# Tsunami activity 9: **Exploring the damages of the 1929 Grand Banks Tsunami**

**Description:** A mapping and database activity that explores the damages associated with the Grand Banks Tsunami that struck Newfoundland in 1929.

**Materials**: Overhead 1. 1929 Grand Banks Landslide and Tsunami
Student worksheets (1. 1929 Grand Banks Tsunami: exploring the damages;
2. Communities impacted by the 1929 Grand Banks Tsunami)
Databases (1.Communities impacted by the 1929 Newfoundland Tsunami;
2. Damage details)

**Duration:** 1 hour plus take home assignment

**Teacher instructions and notes:**

1. Review or teach the different components of a map: longitude, latitude, scale bar, legend.
2. Introduce the 1929 Grand Banks Tsunami – a tsunami caused by a huge submarine landslide that was itself triggered by a 7.2 magnitude earthquake. The landslide severed all Trans-Atlantic cables. The tsunami impacted southern Newfoundland and northeastern Nova Scotia and was observed as far away as Portugal. Use the overhead map of the Grand Banks showing epicentre, landslide and severed cables. For more information see the following:

The Atlas of Canada: Tsunamis [PDF] - included as part of these resources
Natural Resources Canada: http://earthquakescanada.nrcan.gc.ca/historic_eq/20th/1929/1929_e.php

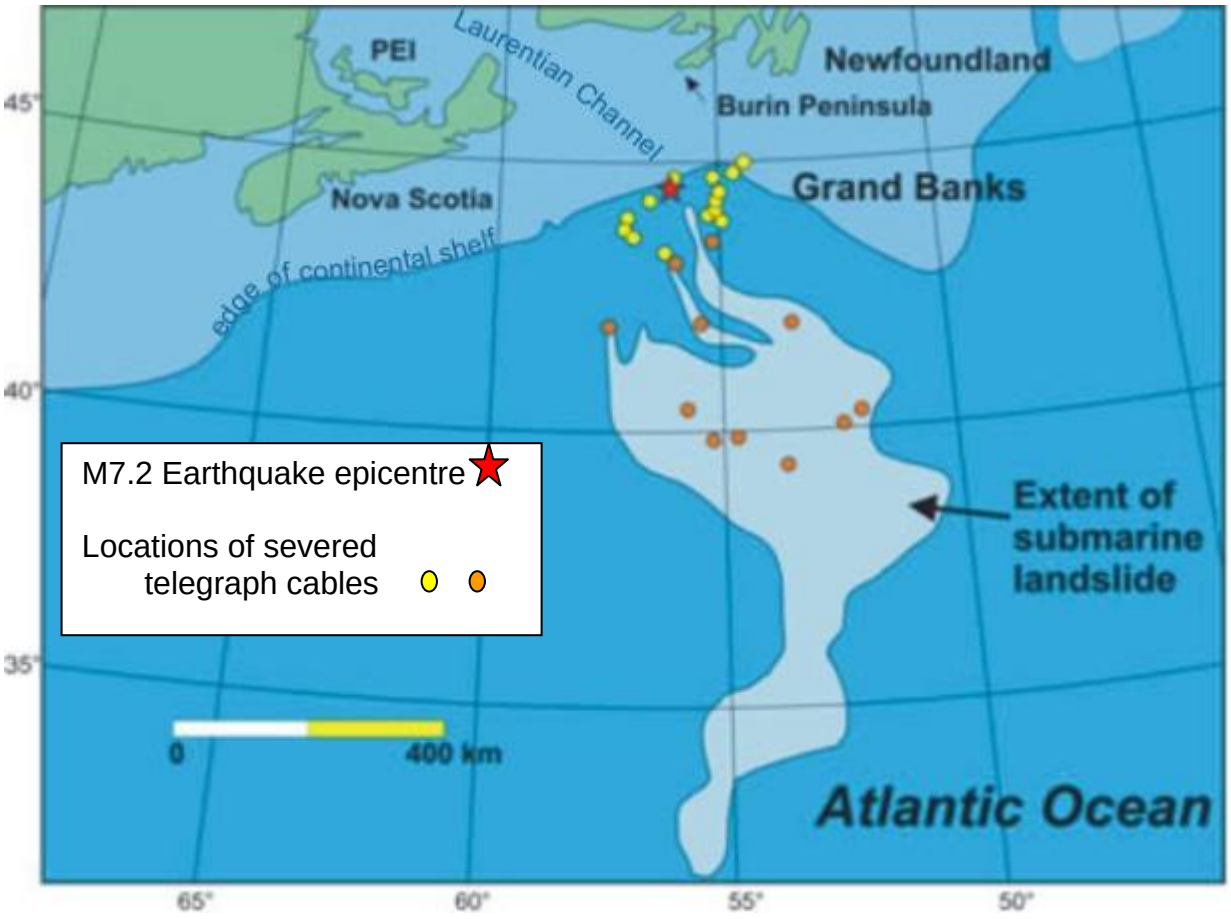
3. Distribute the student worksheets, maps, and databases.
4. After the students complete the work, discuss the results in class. It is unlikely that the students will know the information to complete some of their answers (eg. damage to fisheries).

