Eastland Woolen Mill

Corinna, Maine

EPA Facility ID: MED980915474

Basin: Lower Kennebec

HUC: 01030003

Executive Summary

The Eastland Woolen Mill site is located on the East Branch Sebasticook River within the Kennebec River basin. This mill produced woolen fabrics from the mid-1930s to 1996 and used chlorobenzene in the dyeing process. Before 1971, the mill discharged wastewater directly to the East Branch Sebasticook River. Soils, groundwater, and river sediments are contaminated with chlorobenzene compounds and trace elements at concentrations that exceed screening guidelines. There are several impassable dams in the Kennebec and Sebasticook River basins, but a program to restore anadromous fish access to the watershed is now underway. New fish passageways at the dams are expected to allow fish access to the site by 2002. A consumption advisory is in effect on the East Branch Sebasticook River due to PCB and dioxin contamination.

Site Background

The Eastland Woolen Mill (EWM) site occupies approximately 8.5 ha (21 acres) in Corinna, Penobscot County, Maine. The East Branch Sebasticook River flows under the EWM site into Sebasticook Lake and continues southwest approximately 8 km (5 mi) to the main stem of the Sebasticook River and an additional 35 km (22 mi) to the Kennebec River. The Kennebec River flows south approximately 77 km (48 mi) to the Gulf of Maine and the Atlantic Ocean (Figure 1).

Operations at the EWM site were primarily conducted in a large manufacturing building that crosses over the East Branch Sebasticook River (Figure 2). There is one dam just north of EWM, a second dam beneath EWM, and a third dam approximately 530 m (1,740 ft) downstream of the EWM site. In addition to the main mill complex, three satellite locations were associated with mill operations: the Moosehead Mill, the School Street Yard, and Lot 88 (Figure 2). Eastland Woolen Mill also owned property referred to as the Old Dump Site along the east side of the river approximately 0.97 km (0.6 miles) downstream from the mill.

The EWM produced woolen fabrics from the mid-1930s until its closure in 1996. Chlorobenzene, which was used in the dyeing process, was stored in a 29,000-liter (7,600 gal) underground storage tank (UST) (USEPA 2000a). Wastewater containing spent chemicals was discharged through a tailrace that lead to the East Branch Sebasticook River, or onto the soil under the mill building (Acheron Engineering Services 1994; MEDEP 1999; USEPA 1999a). In 1971, the waste stream was diverted to a sewage treatment plant without pre-treatment (USEPA 1999a). Three additional current and historical sources of contamination to the river are dye kettles, which were located near the dam in the central manufacturing building, soils near the UST area, and approximately 22,000 kg (48,500 lbs) of chemicals removed from the site during a state emergency removal action in 1997 (USEPA 1999b; USEPA 2000a). The U.S. Environmental Protection Agency listed the EWM on the National Priorities List in April 1999.

