

Maine Geological Survey

DEPARTMENT OF CONSERVATION

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PREFACE

The Landslide Overview Map of the Conterminous United States shows that portions of Maine have moderate to high landslide susceptibility and incidence (Radbruch-Hall and others, 1982). Public awareness of Maine's susceptibility was raised as a result of the September, 1983 landslide in Gorham, Maine (Novak and others, 1984). This geologic event focused attention on land failures within the state. Interest in that slide led to a literature search which revealed a number of sizable historical slides along the Presumpscot and Stroudwater River valleys in the Portland area and in coastal areas such as at Rockland, Maine.

Since many of the slides have occurred near developed or developing areas in the Maine coastal zone, concerns were raised regarding the potential impact of future failures as development pressures increased. This concern led to submission of a proposal to the U.S. Geological Survey's Office of Earthquakes, Volcanoes, and Engineering with three major goals:

1. A more extensive survey of literature describing Maine landslides.
2. A landslide inventory of the state, including distribution of a questionnaire for reporting of landslide occurrences.
3. The acquisition of geotechnical data at selected landslides in glaciomarine clays of the Presumpscot Formation (the material in which Maine slides most commonly occur).

This report is consists of the landslide inventory of the state (Part I) and the literature survey (Part II). Studies of selected landslides and geotechnical information about the Presumpscot Formation are treated in a separate report by Amos and Sandford (1987).

PART I

LANDSLIDE INVENTORY

Introduction

A survey conducted by the Maine Geological Survey has provided information on recent and historical slides throughout the State of Maine (see Plate 1, Landslides in Maine). The landslide inventory questionnaire (Figure 1) was distributed to nearly 1,000 geologists, soil scientists, site evaluators, civil engineers, and public works directors. The location, date of occurrence (if known), slide type, size, material involved, and extent of damage for 50 failures has been compiled from the returned forms (Table 1).

What is a Landslide?

The term landslide is perhaps the most loosely used term in slope movement studies (Hansen, 1984). Sharpe (1938) defined landslides as "the perceptible downward sliding or falling of a relatively dry mass of earth, rock or a mixture of the two". His definition reflected the broad, all encompassing, usage of the term and he saw no use in restricting its meaning (Hansen, 1984). Other workers prefer to restrict the term landslide to movement of earth materials along a distinct failure plane or slide surface. Varnes (1978) used the broader term slope movement in order to include failures that did not involve true sliding (Hansen, 1984).

While discussion on the best terminology continues, many geologists and the general public are familiar with the broader use of the term "landslide", so it is used in this sense in this report. It should be noted, however, that there is an increasing preference for the term "slope movement". The scheme proposed by Varnes (1978) was selected to classify the various types of failure because of its acceptance in both the geological and engineering communities. Readers are referred to Hansen (1984) for an in-depth discussion of the status of landslide terminology and classification schemes.

Types of Failure

Questionnaire respondents were asked to select the type of landslide from a list adapted from the classification scheme of Varnes (1978). Slope movement types used in this study are illustrated in Figure 2. The illustrations were not included with the questionnaire. Respondents who were not familiar with the Varnes scheme selected the term they believed to be the most descriptive or appropriate. Some wrote in their own slope movement term or descriptive phrase.

Figure 1. Landslide Inventory Questionnaire.

LANDSLIDE INVENTORY
Maine Geological Survey
Department of Conservation
Station #22
Augusta, ME 04333

Your cooperation is requested to help the Maine Geological Survey compile a list of recent and historic landslides that have occurred in Maine. Please complete the questionnaire if you are aware of any slide locations or references to historic slides. We seek information about slides of any type or size. Please copy this form as needed and pass it along to anyone else you think may be of help with this project. Thank you.

LOCATION:

Town _____
Nearest Street or Landmark _____
Nearest River or Stream _____
U.S. Geological Survey Topographic Map _____

DATE OF OCCURRENCE: _____

TYPE OF SLIDE (Circle appropriate number):

- | | |
|---|----------------|
| 1. Debris Slide | 2. Debris Fall |
| 3. Rock Slide | 4. Rock Fall |
| 5. Soil Flow | 6. Earth Flow |
| 7. Block Slide | 8. Slump |
| 9. Complex Slide Involving More Than One Type | |
- (List numbers): _____

ESTIMATED SIZE (Areal Extent; Thickness): _____

TYPE OF MATERIAL (Circle appropriate number):

- | | | | |
|---------|---------|---------|----------|
| 1. Soil | 2. Rock | 3. Clay | 4. Other |
|---------|---------|---------|----------|