**Teacher's notes on the questions:**

1. **Map**: Some students will have trouble plotting latitude and longitude accurately.
2. **Other damages**: Loss of numerous waterfront businesses and homes, fishing facilities, wharfs, and small boats were common. Loss of fishing gear. Loss of coal piles.
3. Assess the severity of damages for each community. Students must present logical reason for their classification system. High should involve elements of economic loss as well as deaths.
4. Map the severity of damages (High, Medium, Low). West shore of Placentia Bay was hardest hit. Facing the wave direction.
5. Explain why the tsunami run-up often reached higher elevations than that of the wave itself.
   - Long narrow bays funnel the tsunami energy into a wave of ever increasing amplitude until it broke. If the shore is steep, the wave will bounce back. If the shore is low, the tsunami' s momentum can move it further inland before the effect of rising against gravity saps the wave energy and the water must flow back to the sea.
6. Other damages attributed to this landslide?
   - Severing of all trans-Atlantic cables cutting off communication between North America and Europe. Also damage to fisheries – It is suggested that the landslide and the tsunami affected fisheries as there was a downturn in catch in following years.
7. Discuss what would happen if this tsunami occurred today.
   - Less damage: The almost instantaneous measurement and communication of earthquake magnitude can quickly put an area on tsunami alert, allowing for emergency evacuations. With warnings, fatalities may be less. Community planning may restrict homes in run-up locations.
   - More damage: Much more coastal infrastructure (bridges, piers, wharfs, cables, dock facilities, ferries) today.
   - Different damages: New facilities, such as oil rigs.

Overhead 1

# 1929 Grand Banks Landslide and Tsunami




Source: EarthNet/Geonet Virtual Resource Centre for Earth Science Educators/Un centre virtuel de matériel pédagogique pour les enseignants en sciences de la Terre (http://www.earthnet-geonet.ca/)

 Name: _____

# 1929 Grand Banks Tsunami: exploring the damages

Reports from communities around the Grand Banks in 1929 ranged from “a noticeable rise in water levels but no damage” to “lives lost and total devastation”. The west coast of Placentia Bay along the Burin Peninsula of Newfoundland was particularly heavily hit.

1. **Map**: Using the longitude and latitude given in the Database 1, plot and label the communities in Newfoundland and Nova Scotia that reported effects of the 1929 tsunami. Use colour to indicate the number of deaths at each community. You may choose to group fatalities into several ranges (i.e. 0, 1-3, etc). Create a legend on the map. Indicate the number of houses destroyed in parenthesis after the community label.
2. **Damages**: Obviously, more damage occurred than is shown Database 1. Summarize, from Database 2, other types of damages reported in newspapers of the time.

3. Assess the severity of damages for each community, classifying it as high, medium, or low on a scale that you create. Explain your criteria for establishing these scale levels.

| Community | Severity | Community | Severity | Community | Severity |
|---|---|---|---|---|---|
| Burin | | Port Au Bras | | Cape la Hune | |
| Collins Cove | | Rock Harbour | | Corbin | |
| Kellys Cove | | Saint Lawrence | | Canso | |
| L'Anse Au Leau | | Salmonier | | Glace Bay | |
| Lamaline | | Stepaside | | Halifax | |
| Lawn | | Taylor's Bay | | Louisbourg | |
| Lords Cove | | Ship Cove | | Lunenburg | |
| Mortier Bay | | Bay De L'Eau | | Sydney | |
| Point Au Gaul | | Bonavista | | | |

Criteria:

**High**: _____

**Medium**: _____

**Low**: _____

4. Map the severity of damages (High, Medium, Low) by shading the coastline to indicate the level of severity. What can you say about the distribution of damages and why do you think this occurred?

