *Fleet Captain, Cruising Aka, The cabin boy*

"My apologies to the General Meeting of 24 February for my totally tongue-tied waddle. Explanation: (1) I was on pain pills; (2) A huge wave of *deja vu* swept over me and I was back in school about to give a specious and facile report on some book like Lord Jim. Brrrrrrrr! (3) Brain is turning to mush."

## More information about sewage discharge

Jennifer Healey draws our attention to an article in the latest newsletter from the Georgia Strait Alliance which she (and Jon) thought would be of interest to club members. Have a look at the article in the February issue of the Georgia Strait Alliance at [www.georgiastrait.org](http://www.georgiastrait.org), 'Considering our own impact', which deals with the discharge of holding tanks and marine toilets.

Please consider getting the electronic edition of TellTales—saves the Secretary from having to fold, stuff, lick and mail the newsletter!

## Wharfinger's report

**Moorage** - The reconstruction of B-dock has kept your committee quite busy over the past two months. During the reconstruction, boats berthed at B-dock had to be sent elsewhere. Jim Ballantyne was able to make arrangements for about half of the boats to go to the Royal Vancouver Yacht Club outstation in Long Harbour. Space was found for others in our own marina and a few boats had to move to Salt Spring Marina. A big thank you to Jim and to the Royal Van for their assistance in hosting boats.

The new dock configuration required considerable relocation of member boats. We have not been able to entirely satisfy everyone but overall the arrangement seems about as good as we can manage for the moment. One or two members would have liked individual consultation and choice of location but given the time constraints and the fact that four affected members were away at the time it did not seem to be practical. The proposed relocation plan was posted in the club foyer for some time to allow members to review it. Fortunately it was possible to offer relocation to single slips for those expressing dissatisfaction. In most cases this has resolved the issue. As well, we were able to satisfy some long-standing requests for relocation by other members.

As several members were away, it was necessary to move their boats by hand and by towing. Thank you to all who helped, particularly Bob Sissons, who was very handy with the club rescue boat.

Thank you to everyone for being patient throughout this process.

We currently have seven members waiting for moorage and six requesting relocation. Two smaller slips are available but most of the requests require larger slips. As Tony Booker noted last year the trend is to larger vessels and we are having difficulty accommodating these requests within the marina. Several of the new fingers created during the B-dock reconstruction are of a larger size but at the moment it has been necessary to use these for the smaller boats from B-dock. These smaller boats will be relocated as

soon as suitable slips become vacant. This will allow us to accommodate some of the larger boats.

**Electricity** - All boats with electrical hook-up have had their draw measured. The new meter has worked well and made the job fairly fast and convenient. At a couple of locations the ground fault circuit interrupter outlet GFCI was tripped and no current at all was flowing to the boat. It has been suggested that if there is a GFCI outlet on the boat as well as on the dock, one or other of the outlets may trip. I am not an electrician but this might be worth checking if your vessel has a GFCI outlet.

The power draw for a handful of boats measured over what was contracted for. In these cases, several measurements were made over a period of a couple of weeks to ensure the overage was not an aberration. Where vessels continued to show a power draw in excess of that paid for the details were reported to the financial manager.

Two extension cords were found not to have grounded plugs. It is very important that members comply with the club regulation and use a grounded plug. To do otherwise creates a significant danger of electrocution for the wharfinger and everyone else, including the owner!

**Upcoming matters** - We all have a responsibility to assist with moorage over the summer and during the Round Saltspring weekend. The summer wharfinger roster will soon be placed in the club foyer for members to sign up. Round Saltspring comes up in May. Please be ready to share moorage space with the many visitors expected for the big race.

Thank you to committee members and others who have assisted during this busy start to the year.

—Jon Healey, *Wharfinger*

**Please note that my telephone number in last year's Yearbook is incorrect. The correct number is 537-1222.**

**Who'd have thought:** the club website, during January, had 2565 visitors looking for racing, float-building and TellTales—in that order.

We've had a total of 15,336 visitors since we started the website!

TellTales is published ten times a year by the Salt Spring Island Sailing Club  
152 Douglas Road, Salt Spring Island, B.C. V8K 2J2

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Editing/production by Per and Lynetta Rasmussen (pras@saltspring.com)

## The 2004 yearbook is ready...

for pickup now. Please go and get yours as soon as possible. The books are laid out on a table in the clubhouse, they include your 2004 membership card, and you can at the same time pick up a copy of the 'yellow club directory'

And, again, the yearbook comes in on budget. What this means to us is that we get this great yearbook, filled with useful information, at no cost whatsoever to the club!