DESCRIBE ANY DAMAGE: _____

REFERENCE TO SLIDE (Book, Diary, Newspaper, etc.): _____

IS SITE PRESENTLY ACCESSIBLE: Yes No

CONTACT PERSON AT SITE: _____
ADDRESS _____
PHONE NO. _____

PERSON COMPLETING THIS FORM: _____
ADDRESS _____
PHONE NO. _____

ADDITIONAL INFORMATION OR COMMENTS: _____

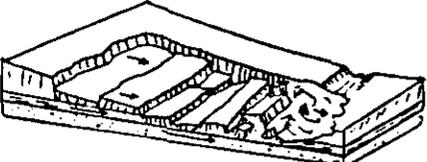
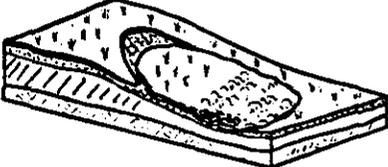
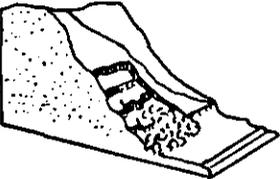
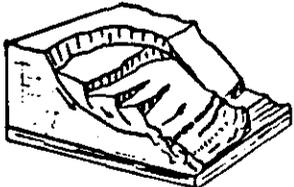
<p>A. Rock Fall</p> 	<p>E. Lateral Spread</p> 
<p>B. Rock Slide</p> 	<p>F. Shallow Land Slip</p> 
<p>C. Debris Slide</p> 	<p>G. Earth Flow / Soil Flow</p> 
<p>D. Slump - Earth Flow</p> 	<p>H. Complex</p> <p>Combination of two or more of the above types.</p>

Figure 2. Landslide types (modified after Varnes, 1978) reported by respondents.

Inventory Results

Seventy-three responses to the landslide questionnaire were received (see Appendix 1). Fifty-four of those responding reported on failures at 50 sites (Table 1; an asterisk (*) indicates the first listing of a failure reported more than once). The slides ranged in length from 15 to 500 feet from headscarp to toe. Headscarps were reported to be from 1.5 to 60 feet high. The widths of the failures parallel to the headscarps ranged from 15 to 1200 feet.

Slide types

Many different types of slides were reported (Table 2). The largest group of reported failures, the earth flow/soil flow category, accounted for 36% of the landslides reported. This category was followed by slumps, 28%; complex failures, 14%; rock slides, 8%; rock fall, 4%; block slides, 4%; debris slides, 2%; and lateral spreads, 2%. The remaining 2% were landslide names not offered as choices on the questionnaire.

Some reporting problems occurred because respondents sometimes selected a slide-type term that was not correct or appropriate to the Varnes (1978) classification scheme. Based on the remarks section of the questionnaire, it appeared that some respondents were actually describing a slump when they listed a block slide. Frequently, earth flows are found at the toe of a slump, or a multiple slump or lateral spread has a blocky appearance. The well-known 1973 coastal landslide in Rockland, Maine was most likely a complex lateral spread. Respondents referred to it as a block slide in one report and a soil flow in another. The inclusion of the primary failure types found in Maine in Figure 2 and on the landslide inventory map (Plate I) should reduce confusion in reporting landslides in the future.

Types of material

Soil, rock, and clay were the materials most often reported to be involved in the landslides (Table 3). Clay was the dominant material that failed in nearly 38% of the events. When combined with some other material such as silt, sand, or glacial till, clay is involved in nearly 50% of all reports. This reflects the slide susceptibility of the silty to clayey glaciomarine sediment known as the Presumpscot Formation. The Presumpscot Formation is found in coastal areas and inland along major drainage basins (Thompson, 1982; Thompson and Borns, 1985). It was deposited in lowlands that experienced submergence following deglaciation.

Soil and soil combined with other materials was named in nearly 34% of the reported failures. Rock was the material in 11% of the reported events. Failures involving sliding or falling of rock probably happen more often than reported. Those which were documented occurred in the more sparsely populated areas of the state.

Some respondents may have been uncertain about the type of material(s) that failed. Sometimes only the dominant material was reported. When respondents chose "soil" they may have been referring to unconsolidated surficial materials such as clay, silt, and sand rather than true topsoil.

TABLE 1. REPORTED LANDSLIDES

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
1	Aroostook	Madawaska	Summer of 1984	Complex 1,3,5,6,7	Soil, rock, clay
2	Aroostook	St. Francis	August, 1976 or 1977	Complex 1,6,7	Soil, rock
3	Aroostook	Allagash	Unknown	Block slide or slump	Clay, till
4	Aroostook	T15 R9 WELS	Unknown	Rock slide	Rock
5	Piscataquis	T3 R10 WELS	1927 ±	Debris slide	Soil/rock
6	Somerset	Jackman	June, 1917	Complex 1,3,5,6	Soil, rock, clay
7	Washington	*Whiting	Unknown	Soil or earth flow	Soil
7	Washington	Whiting	1977 or 1978	Soil or earth flow	Clay
8	Washington	*East Machias	March, 1985	Rock fall	Rock
8	Washington	East Machias	April or May, 1985	Rock slide	Rock
9	Washington	Addison	Recurring	Debris and block slide	Clay
10	Hancock	Brooksville	Unknown	Mud slide	Mud
11	Waldo	Stockton Springs	Unknown	Shallow land slips	Not reported
12	Waldo	Belfast	Recurring	Earth flow	Clay
13	Kennebec	Benton	March, 1983 or 1984	Slump	Soil
14	Kennebec	Winslow	Recurring	Soil flow	Clay
15	Kennebec	Waterville	1966	Slump	Clay