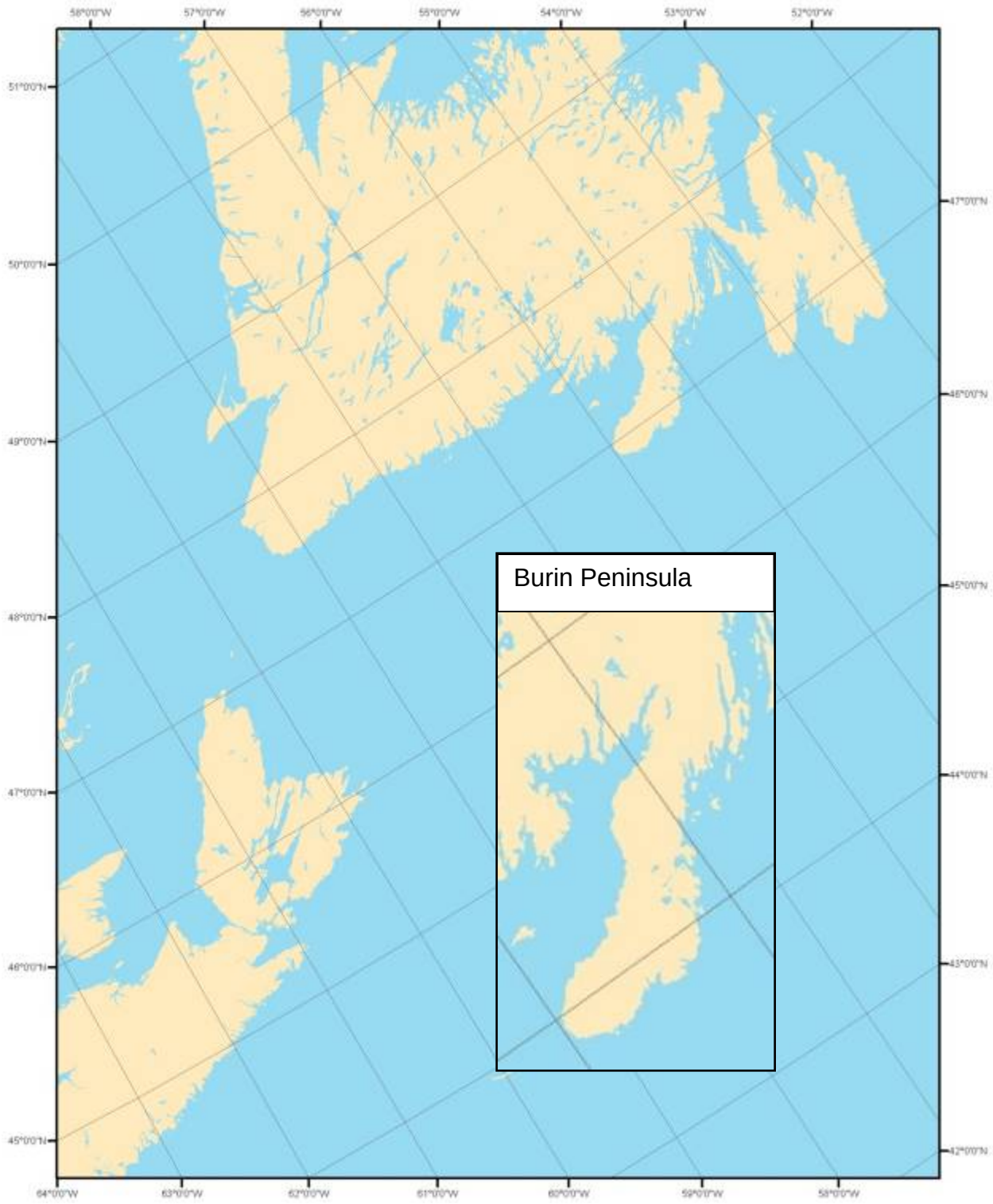
5. The run-up distance is the horizontal distance that the tsunami wave travels inland, above the high tide line. The elevation that it reaches is the run-up height. Alan Ruffman, an expert on this tsunami, determined that the maximum run-up height was in Taylor's Bay which experienced a run-up distance of 2 km in places. In 1929, the tsunami run-up often reached higher elevations than that of the wave itself, particularly at the northern end of some of the long narrow inlets. Explain why.

5. The tsunami was actually triggered by a huge submarine landslide off the continental slope at the mouth of the Laurentian Channel. What damages, other than those attributed to the tsunami, are attributed to this landslide?

6. Discuss what would happen if this tsunami happened today. What types of damages might be less today and why? What types of damages might be greater today and why? What types of damages might occur today that would not have happened in 1929?