We all need to support the advertisers who bought ads in our yearbook; so keep telling them that, "...you saw their ad in the yearbook!"

### Salt Spring Island

Berkshire Group  
BMO Nesbitt Burns  
Calvin's Bistro  
Dave Betts, Shipwright  
Embe Bakery  
Family Jewels  
Flowers & Wine  
Fogsglove Farm & Garden Supply  
Ganges Floor Coverings  
Ganges Garment Co.  
Ganges Village Market  
Gulf Islands Brewery  
Harbours End Marine  
Island Marine Construction  
Island Savings Insurance  
Ken's Mobile Marine Service  
Lightning Press  
Moby's Marine Pub  
Mouat's Clothing  
Mouat's Home Hardware  
Mrs. Clean Laundromat  
Pharmasave  
Porters at Harbour House  
Salt Spring Insurance Agencies  
Saltspring Linen & Drycleaners  
Slegg Lumber  
STS Ltd. Upholstery  
3 Waves Yacht Services  
Thrifty Foods  
Tree House Café  
Windsor Plywood

### Vancouver Island

All Bay Marine  
Blackline Marine  
Boater's Exchange  
Bosun's Locker  
Canoe Cove Marina  
Delta Marine Services  
Jensen Marine Supply  
Leitch & McBride Sails  
Philbrook's Boatyard  
Philpott Machine Works  
Sidney Marine Supply  
The Marine Supply Store  
UK Sails  
West Wind Hardwood  
Westport Marina

*On the docks, from page 1*

Norm Dinsmore, Bob Scott, Bob Shaak, John Myers, Nick Hodson, Peter Nuk, Al Kirk, Bob Sissons, Lorne Shantz, Sam Sydneysmith, Jim Sinclair, John Wellingham, Les Price, Harold Brochmann, Kevin Vine, Rick Gilleland, Alec Houston, Jon Healey, Dick Pattinson, John Gibbs, Gary Railer, Gordon Ford, Dave Arnott, Mike Byrne, David Jardine, Ole Andersen, David Wood, Josh Wood, Dan Wood, Alan Davidson, Ron Beasley, J-P Kraus, Lewis McKay. I endeavoured to take notes of what was required in the way of materials for the next day and who worked which day. Should your name be missing after having turned out I apologise to you.

Whilst all the excitement was going on with the docks, you might not have noticed the new full width metal bridge sections across the gaps along the breakwater. These are courtesy of Bob Shaak and Bob Scott who manufactured them right here on Salt Spring Island.

Before you all retire to rest on your laurels, may I remind you that there is a bit more work to do! It involves making some plywood backing boards to accommodate the electrical outlets and water taps and hoses. In order to get the services to the new docks we should tackle this one as soon as possible.

—Derek Barrio, *Rear Commodore*

## Watch spring arriving!

From late March on into spring is a good time to cruise close to the south shores of the Second and Third Sister islands in outer Ganges Harbour.

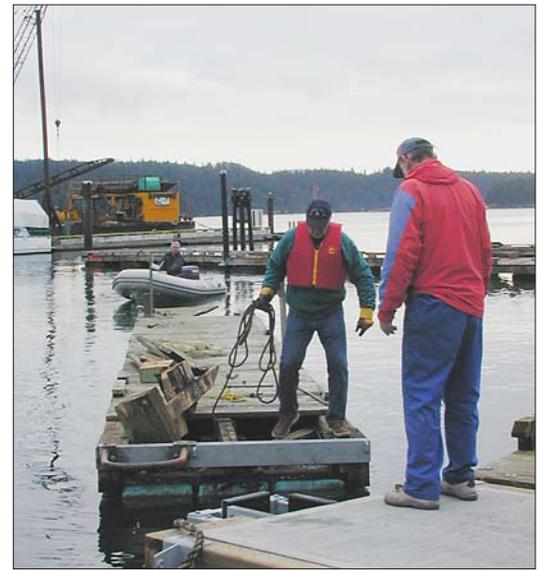
Along the rocky knolls are patches of wild flowers, including pink sea-blush, yellow wooly sunflower, and white field chickweed. Patches of bluish-purple vegetation indicate the presence of Blue-eyed Mary, (*Collensia Grandiflora*) a dainty annual which grows abundantly on dry exposed locations of the Coastal Forest Zone. Reflecting the sky colour are clusters of azure-blue with touches of white. Watch for it! You'll be delighted!

—Chris Pattinson

## Boat exchange

Are there any club members interested in doing a boat exchange in Denmark. The boat is a Bianca 111 (36 foot sailboat), and it is located at Munkebo—a 2½ hour train/bus ride from Copenhagen airport.