Table 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
16	Franklin	New Sharon	Recurring	Slump?	Clay
17	Franklin	Twp. 6	1981 or 1982	Rock slide	Rock
18	Oxford	Byron	Unknown	Slump	Clay
19	Franklin	Twp. E	Unknown	Slump	Soil, clay
20	Oxford	Andover N Surplus	Unknown	Slump	Clay
21	Oxford	Andover	Approx. 1969-1970	Complex 3,5	Soil, rock
22	Oxford	Grafton Twp.	Unknown	Rock fall	Rock
23	Kennebec	Augusta	Early 1970's	Slump	Soil
24	Kennebec	Chelsea	Recurring	Earth flow	Clay
25	Kennebec	Gardiner	Approx. 1974	Soil flow	Clay
26	Knox	Union	March, 1986 (?)	Earth flow	Soil
27	Knox	Camden	Unknown	Rock slide	Rock
28	Knox	Rockland	Approx. 1980	Earth flow	Clay
29	Knox	*Rockland	1970 (1973?)	Block slide	Not reported
29	Knox	Rockland	January 24, 25, 1973	Soil flow	Clay, silt
30	Lincoln	Bristol	Unknown	Soil flow	Clay
31	Cumberland	Freeport	June 2, 1984 and earlier	Slump?	Clay
32	Cumberland	South Freeport	April 24, 25, 1983	Earth flow	Clay, silt, sand

Table 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
33	Cumberland	North Yarmouth	Unknown	Slump	Clay
34	Cumberland	South Harpswell	1978-1980 and earlier	Slumps	Till over clayey sand
35	Cumberland	*Portland (Long Is., Peaks Is.)	Recurring	Soil flow	Soil
35	Cumberland	Portland (Long Is.)	March 19, 1977	Slump	Sand and gravel over clay
36	Cumberland	*Portland (Peaks Is.)	1984	Soil flow	Marine silt
36	Cumberland	Portland (Peaks Is.)	July 2, 1983 and earlier	Shallow land slip	Till over clay
37	Cumberland	Portland	1838	Slump?	Clay
38	Cumberland	Westbrook	1849	Slump?	Clay
39	Cumberland	Windham	Approx. 1980	Earth flow	Soil
40	Cumberland	Westbrook	November 22, 1868	Block slide (Lateral spread?)	Clay
41	Cumberland	Portland	1956, Rte. 1; 1978, I-95	Earth flow	Clay
42	Cumberland	*Portland	Unknown	Block slide (Slump)	Clay
42	Cumberland	Portland	Spring, 1984	Complex 7,8	Clay
43	Cumberland	Westbrook	Historic	Slump	Clay
44	Cumberland	Westbrook	1971	Slump	Clay
45	Cumberland	Gorham	September 28, 1983	Complex lateral spread	Clay

Table 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
46	York	Arundel	1670, 1834 and others	Soil flow; earth flow	Soil, clay
47	York	Kennebunk	April, 1983 and earlier	Slumps	Sand, silt, clay
48	York	Kennebunk	Approx. 1976	Soil flow	Soil, sand over clay
49	York	*South Berwick	Spring, 1984	Slump	Soil
49	York	South Berwick	1983	Block slide	Soil
50	York	South Berwick	1981	Soil and earth flow	Soil, clay

(*) Asterisk indicates first listing of slide reported more than once.

