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GOLD PLACER OCCURRENCES IN COASTAL NEWFOUNDLAND: WILL THEY PAN OUT ?

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ABSTRACT

A nearshore sampling program was undertaken in Deer Cove, Baie Verte in an attempt to assess the potential economic viability of small-scale placer mining in Newfoundland waters. A hydraulically actuated bucket sampler and a diver-operated suction device were used to collect large volume samples in water depths of < 10 m. Gold grades of the bulk samples were found to range from 12 to 1900 ppb. More work is required to determine representative grades and tonnages of this and other prospective sites on the Newfoundland coast.

INTRODUCTION

The possibility of placer gold occurring on the northern Newfoundland coast was first suggested by Emory-Moore and Solomon (1989), who compiled and integrated regional geological evidence for the area. The authors suggested that there is some potential for both primary gold placers (derived from marine abrasion of mineralized bedrock) and secondary gold placers (derived from marine reworking of an auriferous secondary source such as glacial till). In order to test this premise, regional sampling and mapping of selected areas have been undertaken by the Geological Survey of Canada (Shaw, 1990; Shaw *et al.*, 1990; Shaw *et al.*, 1992; Edwardson *et al.*, 1992).

The field data collected to date suggest that there is some potential for small beach and nearshore gold placers, similar to those mined in the Ovens district of southeastern Nova Scotia. The placer deposits in the Ovens area were volumetrically small but locally very rich; approximately 2000 ounces of gold were recovered during the early 19th century (Samson, 1984). The data does, however, indicate only a small probability of finding any large secondary gold placers on the northern Newfoundland shelf (Emory-Moore and Davis, 1992).

This paper describes the first attempt to obtain large volume samples from the inner shelf zone (<10 m water depth) off Deer Cove, Baie Verte (Figure 1), an area known to contain detrital gold. The long-term goal of this work is to determine the potential economic viability and environmental impacts of small-scale placer mining in Newfoundland waters. This work is particularly timely because of the closure of the northern cod fisheries in Newfoundland and the clear need to establish alternate resource bases for small coastal communities.

THE STUDY AREA

Deer Cove is a small, highly exposed cove carved into steep cliffs of ophiolitic and volcanic rocks. Gold occurs within the coastal rock suites and has been the focus of considerable exploration activities on land (Gower *et al.*, 1988). The gold is generally coarse grained and readily detectable by the human eye. The coastal rocks are overlain by a sparse, discontinuous cover of till.

In Deer Cove, a wedge of coarse talus material overlies bedrock near the base of coastal scarps and at the base of a large shoal near the centre of the cove. The talus sediment grades into an armour of tightly packed coarse cobbles and then into a mixture of sandy gravel near the centre of the cove. An 8- to 12-m-wide lens of sand trends offshore from a small brook located near the head of Deer Cove. The maximum water depth in Deer Cove is 12 m.

The gravels and cobbles in Deer Cove are heavily encrusted with a purplish coraline algae (*Lithothamnion*). Sea urchins, sea stars, worms and rock crabs abound. Gastropods, bivalves and shell debris are also present.

METHODS

Seven samples were collected in Deer Cove during the fall of 1992 (Figure 1). Three of the samples were collected with a hydraulically actuated bucket sampler (Scott *et al.*, 1991), which has a penetration depth of approximately 30 cm (Plate 1). The sampler was deployed several times at each sample station to ensure a reasonable sample size (> 40 kg). The heavy-mineral fraction of each sample was concentrated using a 3-m-long sluice box and then submitted for gold analysis. Sample locations were determined using a Global Positioning System.