If you are interested, please contact Lorne Shantz at 537-2483 for more information.



*Jon Healey, Mike Byrne and Bob Sissons (in dinghy) ferry old fingers away to make room for new dock*

## 50% partnership in KANGA for sale

Tanzer 26' sailboat with 8HP Honda four-stroke outboard. Fully equipped and recently upgraded with new VHF radio, Profurl genoa, and head. Redesigned interior and bottom-painted last summer. Asking \$5,000. For details, contact Peter Lamb and Jean Gelwicks 537-4859, or Susan and Doc Paynter 653-9688.

## A note of thanks

On behalf of the *Seeds for Malawi* Steering Committee and SSI Garden Club, I extend many, many thanks to the Crafty Cruisers (April, Jill, Jenny, Sandi, Joan, Candace, Sylvia, Dawn and Jennifer) for volunteering your time and your clubhouse for making so many colourful *AIDS angel dolls*. They made a great display at *Seedy Saturday* and we plan to have them on display at many other fundraising events to come. The proceeds of the sales are directly supporting African women to grow food for their families in northern Malawi. Thanks for contributing your artistry and enthusiasm to help those who are so much in need. Donna Cochran.

Recently the Crafty Cruisers participated in the making of 90 angel dolls for donation to the SSI Garden Club's on going fundraiser, *Seeds for Malawi*. This was all accomplished in two crafty mornings of assembly line style work. The Garden Club provided heads that Jill painted and is now counting in her sleep and the bodies. The Cruisers provided fabric and embellishments to dress up the angels, made wigs and wings and had a grand time.

—April Steel

# Look forward to exciting and educational cruising in our own back yard this spring and summer!

Reading the two articles on the following pages should get even the most confirmed armchair sailor out on the water around Salt Spring Island this summer.

Neil Buchan, our Cruising Fleet Captain, in collaboration with Hugh Greenwood, has planned two geology-oriented cruises: the first one—a four-day boat cruise in the vicinity of Salt Spring and the other Gulf Islands—and the second, a 'land cruise' to various locations of geological interest on Salt Spring Island.

We all know a little bit about what's under our feet on our island, and we've all seen the spectacular rock formations in various places on adjacent islands, but in the end most of us are, at best, well informed amateurs.

Hugh, on the other hand, is an acknowledged expert in this field, having spent most of his life studying rocks in university

settings, and having been Head of Geological Sciences at UBC from 1977 to 1984. We'd be hard put to find anyone more qualified to conduct these tours than Hugh.

## ***The Shake-Down Cruise***

Starts Friday, 23 April

Itinerary takes us to Montague, Portland Island, Tod Inlet and Russell Island. We'll be back home again Monday, 26th.

## ***Geological Land Cruise***

A one-day tour of Salt Spring Island on Saturday, 8 May, when we visit a number of important geological sites.

Space on this tour is very limited, so make sure you get your name in early.

## A brief geological history of the Gulf Islands

*Text and photo by Hugh Greenwood*



*Eroded rocks on the beach at Bedwell Harbour*

The Gulf Islands seem immovable to those of us who like to explore them in boats. From the nautical standpoint this is certainly true as could be certified by any of us who may have gone aground on them, or perhaps the skippers of the boats forming wrecks among our islands, such as the *PANTHER*, which sank after striking the reef at the south end of Wallace Island, now known as Panther Point.

But our sailing haunts are new arrivals. Not only have the islands not always been here, but the rocks which form them may well have started their existence as muddy sands thousands of miles to the south of B.C. This short article gives a much abbreviated account of the origin and arrival of our rocks to provide a setting for describing some places of interest to visit while boating. There are things to see and once seen it is more interesting to understand than to stare vaguely and move on.

The Island of Saltspring is made up of two distinct groups of rocks. At the south end of the island, a group of older, deformed, and metamorphosed rocks have been referred to as the Myra Formation of the Sicker Group, and are mainly of volcanic origin. To the north of an east-west line approximately through Arnell Park the rocks are all much younger, made up of conglomerates, sandstones and black shales. These younger rocks have been referred to as formations of the Nanaimo Group. The Nanaimo Group hosts the coal deposits of the Nanaimo-Comox area and forms almost all of the rocks seen in the rest of the Gulf Islands and the San Juan Islands.