TABLE 2. LANDSLIDES LISTED BY TYPE

TYPE	NO.	COUNTY	TOWN	DATE	MATERIAL
Block slide	29	Knox	*Rockland	1970 (1973?)	Not reported
Block slide	49	York	South Berwick	1983	Soil
Block slide (lateral spread?)	40	Cumberland	Westbrook	November 22, 1868	Clay
Block slide (slump)	42	Cumberland	*Portland	Unknown	Clay
Block slide or slump	3	Aroostook	Allagash	Unknown	Clay, till
Complex 1,3,5,6	6	Somerset	Jackman	June, 1917	Soil, rock, clay
Complex 1,3,5,6,7	1	Aroostook	Madawaska	Summer of 1984	Soil, rock, clay, trees
Complex 1,6,7	2	Aroostook	St. Francis	August 1976 or 1977	Soil, rock
Complex 3,5	21	Oxford	Andover	Approx. 1969-1970	Soil, rock
Complex 7,8	42	Cumberland	Portland	Spring, 1984	Clay
Complex lateral spread	45	Cumberland	Gorham	September 28, 1983	Clay
Debris and block slide	9	Washington	Addison	Recurring	Clay
Debris slide	5	Piscataquis	T3 R10 WELS	1927 \pm	Soil/rock
Earth flow	32	Cumberland	South Freeport	April 24, 25, 1983	Clay, silt, sand
Earth flow	39	Cumberland	Windham	Approx. 1980	Soil
Earth flow	24	Kennebec	Chelsea	Recurring	Clay

Table 2. Continued

	TYPE	NO.	COUNTY	TOWN	DATE	MATERIAL
	Earth flow	28	Knox	Rockland	Approx. 1980	Clay
	Earth flow	26	Knox	Union	March, 1986(?)	Soil
	Earth flow	12	Waldo	Belfast	Recurring	Clay
	Earth flow	41	Cumberland	Portland	1956, Rte. 1; 1978, I-95	Clay
	Mud slide	10	Hancock	Brooksville	Unknown	Mud
	Rock fall	22	Oxford	Grafton Twp.	Unknown	Rock
	Rock fall	8	Washington	*East Machias	March, 1985	Rock
	Rock slide	4	Aroostook	T15 R9 WELS	Unknown	Rock
21	Rock slide	17	Franklin	Twp. 6	1981 or 1982	Rock
	Rock slide	27	Knox	Camden	Unknown	Rock
	Rock slide	8	Washington	East Machias	April or May, 1985	Rock
	Shallow land slips	11	Waldo	Stockton Springs	Unknown	Not reported
	Shallow land slip	36	Cumberland	Portland (Peaks Is.)	July 2, 1983 and earlier	Till over clay
	Slump	33	Cumberland	North Yarmouth	Unknown	Clay
	Slump	35	Cumberland	Portland (Long Is.)	March 19, 1977	Soil and pebble
	Slump	43	Cumberland	Westbrook	Historic	Clay
	Slump	44	Cumberland	Westbrook	1971	Clay
	Slump	23	Kennebec	Augusta	Early 1970's	Soil

Table 2. Continued

TYPE	NO.	COUNTY	TOWN	DATE	MATERIAL
Slump	13	Kennebec	Benton	March 1983 or 1984	Soil
Slump	15	Kennebec	Waterville	1966	Clay
Slump	20	Oxford	Andover N Surplus	Unknown	Clay
Slump	18	Oxford	Byron	Unknown	Clay
Slump	19	Franklin	Twp. E	Unknown	Soil, clay
Slump	49	York	*South Berwick	Spring, 1984	Soil
Slump?	31	Cumberland	Freeport	June 2, 1984 and earlier	Clay
Slump?	37	Cumberland	Portland	1838	Clay
Slump?	38	Cumberland	Westbrook	1849	Clay
Slump?	16	Franklin	New Sharon	Recurring	Clay
Slumps	34	Cumberland	South Harpswell	1978-1980 and earlier	Till over clayey sand
Slumps	47	York	Kennebunk	April, 1983 and earlier	Sand, silt, clay
Soil flow	36	Cumberland	*Portland (Peaks Is.)	1984	Marine silt
Soil flow	25	Kennebec	Gardiner	Approx. 1974	Clay
Soil flow	14	Kennebec	Winslow	Recurring	Clay
Soil flow	29	Knox	Rockland	Jan. 24, 25, 1973	Clay, silt
Soil flow	30	Lincoln	Bristol	Unknown	Clay
Soil flow	48	York	Kennebunk	Approx. 1976	Soil, sand over clay

Table 2. Continued

TYPE	NO.	COUNTY	TOWN	DATE	MATERIAL
Soil flow	35	Cumberland	*Portland (Long Is., Peaks Is.)	Recurring	Soil
Soil flow/earth flow	7	Washington	*Whiting	Unknown	Soil
Soil flow; earth flow	46	York	Arundel	1670, 1834, and others	Soil, clay
Soil or earth flow	7	Washington	Whiting	1977 or 1978	Clay
Soil and earth flow	50	York	South Berwick	1981	Soil, clay

(*) Asterisk indicates slide reported by more than one observer.