Student worksheet 2 Name: _____

# Communities impacted by the 1929 Grand Banks Tsunami



**Database 1**

# Communities impacted by the 1929 Newfoundland Tsunami

| Location | Latitude | Longitude | Distance from source (miles) | Number of Deaths | Number of Houses Destroyed |
|---|---|---|---|---|---|
| **On Burin Peninsula, Newfoundland:** | | | | | |
| Burin | 47.05 | -55.183 | 270 | | 16 |
| Collins Cove | 47.03 | -55.17 | 268 | | |
| Kellys Cove | 47.03 | -55.17 | 268 | 2 | 3 |
| L'Anse Au Leau | 47.04 | -55.17 | 269 | | 1 |
| Lamaline | 46.867 | -55.8 | 243 | 1 | |
| Lawn | 46.933 | -55.533 | 252 | | |
| Lords Cove | 46.9 | -55.62 | 276 | 4 | |
| Mortier Bay | 47.083 | -55.1 | 280 | | |
| Point Au Gaul | 46.873 | -55.767 | 242 | 8 | 3 |
| Port Au Bras | 47.07 | -55.13 | 273 | 7 | 11 |
| Rock Harbour | 47.183 | -55.05 | 287 | | 1 |
| Saint Lawrence | 46.9 | -55.383 | 250 | | |
| Salmonier | 47.22 | -53.57 | 338 | | |
| Stepaside | 47.028 | -55.155 | 268 | | 1 |
| Taylor's Bay | 46.909 | -54.173 | 278 | 6 | 11 |
| | | | | | |
| **Elsewhere in Newfoundland:** | | | | | |
| Ship Cove | 47.359 | -53.919 | 308 | | |
| Bay De L'Eau | 47.417 | -55.416 | 307 | | |
| Bonavista | 48.633 | -53.1 | 491 | | |
| Cape la Hune | 47.55 | -56.883 | 325 | | 2 |
| Corbin | 47.61 | -55.45 | 328 | | 1 |
| | | | | | |
| **Nova Scotia:** | | | | | |
| Canso | 45.333 | -61 | 400 | | |
| Glace Bay | 46.183 | -59.967 | 351 | | |
| Halifax | 44.633 | -63.583 | 600 | | |
| Louisbourg | 45.933 | -59.966 | 340 | | |
| Lunenburg | 44.383 | -64.316 | 660 | | |
| Sydney | 46.167 | -60.167 | 364 | | |

Source: National Geophysical Data Centre. “Tsunami Events.” National Oceanic and Atmospheric Administration. 26 Apr. 2008. 23 May. 2008. http://www.ngdc.noaa.gov/nndc/struts/results?bt_10=3&st_10=&ge_9=&le_9=8&type_19=EXACT&query_19=75&type_38=Exact&query_38=null&d=7&t=101650&s=7

# Damage details

**Burin**, NFLD: Initial report* : "Swept, no loss of life," and "Burin experienced very severe earth tremors at 5:05 pm, Monday, followed by an immense 15 foot tidal wave which swept practically everything along the waterfront from Port au Bras to Great Burin." And in report* of November 23: "Houses and stores floating in waters of the harbour and dotted along the beach partially or wholly submerged. Stages and wharves swept away in almost every Cove and Harbour." A witness reported that all of the water at Burin Bay (depth of 30 feet; ~10 m) receded from the harbour, leaving the bottom bare. The returning wave swept high over the shoreline.

**Collins Cove**, NFLD: Initial report* : "All waterside premises lost or damage, no lives lost."

**Kellys Cove**, NFLD: Initial report* : "Three dwelling houses and all fishing premises gone, two lives lost."

**L'Anse Au Leau**, NFLD: Initial report* : "One dwelling house and all fishing gear lost."

**Lamaline**, NFLD: Initial report* : One man died of injuries. All buildings along the waterfront were swept away. "Lamaline and vicinity suffered most severely. Here the coast is rugged and flat, and the people had built their houses as close to the sea as was considered safe."

**Lawn**, NFLD: Initial report* : "All fishing property with most of the boats and dories, provisions and coal gone, no lives lost."

**Lords Cove**, NFLD: Initial report* : "All fishing property with provisions and coal swept away, four lives lost...telegraph office totally destroyed."

**Mortier Bay**, NFLD: Damage to waterside premises.

**Point Au Gaul**, NFLD: Initial report* : "All fishing property, stages, stores, five cod traps, all provisions and about one hundred tons of coal, three dwelling houses and seventy other buildings gone, with eight lives..." Later report reads eighty buildings, plus bridges swept away. The water was described as a white foamy wall, almost a quarter mile wide. Today the point is an island that can only reached during low tide; nobody has lived there since 1920.