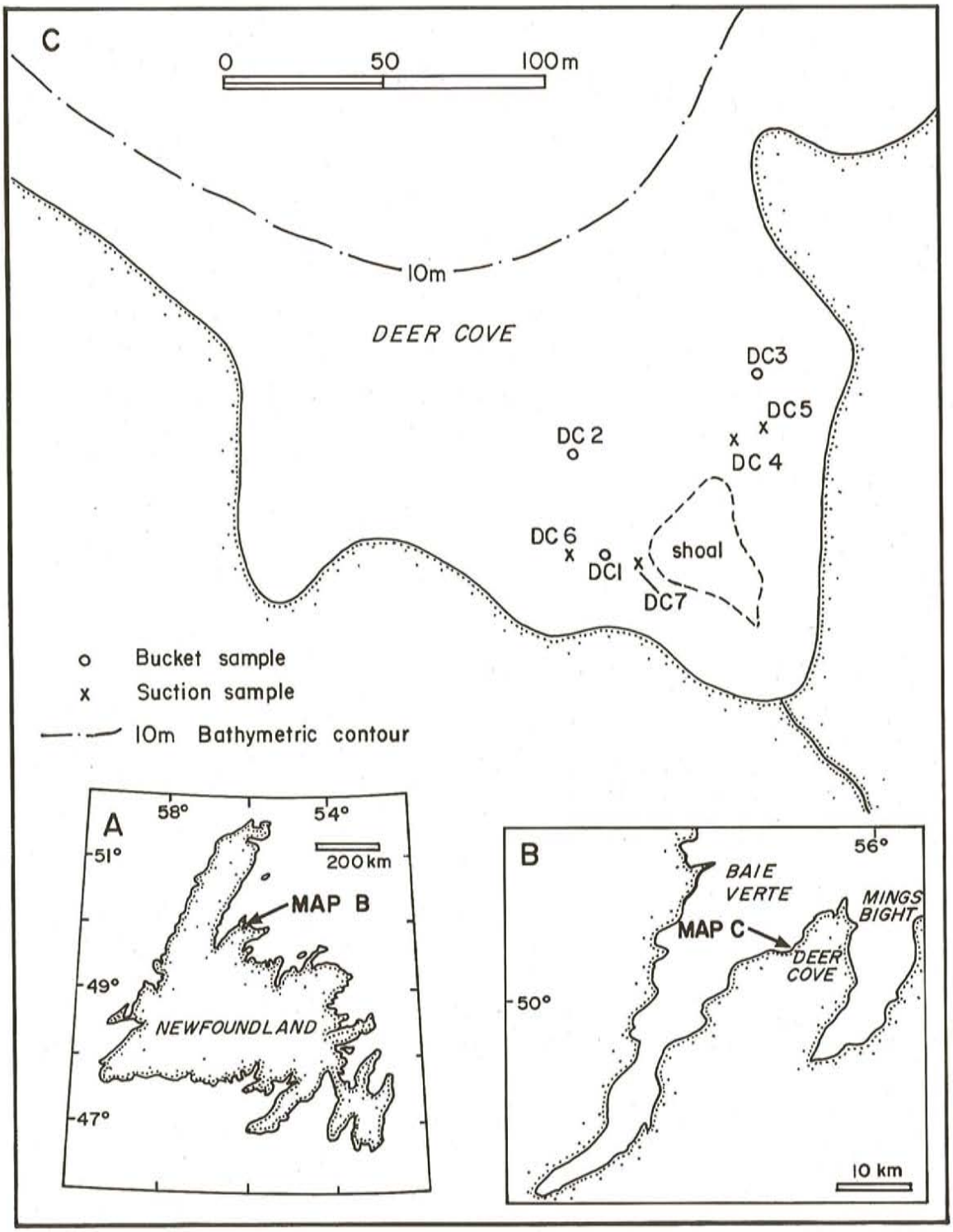

Figure 1. *Location of study area and sample sites.*

Four additional sites were sampled with a diver-operated suction device (Plate 2). The samples were collected over a 1 m² area with penetration to bedrock where possible. The heavy-mineral fraction of each sample was concentrated using the sluice box. The overflow sediment from the sluice was retained and hand-panned to a 20 g concentrate. Both the sluiced concentrate and the overflow concentrate were submitted for gold analysis.