TABLE 3. LANDSLIDES LISTED BY MATERIAL

MATERIAL	NO.	COUNTY	TOWN	DATE	TYPE
Clay	31	Cumberland	Freeport	June 2, 1984 and earlier	Slump?
Clay	45	Cumberland	Gorham	September 28, 1983	Complex lateral spread
Clay	33	Cumberland	North Yarmouth	Unknown	Slump
Clay	41	Cumberland	Portland	1956, Rte. 1; 1978, I-95	Earth flow
Clay	42	Cumberland	*Portland	Unknown	Block slide (slump)
Clay	42	Cumberland	Portland	Spring, 1984	Complex 7,8
Clay	37	Cumberland	Portland	1838	Slump?
Clay	43	Cumberland	Westbrook	Historic	Slump
Clay	40	Cumberland	Westbrook	November 22, 1868	Block slide (lateral spread?)
Clay	44	Cumberland	Westbrook	1971	Slump
Clay	38	Cumberland	Westbrook	1849	Slump?
Clay	16	Franklin	New Sharon	Recurring	Slump?
Clay	24	Kennebec	Chelsea	Recurring	Earth flow
Clay	25	Kennebec	Gardiner	Approx. 1974	Soil flow
Clay	15	Kennebec	Waterville	1966	Slump
Clay	14	Kennebec	Winslow	Recurring	Soil flow

Table 3. Continued

MATERIAL	NO.	COUNTY	TOWN	DATE	TYPE
Clay	28	Knox	Rockland	Approx. 1980	Earth flow
Clay	30	Lincoln	Bristol	Unknown	Soil flow
Clay	20	Oxford	Andover N Surplus	Unknown	Slump
Clay	18	Oxford	Byron	Unknown	Slump
Clay	12	Waldo	Belfast	Recurring	Earth flow
Clay	9	Washington	Addison	Recurring	Debris and block slide
Clay	7	Washington	*Whiting	1977 or 1978	Soil or earth flow
Clay, till	3	Aroostook	Allagash	Unknown	Block slide or slump
Clay, silt	29	Knox	*Rockland	Jan. 24, 25, 1973	Soil flow
Clay, silt, sand	32	Cumberland	South Freeport	April 24, 25, 1983	Earth flow
Marine silt	36	Cumberland	*Portland (Peaks Is.)	1984	Soil flow
Mud	10	Hancock	Brooksville	Unknown	Mud slide
Not reported	11	Waldo	Stockton Springs	Unknown	Shallow land slips
Not reported	29	Knox	Rockland	1970 (1973?)	Block slide
Rock	4	Aroostook	T15 R9 WELS	Unknown	Rock slide
Rock	17	Franklin	Twp. 6	1981 or 1982	Rock slide
Rock	27	Knox	Camden	Unknown	Rock slide

Table 3. Continued

MATERIAL	NO.	COUNTY	TOWN	DATE	TYPE
Rock	22	Oxford	Grafton Twp.	Unknown	Rock fall
Rock	8	Washington	*East Machias	March, 1985	Rock fall
Rock	8	Washington	East Machias	April or May, 1985	Rock slide
Sand, silt, clay	47	York	Kennebunk	April, 1983 and earlier	Slumps
Soil	35	Cumberland	*Portland (Long Is., Peaks Is.)	Recurring	Soil flow
Soil	39	Cumberland	Windham	Approx. 1980	Earth flow
Soil	23	Kennebec	Augusta	Early 1970's	Slump
Soil	13	Kennebec	Benton	March, 1983 or 1984	Slump
Soil	26	Knox	Union	March, 1986(?)	Earth flow
Soil	7	Washington	Whiting	Unknown	Soil or earth flow
Soil	49	York	*South Berwick	Spring, 1984	Slump
Soil	49	York	South Berwick	1983	Block slide
Soil, clay	46	York	Arundel	1670, 1834, and others	Soil flow; earth flow
Soil, clay	50	York	South Berwick	1981	Soil and earth flow
Soil and pebble	35	Cumberland	Portland (Long Is.)	March 19, 1977	Slump
Soil, sand over clay	48	York	Kennebunk	1976?	Soil flow
Soil, rock	21	Oxford	Andover	Approx. 1969-1970	Complex 3,5

Table 3. Continued

MATERIAL	NO.	COUNTY	TOWN	DATE	TYPE
Soil, rock, and trees	2	Aroostook	St. Francis	August, 1976-1977	Complex 1,6,7
Soil, rock, clay	6	Somerset	Jackman	June, 1917	Complex 1,3,5,6
Soil, rock, clay	1	Aroostook	Madawaska	Summer of 1984	Complex 1,3,5,6,7
Soil, clay	19	Franklin	Twp. E	Unknown	Slump
Soil/rock	5	Piscataquis	T3 R10 WELS	1927 ±	Debris slide
Till over clay	36	Cumberland	Portland (Peaks Is.)	July 2, 1983 and earlier	Shallow land slip
Till over clayey sand	34	Cumberland	South Harpswell	1978-1980 and earlier	Slumps

(*) Asterisk indicates slide reported by more than one observer.

On some reports all materials suspected to be of importance were reported. While this leads to a certain lack of uniformity in the tabulation of the questionnaire, the material types have been listed in Table 3 as received.