**Port Au Bras**, NFLD: Initial report* : "Seven lives lost...eleven dwelling houses, fourteen small schooners, all dories and skiffs and all waterside premises and provision gone," and, "The wave swept with [great] fury, flinging itself on the eastern part of Port au Bras".

**Rock Harbour**, NFLD: Initial report* : "Considerable damage was done..." and "At Rock Harbour everything was swept away--wharves, flakes, stores, and also [one] dwelling house...The tidal wave occurred following the second quake, rising to a considerable height and sweeping the Narrows with great violence, carrying schooners and everything before it." Also, "Estimate damage $35,000 in 1929$."

**Saint Lawrence**, NFLD: Initial report* : "No lives lost, all flakes and stores on both sides of the harbour swept away with all provisions and coal...St. Lawrence [telegraph] office is anchored in middle of St. Lawrence Harbour..." The Daily News, November 26, estimated the cost of damage and loss was about $150,000 in 1929$.

**Salmonier**, NFLD: The Daily News, November 26, 1929 reports that in Salmonier, people felt the earthquake, and watched the water seething before it rose over the wharf. The water moved into the house of one witness at a depth of eight inches and then receded rapidly. "The river went almost dry, and as the bore came in again, a witness described a six foot solid of water" that carried lumber away. The Haricot bridge was rolled over by the wave three or four times and washed out to sea.

**Stepaside**, NFLD: Initial report* : "All waterfront premises gone, one dwelling house, no life lost," and (November 23 report*), "totally laid in ruins."

**Database 1 (page 2)**

**Taylor's Bay**, NFLD: Initial report* : "Fifteen families homeless, all fishing property with provisions and coal swept away, four lives lost..." Eleven homes were destroyed. On November 24, The Daily News reports: "This is the worst place on the whole coast and the tidal wave was between 80 to 100 feet high, which carried everything in its way. Houses were shifted in every direction and some completely destroyed." November 27 report*: "At Taylor's Bay eye witnesses describe it as rising so high that it blotted out the stars." Five died in the event, and one died from injuries shortly thereafter. [Note: Experts determined that the tsunami was up to 7 m high, and the run-up at the head of Taylor's Bay was about 13 m.]

**Ship Cove**, NFLD: Initial report* : "All waterside premises lost or damage, no lives lost."

**Corbin, NFLD**: Initial report* : "Swept clean, no lives lost."

**Cape la Hune**, NFLD: Initial report* : West Cul de Sac was left in ruins. All fishermen lost property.

**Bay De L'Eau**, NFLD: Sawmill was wrecked; logs washed away.

**Bonavista**, NFLD: Ruffman states: "The tsunami refracted counter clockwise around the Avalon Peninsula to arrive in the Bonavista area about 1:30 am N.S.T." on November 20. Woodworth reports, "It appears that the water in Bonavista Harbour drained out completely, and then overflowed part of the community upon its return. Bonavista is on the northeast part of the island, at the top of the western shore of Conception Bay, up from St. John's."

**Canso**, NS: "At Canso, a tidal wave about two feet (0.6 m) in excess of spring high tide was noticed at about 8 p.m. Atlantic Standard Time on November 18. The wave came in with great force damaging fishermen's wharves and carried ashore the schooner Lena M which was badly damaged and her cargo of produce a total loss."

**Glace Bay**, NS: Abnormally high tides reported, but no damage other than flooding.

**Halifax**, NS: Halifax Harbour had abnormally high tides, but no damage other than flooding.

**Louisbourg**, NS: Captain Robertson, a witness of the 1929 event, reported that a bit after 5:30 pm, his tied boat gently lifted vertically about 7 or 8 feet, and water rose above the deck of the wharf. The wave did not break on the shore. Later on (no time given), the sea water rose a few feet above the road surface and then subsided after a minute or two.

**Lunenburg**, NS: "The tsunami was physically seen along the coast of Nova Scotia as far southwest as Lunenburg..."

**Sydney**, NS: Abnormally high tides reported.

---

Source

Information derived from National Geophysical Data Centre. “Tsunami Events.” National Oceanic and Atmospheric Administration. 26 Apr. 2008. 23 May. 2008. http://www.ngdc.noaa.gov/nndc/struts/results?bt_10=3&st_10=&ge_9=&le_9=8&type_19=EXACT&query_19=75&type_38=Exact&query_38=null&d=7&t=101650&s=7

* Source of initial report: The Daily News, St. John, Newfoundland. Selections from November 22 through December 2, 1929.