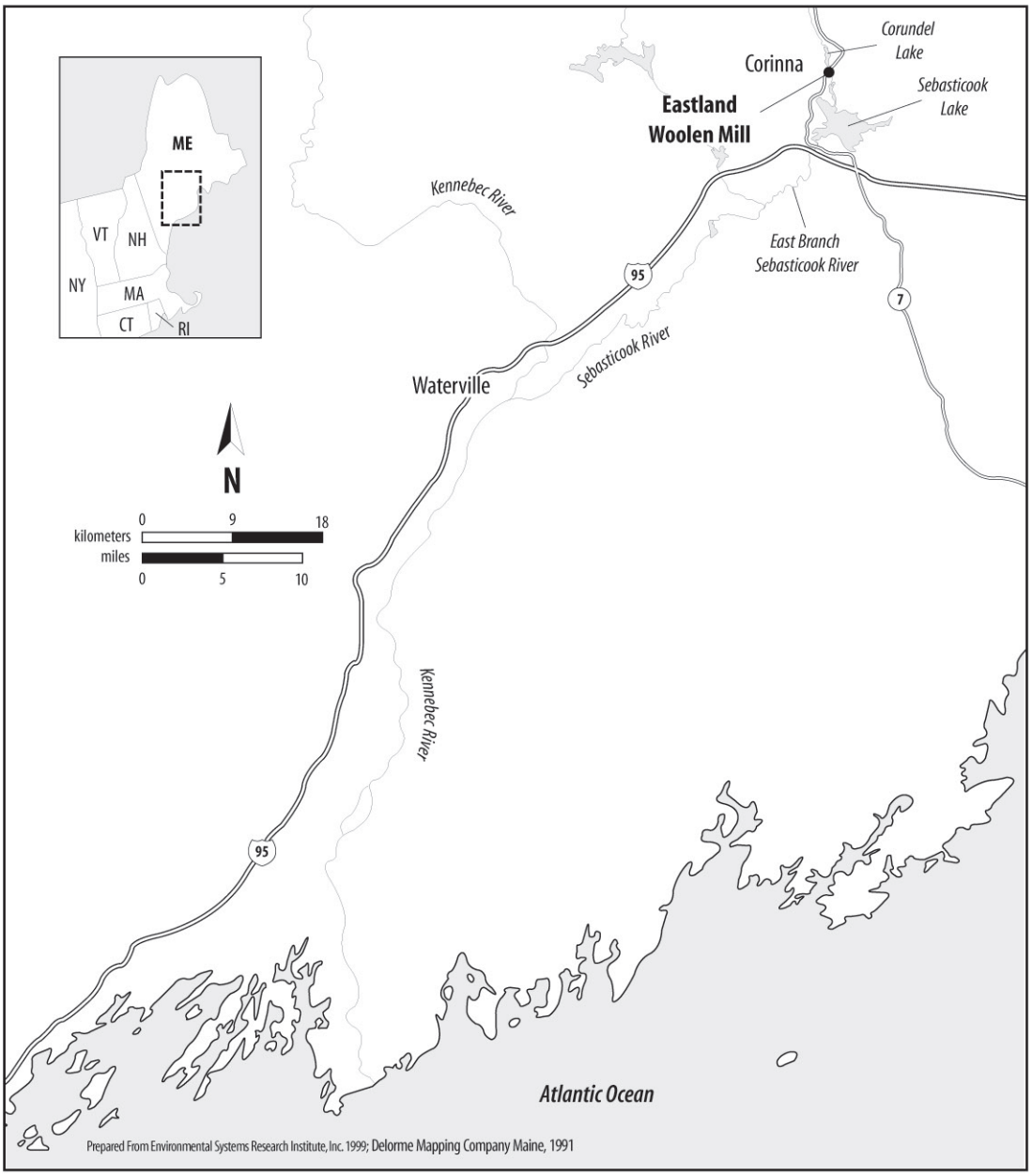

Figure 1. Location of the Eastland Woolen Mill facility, Corinna, Maine.

Direct discharge and groundwater migration are the primary pathways for release of contaminants to the East Branch Sebasticook River. A portion of the EWM site is in the 100-year floodplain. In 1998, the river flooded the property and two floors of the mill building. Groundwater beneath the site is encountered at 1.6 m (5.2 ft) bgs (MEDEP 1999).

NOAA Trust Resources

The NOAA trust habitat of concern is the East Branch Sebasticook River. The East Branch is a moderate-sized and moderate-gradient river ranging widely in width and sediment type because