Conclusions

Prior to this study, landslides were thought to be primarily limited to the area below the marine limit (see Plate 1, Landslides in Maine). However, many block and rock slides were reported from sites in the Longfellow Range and in alluvium along rivers and streams inland from the marine limit. Plate I serves as the first compilation of known slides in Maine. It is intended that the map of Landslides in Maine will be revised as more information becomes available about the extent and distribution of landslides.

ACKNOWLEDGEMENTS

I am indebted to Woodrow Thompson, Director of the Bedrock and Surficial Geology Division of the Maine Geological Survey, who was responsible for guiding this project. Carolyn Lepage, Geologist, Maine Geological Survey, assisted with the preparation, mailing and collection of the responses to the Landslide Inventory questionnaire. Elizabeth Putnam, Jane Payeur, and Elizabeth Coburn, University of Southern Maine geology students, assisted in developing the Landslide Inventory database and with data entry. Linda Healey drafted the figure. I extend my thanks to all of these individuals and to the many people throughout the state who took the time to complete and return the questionnaire.

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APPENDIX 1. SUMMARY OF ALL LANDSLIDES REPORTED

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
	Androscoggin	Mechanic Falls	N.A.	None reported	N.A.
3	Aroostook	Allagash	Unknown	Block slide or slump	Clay and till
1	Aroostook	Madawaska	Summer of 1984	Complex 1,3,5,6,7	Soil, rock, clay, trees
2	Aroostook	St. Francis	August, 1976-1977	Complex 1,6,7	Soil, rock, trees
	Aroostook	Houlton	N.A.	None reported	N.A.
4	Aroostook	T15 R9 WELS	10,000+ years old	Rock slide	Rock
31	Cumberland	Freeport	June 2, 1984 &	Slump?	Clay
45	Cumberland	Gorham	September 28, 1983	Complex lateral spread	Clay
	Cumberland	Harrison	N.A.	None reported	N.A.
33	Cumberland	North Yarmouth	Unknown	Slump	Clay
41	Cumberland	Portland	1956, Rte. 1; 1978, I-95	Earth flow	Clay
42	Cumberland	Portland	N.D.	Block slide (Slump)	Clay
42	Cumberland	Portland	Spring, 1984	Complex 7,8	Clay
37	Cumberland	Portland	1838	Slump?	Clay
35	Cumberland	Portland (Long Is.)	March 19, 1977	Slump	Soil and pebble
35	Cumberland	Portland (Long Is., Peaks Is.)	Recent yrs	Soil flow	Soil
36	Cumberland	Portland (Peaks Is.)	1984	Soil flow	Marine silt
36	Cumberland	Portland (Peaks Is.)	Numerous, 7/2/83	Skin slide	Till over interbedded

Appendix 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
32	Cumberland	South Freeport	April 24, 25, 1983	Earth flow	Silty sand, sandy and clayey
34	Cumberland	South Harpswell	1978-1980 and older	Slumps	Glac. till/gray soft clayey
43	Cumberland	Westbrook	(Historic?)	Slump	Clay
40	Cumberland	Westbrook	November 22, 1868	Block slide (Lateral spread?)	Clay
44	Cumberland	Westbrook	1971	Slump	Clay
38	Cumberland	Westbrook	1849	Slump?	Clay
39	Cumberland	Windham	1980 ±	Earth flow	Soil
22	Cumberland	Yarmouth	N.A.	None reported	N.A.
16	Franklin	New Sharon	Various (active)	Slump?	Clay
	Franklin	Temple	N.A.	None reported	N.A.
17	Franklin	Weld or Byron	1981 or 1982	Rock slide	Rock
10	Hancock	Brooksville	N.D.	Mud slide	Mud
	Hancock	Ellsworth	N.A.	None reported	N.A.
23	Kennebec	Augusta	Early 1970's	Slump	Soil
13	Kennebec	Benton	March, 1984 or 1983	Slump	Soil
24	Kennebec	Chelsea	Pre 1975	Earth flow	Clay
25	Kennebec	Gardiner	Approx. 12	Soil flow	Clay
15	Kennebec	Waterville	1966	Slump	Clay

