CHAPTER 7. SOURCES OF POLLUTION
L. STREAMBANK EROSION

INTRODUCTION
Streambank erosion is a primary source of sediment loading into Seneca Lake. The purpose of this study was to estimate sediment yield from each subwatershed and prioritize those having the highest "potential" sediment yield. The Seneca Lake watershed was divided into 17 subwatersheds and 12 direct drainage areas that comprise 175 tributaries representing 917 miles of waterways entering Seneca Lake throughout the watershed.

The Erosion and Sediment Inventory (EASI study) conducted in 1974 by the USDA Soil Conservation Service (now the Natural Resources Conservation Service) estimated 1547 miles of stream banks in the watershed. The estimated sediment contribution from these miles of streambank totaled 143 tons of sediment yield/bank mile/year. EASI estimated the total sediment yield from stream banks in a given year at 43657 tons (Table 7L. 1.). This study listed Kashong Creek, Big Stream, and Catharine Creek as separate water resources impacting sediment loading into Seneca Lake.

Table 7L.1. EASI Study Summary of Streambank Miles and Bank Erosion in Tons(T)

Water Body	Total Bank Miles	T/Bank Mile/Year	Total T/Year
Kashong Creek	48	42.23	2027
Big Stream	51	41.31	2107
Catharine Creek	337	34.20	11524
Seneca Lake	1111	25.20	27999
TOTAL	1547	142.94	43657

METHODS
The method used to determine the erosion potential index of the subwatersheds and direct drainage areas was developed by the Yates County Soil and Water Conservation District and reviewed by DuLac Engineering. The erosion potential method utilizes information taken from USGS topographical maps, Manning's velocity formula for stream flow and field data collected from tributaries throughout the entire watershed.

Tributary miles were calculated using the New York State Department of Environmental Conservation (NYSDEC) stream coverage database. To determine actual stream length, unrelated hydrographic features were omitted from the database, measurements were converted from metric to standard and ARCView statistics were used to determine final tributary miles. Two hundred and twenty-one sites were visited throughout the watershed during the summer of 1997 through spring 1998 with the following data collected at each site: stream bottom material, vegetative and side slope condition of stream banks and

cross sectional information. USGS maps were used to determine stream gradient at each site where data was collected.
To determine the streambank erosion potential, the following formula was applied for data collected at each site:

Erosion Potential Index Number (EPIN) = bottom material value (rock, gravel, or soil bottom) + side slope condition value (stable, moderate erosion, eroded) + vegetative condition value (good, moderate, or poor) + (average velocity * Tributary Miles).

An EPIN was calculated for each site and then averaged by subwatershed or direct drainage area. The product is an Erosion Potential Index for each of the 17 subwatersheds and 12 direct drainages. The higher the Potential Index Number the greater potential of sediment loading from that portion of the Seneca Lake watershed.

RESULTS

The sub-watersheds and the direct drainage areas were ranked separately due to differences in tributary size and length. Tables 7L. 2. and 7L.3. shows the average values for stream bottom, side slope condition, vegetative condition, velocity and EPIN for the subwatershed and direct drainages. The EPIN ranged from a high for Catharine Creek of 4787.4 to a low for Sunset Bay of 96.04.

The ranking of sub-watersheds and direct drainages in the high, medium or low category for streambank erosion was determined by subtracting the low value of 111.69 for Lodi Point from the high value of 859.18 for Reading DD and dividing by three. The EPIN values for Catharine Creek, Big Stream, Reading DD and Sunset Bay DD were considered extreme and consequently omitted in this ranking process. Utilizing this process, EPIN values that fell between 859.18 – 610.02 are considered HIGH, values between 610.01 – 360.86 are MODERATE and values between 360.85 - 111.69 are LOW. Tables 7L.2. and 7L.3. summarize the ranking values for streambank erosion for the Seneca Lake watershed.

Sub-watersheds and direct drainages with a HIGH ranking for streambank erosion include:

> Catharine Creek, Big Stream, Keuka Lake Outlet, Reading DD, Starkey DD, Long Point DD and Satterly Hill DD.

Sub-watershed and direct drainages with a MODERATE ranking for streambank erosion include:

> Rock Stream, Kashong Creek, Sawmill/Bullhorn Creek, Glen Eldridge, Hector Falls, Lamoreaux Landing DD and Valois DD.