The rocks seen on the Saltspring side of Sansum Narrows are all part of the Sicker Group, named after Mount Sicker on Vancouver Island, where it was first recognised as a distinct group of rocks sharing a common history. Originally referred to as the Myra Formation, these rocks have been further subdivided on the basis of mapping into smaller sub-units. The oldest of these is about 400 million years old, known as the 'Maxwell Volcanics', and are the result of submarine volcanic activity far to the west of North America, probably near volcanic arcs resembling the modern Aleutian Islands or the modern Philippines.

These oldest rocks were intruded by molten rock (igneous magma) about 370 million years ago, which has been given several different names over the years of work. Some call the rocks the 'Tyee Intrusions' and others call them the 'Island Intrusions'. On Saltspring they may be seen at the base of Mount Maxwell along the shore of Burgoyne Bay and beside Fulford-Ganges road at the bend at the top of Lee's Hill.

Next in the recognisable succession of events, at about 250 million years ago, was yet more submarine volcanic activity, still in an island-arc environment far out in the Pacific, although now closer to North America. These events were violently explosive, spreading vast amounts of volcanic dust and ash which settled out in the sea and onto the bottom. These deposits now form what is called the 'Tuam Tuff', which is a splintery thin-layered volcanic sediment.

200 million years ago all these rocks were penetrated by more igneous material which squeezed upward in large cracks and fractures, on the way to forming the lava flows of the overlying Karmutsen Volcanics which may be seen toward central and northern Vancouver Island. These intrusive bodies can be referred to as 'Kanaka gabbro' and 'Kanaka diabase', named after Kanaka Bluff.

Meanwhile, the steady progress of plate tectonics and sea-floor spreading was bringing this complex of volcanic rocks ever closer to North America, and about 110 million years ago they collided with North America and became 'welded' to the continent. Some of the material was dragged down the subduction fault and some of it was scraped off and plastered into its present position. This 'accreted terrane' has been called 'Wrangellia' after the Wrangell Mountains of Alaska where it was first recognised. The process of accretion deformed, folded, faulted and metamorphosed these rocks into the condition in which we now find them, making it difficult to trace the continuity of individual layers of rock, while the original volcanic minerals of

the rocks have been altered to new minerals characteristic of the conditions of accretion rather than of volcanism.

The accretion of terranes against a continental mass produces compression, crustal thickening, and mountain building, but eventually mountains get eroded and the erosion products get redeposited in whatever low-lying bodies of water that may be available at the time. Consequently, the rocks of the Sicker Group were buried, uplifted and eroded, and the irregular topography that resulted formed the base upon which the rocks of the Nanaimo Group were deposited. Because of the time gap required to accomplish all this folding, uplift, and erosion, there is a huge gap in the geologic record of events. It was not until much more recently, about 90 million years ago, that the record resumes, with the deposition of the Nanaimo Group of sandy sediments.

The Nanaimo Group consists of a 4 kilometre thickness of conglomerates, shales, and sandstones which carry in places commercial deposits of coal formed from the burial of vast subsiding swamps of the Cretaceous Period. These basins of deposition were probably fault-bounded depressions which received contributions first from the northwest and later from the southeast.

The two main lines of evidence on the original location of these rocks are in conflict. Measurements of the residual magnetism of the rocks indicate that they were deposited far to the south, perhaps as far away as Baja California. Measurements on the minerals in the rocks (zircon, mainly) indicate that the rocks are made up of material eroded from an ancestral Coast range in southern B.C. or northern Washington. The underlying Sicker almost certainly is far-travelled but the Nanaimo Group may still hold surprises.

The oldest unit of the Nanaimo Group is the Comox Formation, 90 million years old, and consists of a coarse conglomerate lying directly on the eroded old topographic surface of the underlying Sicker Group. The Mount Maxwell lookout is a good spot to see these rocks, where, in addition, one can see the gouges and scrapes left by the glacial ice cap of 10,000 years ago.

On top of the Comox conglomerate is the Haslam Slate, black crumbly shale which has been used for years as topping for driveways and secondary roads. Being shale, this material usually continues to crumble into smaller and smaller fragments until it resembles the black mud from which it originally formed.

Above the Haslam Slate one may find conglomerates and sandstones of the Extension Formation, although irregularities in the depositional surface have resulted in a patchy distribution.

Still farther up-section is several other recognisable sandstone units which form most of the Gulf Islands.