Appendix 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
14	Kennebec	Winslow	Periodic: Last 1984	Soil flow	Clay
27	Knox	Camden	N.D.	Rock slide	Rock
29	Knox	Rockland	1970 (1973?)	Block slide	None listed
28	Knox	Rockland	1980?	Earth flow	Clay
29	Knox	Rockland	Jan. 24, 25, 1973	Soil flow	Clay, silt
26	Knox	Union	March	Earth flow	Soil
	Lincoln	Bristol	N.A.	None reported	N.A.
30	Lincoln	Bristol	N.D.	Soil flow	Clay
21	Oxford	Andover	Approx. 1969-1970	Complex 3,5	Soil, rock
20	Oxford	Andover N Surplus	Unknown	Slump	Clay
18	Oxford	Byron	Unknown	Slump	Clay
22	Oxford	Grafton Twp.	Possibly prehistoric	Rock fall	Rock
19	Oxford	Twp. E	Unknown	Slump	Soil, clay
	Penobscot	Bradley	N.A.	None reported	N.A.
	Penobscot	Eddington	N.A.	None reported	N.A.
	Penobscot	Hampden	N.A.	None reported	N.A.
	Piscataquis	Abbot	N.A.	None reported	N.A.
	Piscataquis	Monson	N.A.	None reported	N.A.
5	Piscataquis	on OJI Mt.-west face	1927 <u>±</u>	Debris slide	Soil/rock

Appendix 1. Continued

NO.	COUNTY	TOWN	DATE	TYPE	MATERIAL
	Piscataquis	Sangerville	N.A.	None reported	N.A.
6	Somerset	Jackman	June, 1917	Complex 1,3,5,6	Soil, rock, clay
	Somerset	Norridgewock	N.A.	None reported	N.A.
12	Waldo	Belfast	Year around	Earth flow	Clay
11	Waldo	Stockton Springs	Unknown	Shallow land slips	N.D.
	Waldo	Thorndike	N.A.	None reported	N.A.
9	Washington	Addison	Daily(?) for last	Debris and block slide	Clay
8	Washington	East Machias	March, 1985	Rock fall	Rock
7	Washington	Whiting	1977 or 1978	Soil or earth flow	Clay
24 8	Washington	East Machias	April or May, 1985	Rock slide	Rock
7	Washington	Whiting	Unknown	Soil flow/earth flow	Soil
46	York	Arundel	1670, 1834 and others	Soil flow; earth flow	Soil and clay
48	York	Kennebunk	1976?	Soil flow	Soil sand over clay
47	York	Kennebunk	1) Unknown; 2) April	Slumps	Fine sands, silts and silty
49	York	South Berwick	Spring, 1984	Slump	Soil
49	York	South Berwick	1983	Block slide	Soil
50	York	South Berwick	1981	Soil, earth flow	Soil, clay

PART II

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**PLATE I
LANDSLIDES IN MAINE**

COMPILED BY
IRWIN D. NOVAK

Maine Geological Survey
DEPARTMENT OF CONSERVATION
Walter A. Anderson, State Geologist

1987

EXPLANATION

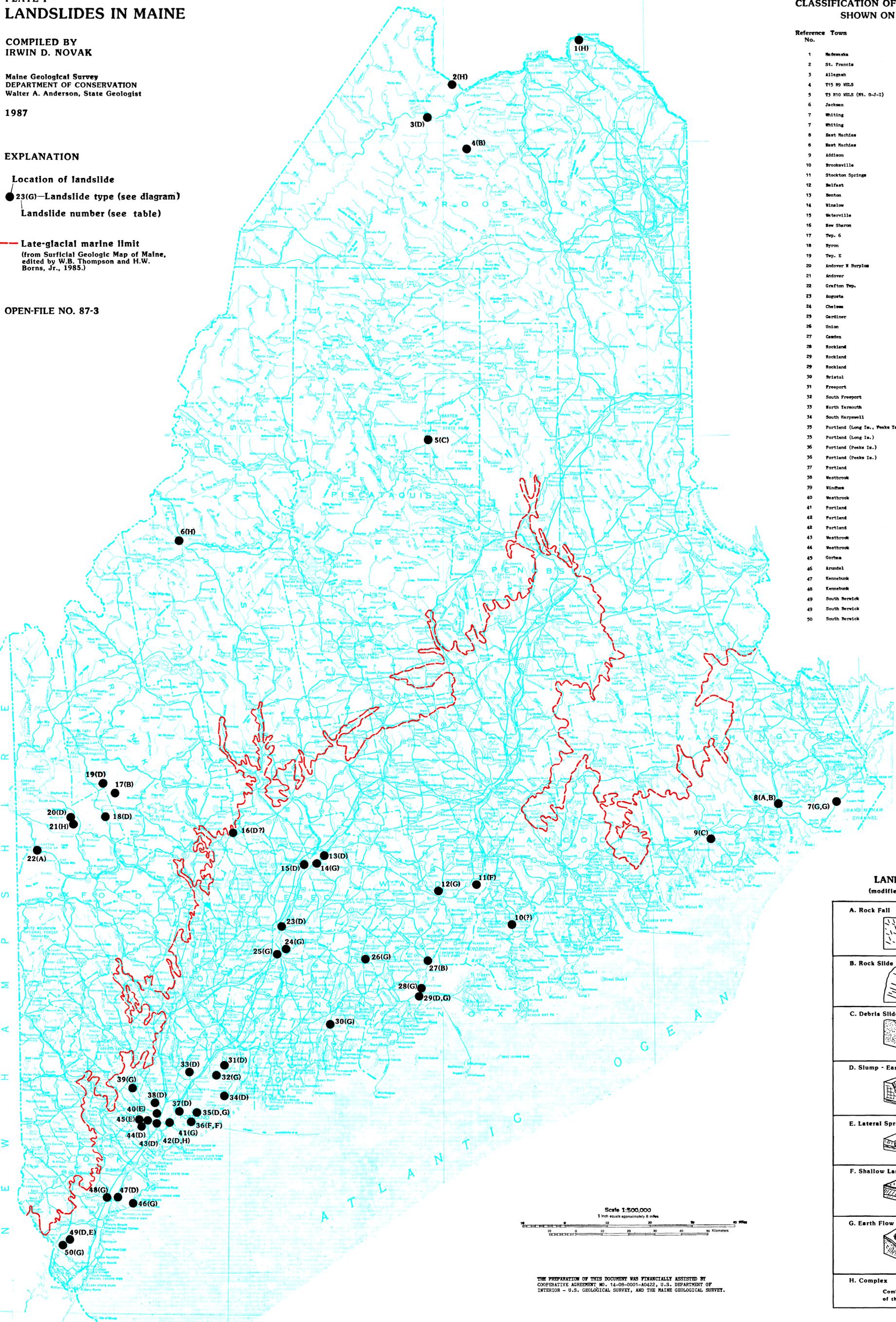
● Location of landslide
● 23(G)—Landslide type (see diagram)
● Landslide number (see table)