Sub-watersheds and direct drainages with a LOW ranking for streambank erosion include:

Plum Point Creek, Wilson Creek, Reeder Creek, Kendaia Creek, Indian Creek, Simpson Creek, Lodi Point, Mill Creek, Benton DD, Reed Point DD, Geneva DD, Sunset Bay DD, Wilcox Creek DD, Sampson State Park DD and Sixteen Falls Creek DD.

Table 7L. 2. Streambank erosion potential for subwatersheds in the Seneca Lake watershed.

Sub-Watershed	Bottom Material[1]	Side Slope Condition[2]	Vegetative Condition[3]	Velocity[4]	Tributary Miles[5]	EPIN Value	Erosion Potential
Catharine Creek	23.0	24.6	23.1	19.25	259.27	4787.4	H
Rock Stream	15.0	16.7	18.3	18.79	17.86	385.63	M
Big Stream	23.3	23.3	27.5	15.49	75.78	1249.33	H
Plum Point Creek	21.7	28.3	25.0	14.94	12.64	263.80	L
Keuka Lake Outlet	17.5	21.7	22.8	13.05	61.10	859.18	H
Kashong Creek	18.5	22.3	20.8	10.26	47.83	552.23	M
Wilson Creek	20.0	24.3	22.9	10.36	25.11	327.21	L
Reeder Creek	15.0	25.0	25.0	6.97	13.71	160.06	L
Kendaia	20.0	30.0	30.0	13.18	5.66	154.62	L
Indian Creek	15.0	30.0	30.0	13.86	13.39	260.58	L
Simpson Creek	30.0	30.0	30.0	9.87	5.31	142.39	L
Lodi Point	20.0	25.0	25.0	9.31	4.48	111.69	L
Mill Creek	25.0	25.0	27.5	7.50	18.09	232.31	L
Sawmill/Bullhorn Creek	20.0	30.0	25.0	22.62	18.70	498.96	M
Glen Eldridge	22.5	25.0	25.0	22.0	17.23	453.43	M
Hector Falls	20.0	30.0	30.0	11.67	26.65	387.30	M

Table 7L. 3. Streambank Erosion Potential for Direct Drainages in the Seneca Lake Watershed.

Direct Drainages	Bottom Material[1]	Side Slope Condition[2]	Vegetative Condition[3]	Velocity[4]	Tributary Miles[5]	EPIN Value	Erosion Potential
Reading DD	19.23	21.5	21.5	15.48	65.12	1070.11	H
Starkey DD	20.8	25.8	25.0	16.70	34.01	639.73	H
Long Point DD	23.3	26.7	27.3	15.35	36.56	638.68	H
Benton DD	18.3	28.3	28.3	23.38	8.77	280.06	L
Reed Point DD	25.0	26.7	23.3	9.19	11.45	180.24	L
Geneva DD	30.0	23.8	21.3	6.58	24.03	233.03	L
Sunset Bay DD	26.7	23.3	20.0	6.74	4.54	96.04	L
Wilcox Creek DD	20.0	27.5	27.5	10.58	6.59	144.73	L
Sampson State Park DD	30.0	30.0	25.0	14.05	2.09	114.36	L
Sixteen Falls Creek DD	18.6	27.1	24.3	8.97	19.18	242.03	L
Lamoreaux Landing DD	27.5	25.0	25.0	18.43	27.98	592.00	M
Valois DD	20.0	25.0	27.5	16.61	27.36	525.66	M
Satterly Hill DD	25.0	30.0	30.0	20.22	26.69	621.01	H

[1] At each sample site the predominant bottom material (rock, gravel, and soil) was chosen and assigned a value of 10, 20 or 30 respectively. Values shown are averages for each subwatershed and drainage area.

[2] At each sample site the streamside slope condition (stable, moderate erosion, severe erosion) was evaluated and assigned a value of 10, 20 or 30 respectively. Values shown are averages for each subwatershed or drainage area.

[3] At each sample site overall vegetative growth (good, moderate, poor) was evaluated and assigned a value of 10, 20 or 30 respectively. Values shown are averages for each subwatershed or drainage area.

[4] Velocity (ft/sec) was calculated using Manning's formula, field data and USGS topographic data.

[5] Tributary miles were calculated using the NYSDEC stream data coverage base.

Potential Pollution Problems By Sub-Watershed
Streambank Erosion Potential