Nearing the time of deposition of the youngest Nanaimo rocks, the entire earth suffered a violent surprise. About 65 million years ago an asteroid 10 kilometres in diameter struck the earth in what is now the Yucatan peninsula. The explosion was so violent that the climate of the globe was affected for years, most of the dinosaurs died along with many other species, and whole new evolutionary trends were started from the creatures that survived. All that remains of the event is the huge Chixlub crater in Mexico's Yucatan peninsula and a scattering of rare elements such as iridium otherwise found mostly in meteorites. These chemical anomalies are found world-wide at the sedimentary boundary that marks the change from the Cretaceous to the Tertiary periods. Around this time the youngest rocks of the Nanaimo Formation were being deposited.

About 45 million years ago the continued accretion of other terranes resulted in more compression of the coastal rocks, forcing the rocks of the Nanaimo Group into a great series of folds trending northwest-southeast. These folds take the layers of sandstone, shale, and conglomerate and 'bend' them into

humps (anticlines) and hollows (synclines) which have been partly eroded. Softer units like the Haslam Shale have been eroded more deeply than harder units, with the result that the bays of the Gulf Islands are in shale and the highlands and promontories are in sandstone and conglomerate.

Places that are interesting to visit on Saltspring Island include Mount Maxwell where one can see the conglomerates of the Comox Formation and the evidence of the glacial scouring that took place 10,000 years ago. In some spots one can determine which way the ice moved as it carried its load of rocks and boulders across the land.

Vesuvius Bay is another spot of interest. Here, below the pub and along the intertidal zone to the northwest, are exposed rocks that belong to the Protection, Cedar District, and De Courcy formations. What is interesting here is the evidence of how these sedimentary rocks were deposited. They were literally 'poured' into a body of water that was much like the present Strait of Georgia. Close examination of the individual layers will show that each layer has very fine-grained material at one side and coarser material at the other side. All of them face the same way. The reason is as follows: if a mixture of sand and mud is dumped into a standing body of water the coarse material settles faster and gets to the bottom before the finer material. When this has hardened into rock this 'graded bedding' can still be seen and used to tell which way was up at the time of deposition. Most of the Rocks of the Nanaimo Group arrived in their sedimentary basin as turbid flows of mud and sand which 'avalanched' off the faces of growing deltas. As an interesting 'aside' one could refer to the earthquake on the Grand Banks in 1929, where turbidity currents were set loose, racing at speeds of 60 kms per hour down the continental slope and onto the Atlantic sea floor. The speeds are well known from the record of transatlantic telephone cables that were broken by the flows. The rocks of the Nanaimo Group had a similar history, 65 million years (give or take) before the advent of telephones.

Another Saltspring locality of interest is the intertidal zone north of Fernwood where rocks similar to those at Vesuvius may be seen. Keen observers may be able to tell whether these rocks have their upper sides facing the same way as those at Vesuvius.

A visit to Ruckle Park can be rewarded by a look at rocks of the Sicker Group, which are completely different from those of the Nanaimo Group. These older rocks are metamorphosed volcanic flows and sediments made up of fragments of volcanic material. It takes a sharp eye for detail to resolve the features of volcanic origin but it is easy to see that these rocks are much different from the younger Nanaimo sandstones and shales.

Another Saltspring location of interest is the shoreline south of Beddis Beach. Here one can see outcrops of the Haslam slate and the Extension Formation of coarse conglomerate. Also there are many rounded concretions which have weathered out of the solid rock. Many of these concretions contain fossils at their centres. The concretions form as a result of the decomposition of the animal now recorded at the centre. Methane and carbon dioxide produced by decomposition reacts with dissolved calcium from the sea water to form calcium carbonate cement which resists later erosion and can be found as rounded boulders on many beaches. Close examination will often show that the original sedimentary layers go right through these concretions from one side to the other showing that they formed while the rock was still intact and in place.



# Some shoreline geologic sites in the Gulf Islands

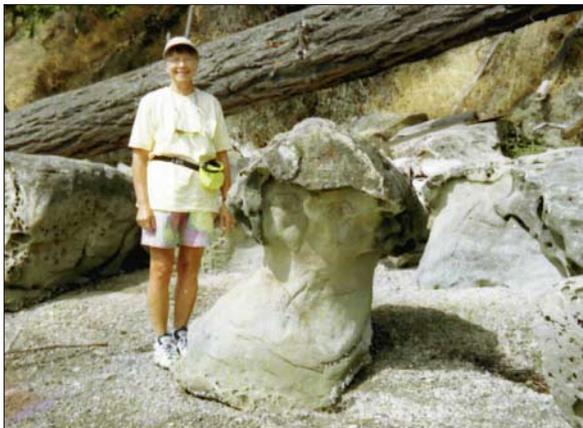
*Text and photos by Hugh Greenwood*

Most of the rocks that form the Gulf Islands belong to the Cretaceous-aged Nanaimo Group. This group of rocks is roughly 4 kilometres thick and consists of layers of conglomerate, sandstone, and shale. The oldest of these rocks is the Comox Formation, which is a 90 million year old conglomerate of boulders and pebbles lying on top of the eroded surface of the Sicker Group, named after Mount Sicker on Vancouver Island. The youngest is the Gabriola Formation, 65 million years old and lying at the top of the stack of folded sediments. As one cruises the Gulf Islands one may add to the interest and enjoyment of our coast by seeing and understanding some of the evidence that points to the history and origin of our islands.