— Late-glacial marine limit
(from Surficial Geologic Map of Maine,
edited by W.B. Thompson and H.W.
Borns, Jr., 1985.)

OPEN-FILE NO. 87-3

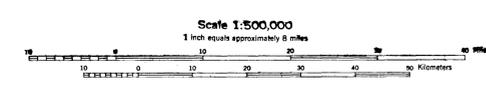
**CLASSIFICATION OF LANDSLIDES
SHOWN ON MAP**

Reference No.	Town	Slide Type	Material
1	Nedwaska	H	Soil, rock, clay
2	St. Francis	H	Soil, rock
3	Allagash	D	Clay, till
4	T15 R9 WELS	B	Rock
5	T3 R10 WELS (Mt. O-J-I)	C	Soil, rock
6	Jackson	H	Soil, rock, clay
7	Whiting	G	Soil
7	Whiting	G	Clay
8	East Machias	B	Rock
8	East Machias	A	Rock
9	Addison	C	Clay
10	Brooksville	F	Mud
11	Stockton Springs	F	Not reported
12	Belfast	G	Clay
13	Benton	D	Soil
14	Minalow	G	Clay
15	Waterville	D	Clay
16	New Sharon	D?	Clay
17	Twp. 6	B	Rock
18	Byron	D	Clay
19	Twp. E	D	Soil, clay
20	Andover N Surplus	D	Clay
21	Andover	H	Soil, rock
22	Grafton Twp.	A	Rock
23	Augusta	D	Soil
24	Chelsea	G	Clay
25	Gardiner	G	Clay
26	Union	G	Soil
27	Camden	B	Rock
28	Rockland	G	Clay
29	Rockland	D	Not reported
29	Rockland	G	Clay, silt
30	Bristol	G	Clay
31	Freeport	D	Clay
32	South Freeport	G	Clay, silt, sand
33	North Yarmouth	D	Clay
34	South Harpswell	D	Till over clayey sand
35	Portland (Long Is., Peaks Is.)	G	Soil
35	Portland (Long Is.)	D	Sand and gravel overlying clay
36	Portland (Peaks Is.)	F	Marine silt
36	Portland (Peaks Is.)	F	Till overlying clay
37	Portland	D	Clay
38	Westbrook	D	Clay
39	Windham	G	Soil
40	Westbrook	E	Clay
41	Portland	G	Clay
42	Portland	D	Clay
42	Portland	D	Clay
43	Westbrook	D	Clay
44	Westbrook	D	Clay
45	Corvan	E	Clay
46	Arundel	G	Soil, clay
47	Kennebunk	D	Sand, silt, clay
48	Kennebunk	G	Soil, sand overlying clay
49	South Berwick	D	Soil
49	South Berwick	E	Soil
50	South Berwick	G	Soil, clay



**LANDSLIDE TYPES
(modified after Varnes, 1958)**

A. Rock Fall	
B. Rock Slide	
C. Debris Slide	
D. Slump - Earth Flow	
E. Lateral Spread	
F. Shallow Land Slip	
G. Earth Flow / Soil Flow	
H. Complex	Combination of two or more of the above types.



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