RESULTS

Particulate gold was recovered from all samples collected in Deer Cove. The gold grains range in size from 0.05 to 3 mm. Most of the grains are relatively fresh, exhibiting irregular edges, minor folding of exposed knobs and minimal corrosive etching (Plate 3). A smaller number of grains were

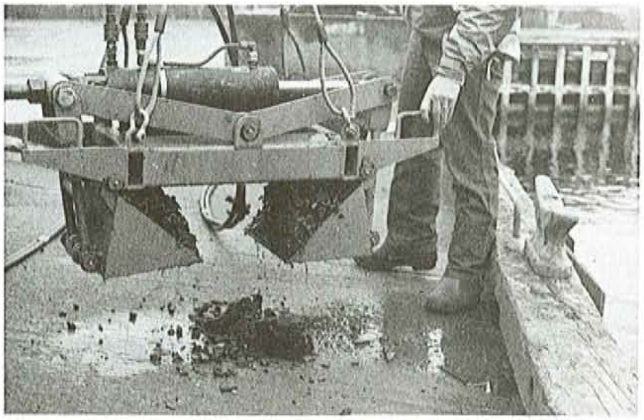

Plate 1. *Hydraulically actuated bucket sampler.*

Plate 2. *Diver-operated suction sampler.*

worn with evident pitting, extensive surface matting and rounded grain edges.

Not suprisingly, the gold grade of the suction samples is higher than that of the bucket samples (Table 1). The bucket sampler was unable to penetrate very deeply into the gravel–cobble armour and hence only a surficial 'halo' of gold-bearing sediments is discernable. More representative estimates of gold grade are provided in the samples collected over a 1 m² area using the suction device (Table 1). The grade

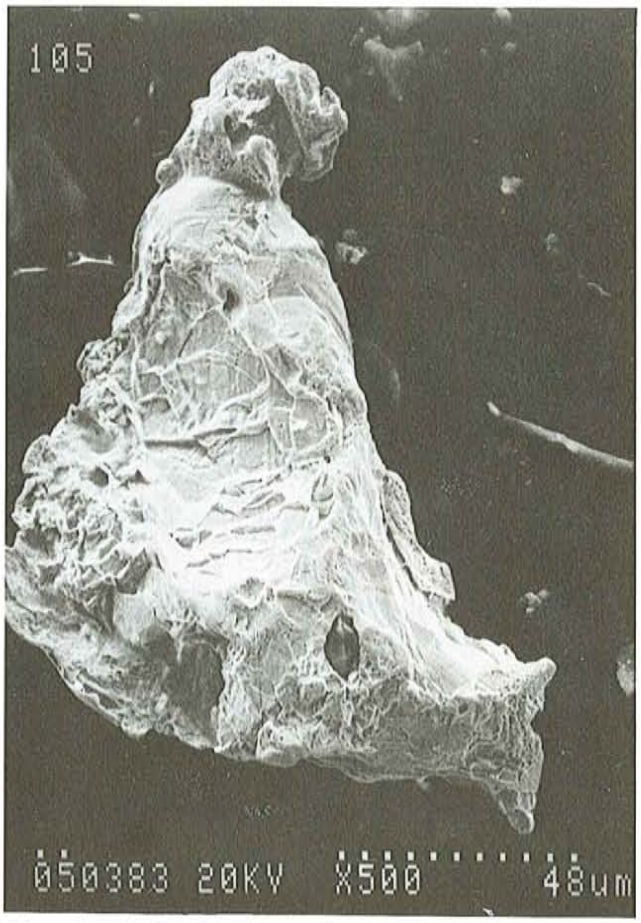

Plate 3. *Gold grain from Deer Cove; very little evidence of chemical etching and only minor rounding of grain edges.*

Table 1. Gold grades of the seabed samples

Sample number	Sample type	Water depth (m)	Bulk weight (kg)	Gold grade (ppb)
DC-1	bucket	6	63	12
DC-2	bucket	14	74	33
DC-3	bucket	14	42	90
DC-4	suction	5	128	1900
DC-5	suction	9	75	30
DC-6	suction	8	108	75
DC-7	suction	8	124	256

of these samples is highly variable, owing in part to the inherently erratic distribution of gold in placer deposits. In that the divers did not attempt to dislodge the boulders and cobbles, the reported grades are probably conservative (as placer gold tends to concentrate at the base of an armour) and a representative estimate of sediment tonnage is not available. Total sediment tonnage in Deer Cove will likely be low, as the gravel–cobble armour appears to form a relatively thin (<1 m) veneer overlying bedrock.