Below is a brief list of some of the spots worth visiting with notes on what may be seen and what may be inferred from the exposures. The previous article in *Telltales* (p.4) emphasises some of the sites on Saltspring Island, and this article covers stops at some of the other islands.

## **Montague Harbour**

In Montague Harbour, Galiano Island, a walk along the beach near the park dock, and then around the trail that skirts Grey Peninsula opposite Parker Island shows some interesting features.



*Sylvia beside 'mushroom rocks' on the beach at Montague Harbour*

Along the intertidal zone to the west of the pier are 'mushroom rocks,' 'hollow boulders', and thin-bedded sandstones and shales of the Spray Formation. The 'mushrooms' stand up above the surroundings on thinner 'stalks' with broader 'heads'. These have formed by the erosive action of small waves that continually nibble away at the rock, while the rock above is rarely touched by the sea. The hollow boulders have an erosion-resistant outer layer, which when breached by splashing of salt water, is removed and a process of grain-by-grain erosion occurs as the cementing minerals are washed away or dissolved. This process is similar to that which forms the famous Gabriola Galleries, or caves, of which more below.

Carrying on around the tidal lagoon and following the trail to the point opposite Parker Island one may turn back along the beach for 50 metres to see a 'sandstone dyke'. It is generally noted in elementary geology texts that when one finds evidence that one body of rock has been injected into another one assumes that the injected material was liquid and molten. However here we have 2 metre thick unit of sandstone, standing nearly vertically (dipping 70 deg. N) and clearly trending counter to the direction of the thinly layered sediments. This sandstone is the product of liquifaction, in which soft sediment,

newly deposited and saturated with water can be injected as slurry into other more consolidated rocks. The process is cold, not molten, and happens fairly soon after the sediments are first deposited. Upon looking across toward Parker Island the continuation of this sandstone dyke can be clearly seen. In the same area as the dyke the thin-layered rocks are divided into roughly rectangular patches by cross-cutting brown massive alteration. This is the result of chemical alteration of the original rock by outward diffusion of solutions that have made their way along sets of fractures. Note the symmetry of the brown zones centered about the central fractures.



*Sylvia Greenwood above the cavern at Montague Harbour*

At the east end of Grey Peninsula, at the entrance to the main anchorage are some large caves in sandstone. They are big enough to hold several people, especially if the people are children. There are many examples of this kind of cave formation in the Gulf Islands, and the most famous examples are the Gabriola Galleries at the north end of Gabriola Island. These caves are all located in the splash zone, where they are often splashed and sprayed by sea water but never fully immersed. Some research has been devoted to this phenomenon but puzzles still remain. Their formation seems to be due to the existence of a cementing material that is not washed away by rain water but which is easily removed by splashing sea water. The result is a weather-resistant cap which forms the overhanging top. The nature of the cementing material is not fully understood, but some of it seems to be calcium carbonate cement formed by the interaction of rain water with products of organic life such as methane and carbon dioxide produced by bacteria and mosses and lichens. These sources of cementing material are absent in the splash zone so that a grain-by-grain wasting of the sandstone can occur.

## **Pirates Cove**

At Pirates Cove, just above the high tide line and near the octagonal dinghy dock are excellent examples of cavernous weathering of the same origin as the Galiano caves but on a smaller scale. In this thick-bedded sandstone succulent plants have colonised some of the smaller holes and may have served to amplify the effect.

Progressing along the trail to the south end of DeCourcy Island one may see numerous whitish granitic boulders, some nearly a metre in diameter. A moment's thought should identify these as being anomalous, for they are sitting on fine-grained sandstone. These are called 'erratics' because they do not belong to the rocks on which they sit. These erratics have been left behind

by the glacial ice that covered the Gulf Island 10,000 years ago and which contributed to their erosion.

At the south end of De Courcy Island one may see several salt-pans. These are shallow flat-bottomed depressions, some of which are between 5 and 10 cms deep and up to 4 metres across. There are many of these around the Gulf Islands but these are some of the best. They are formed slowly, probably over hundreds of years by the action of evaporating salt water. Sea water from a high tide collects in a depression and at low tide begins to evaporate, concentrating the salt. The concentrated salt solution dissolves the cementing agent that holds together the grains of the sandstone and the loose grains are eventually washed away. To every such basin there is a lowest point and this controls the level of the salty solution, and over time the removal of sand grains moves ever wider, its height controlled by the lowest draining point. Often in summer one may see crusts of salt retained in the salt pan, but in winter all the salt is washed away.

### **Ganges Harbour**

Second Sister Island has some good cavernous weathering on the south-west side near the navigational aid. However there is little point in stopping here unless you have gone aground on the reef just east of the light and need to wait for high tide. The same may be said for North Acland Island near Glenthorne Passage, where there is excellent cavernous weathering near the high tide line.

### **Portland Island**

Portland Island, Princess Margaret Marine Park, is a lovely place to visit at any time of year, whether to see the remains of the old homestead, or to walk the well-maintained paths, or just to have a picnic. While doing these things it is also possible to see some interesting geologic features.

Royal Cove, behind Chads Islet at the north end of Portland Island is a nice stopping place. There are many ring-bolts on the shores for a stern-tie and the only ferry waves that enter are from the few ferries that approach Swartz Bay from the Saltspring side of Satellite Channel. However if it is crowded there is always the chance of having anchor rode crossed under water when late-comers anchor over early arrivals and then tie ashore. In this respect it is no different than many of the marine parks.

The east side of Royal Cove is made of Nanaimo Group sandstones, and the west side is made of rocks of the much older (400 million years) Sicker Group. There is thus a 310 million year gap between the formation of the rocks on the west and those on the east side of the bay. Along the east side, near the head of the bay one can see for a few metres the contact between the younger and the older rocks. The older ones are sheared and the thin seams of mica and a green layer mineral called chlorite are standing almost vertically. By contrast the younger sandstone shows signs of having been deposited on top of these steeply dipping metamorphic rocks. This huge discordance is called an unconformity.

There is an old narrow trail that skirts the north and west sides of the island which may be followed with care. It is unimproved and without signs but a pleasant and interesting walk over outcrops of the Sicker Formation. About half way to Kanaka Bluff the trail passes by an abandoned mine shaft, or prospect pit. This is a 2 metre square hole partly filled with water. White quartz veining can be seen in the edges of the pit. This was probably dug in hopes of finding a large quartz vein with gold, but apparently the vein was in vain. There are several other quartz veins in the neighbourhood reflecting the fact that in the past there were economic deposits in the Sicker Group on Sicker Mountain.



*Derek Barrio peering into the prospect pit on Portland Island*

As you continue your walk to Tortoise Bay at the south end of the island you may perhaps see a 30-cm fragment of the Comox Formation Conglomerate upon which someone has written the name of the formation, its age at 90 million years, and pointed out the presence of bivalve fossils. Farther north along the east side of the island below high tide there are numerous erratics and the cobbles in the conglomerate have been glacially polished and striated.

### **Russell Island**



*A view of the unconformity on the south side of Russell Island*

Russell Island, near the entrance to Fulford Harbour, is a B.C. Marine Park and must be treated with the same respect that is due to all our marine parks. Russell Island Marine Park is protected from the ravages of visitors by a resident caretaker, Patricia Sarazin, who lives in the house on the eastern half of the island, which is outside the area served by the well-maintained trails. Visitors who wish to leave the designated trails must first get permission from the caretaker, as that part of the island is an ecological reserve.

Upon landing at the 'south beach landing area' the first striking feature is the broad grooving and scratching of the Nanaimo sandstone that was caused by the moving ice sheet of 10,000 years ago. The layers of this pebbly sandstone can be seen to dip gently at 10 degrees to the east.



*Southerly view from Russell Island*

Following the trail along the south side of the island one soon arrives at a bold outlook point with view to the south and east. From this point, look to the east along the shore line across the embayment to where one can see a whitish cliff exposure with light-coloured rocks at the bottom and dark-coloured rocks above. This is an exposure of the unconformity between the 400 million year old Sicker Group and the 90 to 65 million year old Nanaimo Group of rocks. Just past this point the trail turns inland and takes one back to the boat landing.

If one obtains permission to visit the unconformity one should be guided to the spot by the caretaker or other authorised guide. Visitors should be warned that access to the locality involves a scramble down steep loose rocky material and that if the tidal level is higher than 5 feet the place will be inaccessible. With these caveats it is an interesting place to visit.