DISCUSSION

Detrital gold is present in the seabed sediments of Deer Cove and can be recovered using a diver-operated hydraulic dredge and a simple sluice box. More work is required to determine representative grades and tonnages of the occurrence. A comprehensive sampling program including the collection of sediment entrapped between and beneath the cobbles and boulders is necessary.

Several other sites along the northern Newfoundland shelf hold potential for placer gold. Field data collected by the Geological Survey of Canada and by C-CORE suggest that the nearshore areas around Betts Cove, Tilt Cove, the head of Mings Bight and embayments along eastern Baie Verte (e.g., Pine Cove, Green Cove and Devils Cove) hold some potential for placer gold. Along the northeastern Newfoundland coast, the Dog Bay area and Birchy Cove area are also prospective sites.

In addition to nearshore prospects, there is also some potential for gold placer occurrences in deeper water. Interestingly, surficial grab samples collected in deeper water off Deer Cove reveal a fairly large halo of gold-bearing surficial sediments overlying an 18-m-thick pocket of sediment (Shaw, 1992). The sediment occurs in 17 to 30 m of water and covers an area 1.0 by 0.75 km. This site and others may warrant attention in the future.

Of equal importance to an economic assessment of placer gold occurrences such as Deer Cove, is an understanding of the short- and long-term environmental impacts of nearshore placer mining. The lack of provincial and federal regulations that govern marine-mining operations is a result, in part, of uncertainties related to the environmental impacts of such operations. To facilitate the establishment of a reasonable set of regulations, a limited test-mining program is planned; Deer Cove appears to be a suitable site for such a test. Several mining methods will be tested, and biological, physical and chemical effects in the water and on the surrounding bottom will be monitored before, during and after the test.

REFERENCES

Edwardson, K.A., Shaw, J., Wile, B. and Prime, W.
1992: C.S.S. Navicula operations in northeastern Newfoundland coastal waters: Ming's Bight, White bay, Moreton's Harbour, Bay of Exploits and Twillingate Harbour. Geological Survey of Canada, Open File 2492.

Emory-Moore, M. and Davis, L.
1992: Detrital gold occurrences, northern Newfoundland shelf. Contract Report for Atlantic Geoscience Centre, C-CORE Contract Report 92-C6.

Emory-Moore, M. and Solomon, S.
1989: Placer gold potential offshore Newfoundland: a preliminary assessment. *In* Current Research. Newfoundland Department of Mines, Geological Survey of Newfoundland, Report 89-1, pages 229-236.

Gower, D., Graves, G., Walker, S. and MacInnes, D.
1988: The Deer Cove lode gold deposit. Paper presented at the Geological Association of Canada Annual Meeting, St. John's, Newfoundland.

Samson, J.
1984: An overview of coastal and marine gold placer occurrences in Nova Scotia and British Columbia. Energy, Mines and Resources, Ocean Mining Division Document 1984-3, 170 pages.

Scott, W.J., Poorooshasb, F. and Kanzig, M.L.
1991: Hydraulically-actuated dual-bucket sampler for compacted or coarse-grained bottoms. Institute of Mining and Metallurgy, Proceedings International Conference on Alluvial Mining, pages 574-585.

Shaw, J.
1990: Surveys in White Bay, Baie Verte, Green Bay and Halls Bay, northeast Newfoundland. Report on final phase of Cruise 90-013, C.S.S. Hudson. Geological Survey of Canada, Open File 2311.

1992: Surficial sediments of Baie Verte, Newfoundland. Geological Survey of Canada, Open File 2457.

Shaw, J., Beaver, D.E. and Wile, B.
1990: Marine geological surveys in northeast Newfoundland coastal waters: Hamilton Sound, Baie Verte, La Scie, Halls Bay, Little Bay, Sunday Cove Island. Cruise Report 90-035. Geological Survey of Canada, Open File 2333.

Shaw, J., Russell, H., Sherin, A. and Atkinson, T.
1992: C.S.S. Dawson operations in Newfoundland coastal waters: La Poile Bay to Bay D'Espoir, Notre Dame Bay, and Bay of Exploits. Geological Survey of Canada, Open File 2482.