Below the unconformity lie the rocks of the Sicker Group. Here these rocks contain a set of greenish minerals that indicate that these rocks have been subjected to pressures of more than 2000 atmospheres (30,000 pounds per square inch) at a depth in the earth of 6 kilometres and to temperatures of 400 to 500 degrees Celsius. With a strong hand lens one can identify the minerals chlorite, albite feldspar, quartz, biotite mica, and epidote. These minerals are quite well aligned and are oriented to be approximately vertical. No original volcanic features can be seen in this outcrop as these rocks have been through the squeeze and furnace that accompanied mountain building and deep burial in the earth's crust.

Above the unconformity lies the bottom of the Nanaimo Group of rocks. These are pebbly sandstones at this place and can be seen to be in approximately horizontal layers. The lower layers contain rounded and irregular blocks of the underlying Sicker rocks, and imprints of fossil bivalves and snails (ammonites) can be found in some of the loose pieces of sandstone. These should not be removed from the site, as it is an ecological reserve and nothing should be taken. This is not a place from which to make a collection. Removal of specimens should be regarded as theft.

### **Cabbage Island Marine Park**

Cabbage Island shows at low tide a Nanaimo Group conglomerate which has weathered out to spread loose pebbles over the modern beach as a 'lag deposit', the interstitial grains having been removed by wave action. Some of these pebbles and cobbles show scratches and striae from the passage of glacial ice. On the Tumbo Channel side of Tumbo Island there is a large splash cave of the same type as found at the north end of Gabriola Island.

### **Bedwell Harbour**

Starting at the park steps and walking north along the intertidal wave-cut beach one can see good exposures of thin-bedded turbidite sediments similar to those at Vesuvius Bay. Here one may be able to determine that these steeply-dipping layers were once horizontal and that now the sides of the layer which were once on top lie to the east. Following along toward the sandy bay it is possible to see that the layers progressively change their angle, indicating that one is approaching a visible fold in the layers.

Glancing across to the small islet with the light structure on it one may see a 2 metre granitic erratic providing evidence that our island were once totally covered by ice. This erratic was transported by ice to South Pender Island from somewhere in the Coast Ranges north of Texada Island.

### **En passant**

In passing other locations there are things to see and to appreciate even if one does not have the time or inclination to stop.

For example, here and there among the Gulf Islands are high white sandy cliffs and bluffs. These have been called the 'Quadra Sands' by researchers and represent the outwash from an early glaciation. The sands can be seen all the way south from Desolation Sound, on Hernando Island, Savary Island, around Nanaimo, and Sidney and James Island near Sidney. As the ice of this early glaciation retreated the sands were poured out and deposited in the Georgia Basin during the interval between 40,000 and 20,000 years before the present. The times have been derived from radio carbon dating.

While transiting Active Pass by ferry or your own vessel, a glance toward Gossip Island will reveal a large white boulder about 3 metres in diameter, which is resting upon sandstones of the Nanaimo Group. Here again is an example of an ice-transported granitic boulder, far from its point of origin in the Coast Ranges at a depth of about 5 kilometers and a pressure of about 650 degrees Celsius. Erratic indeed!

Newcastle Island Marine Park is another place well worth a visit, where one can see good examples of salt pans, cavernous weathering, and some thin coal seams in addition to the excellent notes that are available at the park

Farther north between Lasqueti and Jedediah Islands a whole different environment is displayed. Here the Karmutsen volcanic rocks, about 200 million years old, display a number of interesting volcanic features. As you travel north in Bull Passage, between Jedediah Island and Lasqueti Island you can see, in a bluff on Jedediah Island, a body of basaltic rock which has fractured into roughly hexagonal columns. Such columnar joints are the result of shrinkage during cooling of the originally molten basaltic material. Similar columns may be seen en route to Whistler just south of Brandywine Falls.

Upon anchoring in Boho Bay, Lasqueti Island you may see some interesting features on the bare point on the north side of the entrance. There are rocks made up of angular and slightly rounded fragments of all sizes, and these are known as lahars, or volcanic mud flows similar in many ways to the mud flows that poured down the Toutle River after Mt. St. Helens erupted. In addition one can find pillow lavas. These are similar to what one finds at the south end of the big island of Hawaii, where lavas have poured into the sea and formed pillow-shaped and mattress-shaped lumps with a tough glassy skin and a molten interior. These pile one upon the other into a stack of pillow-like bodies.

On Jedediah Island there are glacial striations to be seen in Deep Bay and pillow lavas to be seen at the south end of the island.

Altogether this area has plenty of interest beyond the old farm and the feral goats.