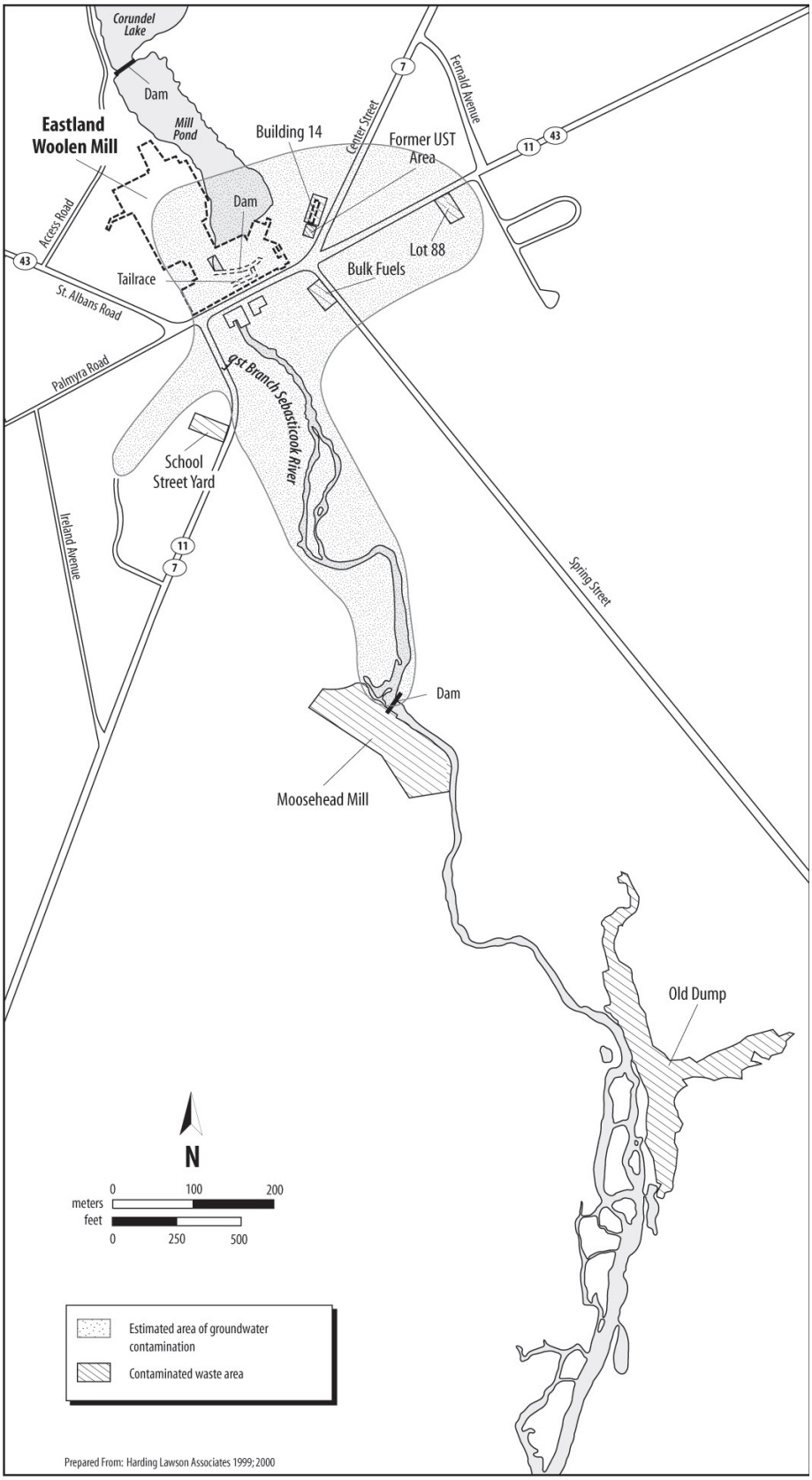

Figure 2. Detail of the Eastland Woolen Mill property.

Table 1. Future use of anadromous resources in the East Branch Sebasticook River after anadromous restoration of dams on the Kennebec River basin (Squires 2000).

Species		Future Habitat Use		
Common Name	Scientific Name	Spawning Ground	Juvenile Nursery	Migratory Corridor
ANADROMOUS FISH				
Alewife	*Alosa pseudoharengus*	◆	◆	◆
Atlantic salmon	*Salmo salar*	◆	◆	◆
Blueback herring	*Alosa aestivalis*	◆	◆	◆

of several dams on the river. Historically, the East Branch was used by several anadromous fish species for spawning and juvenile rearing but dams now block access to most of the river. A program to restore anadromous fish access to the Kennebec River basin is underway. Fish passageways have been built on several dams, and agreements for additional passageways have been made with the State of Maine and electric utilities. Fish passage to the East Branch Sebasticook River is expected to be restored by 2002 (Squires 2000).

The catadromous American eel is the NOAA trust species near the site. Eel enter streams as juveniles and reside in most habitable reaches as adults. Eel can traverse low-head dams, small waterfalls, and other obstructions that block many anadromous fish. After dams are fitted with fish passageways, it is expected that alewife, blueback herring, and Atlantic salmon would use reaches of the river near the EWM site for spawning and juvenile rearing (Squires 2000).

Two fish consumption advisories are in effect for the East Branch Sebasticook River. A statewide fish consumption advisory is in effect for all inland waters due to ubiquitous mercury contamination. A second advisory in effect for the Kennebec watershed includes the East Branch and mainstem Sebasticook rivers, and the Kennebec River, due to PCB and dioxin contamination (EPA 2000b).

Recreational fisheries occur on the East Branch Sebasticook River for warm-water resident species, including those areas affected by the fish consumption advisory for the Kennebec watershed (Squires 2000).

Site-Related Contamination

Field investigations reported contamination of soils, groundwater, and river sediment in and around the EWM property. The primary contaminants of concern to NOAA include chlorobenzene compounds, trace elements, and PAHs. Maximum contaminant concentrations based on investigations by the Maine Department of Environmental Protection and the U.S. Army Corps of Engineers are summarized in Table 2, along with appropriate screening guidelines. These investigations collected over 100 soil and groundwater samples, 16 surface water samples, and at least 30 sediment samples (Harding Lawson Associates 1999, 2000; MEDEP 1999).

Chlorobenzenes and PAHs were detected at substantial concentrations in EWM soils. The greatest concentrations of chlorobenzene-contaminated soils were found in the UST excavation area and in an area 38 m (125 ft) downstream of the mill building wet process area, where direct discharge to the ground and river occurred (Figure 2; MEDEP 1999). Screening guidelines are not available for organic compounds in soil. Trace elements were detected in soils at concentrations that exceeded

Table 2. Maximum concentrations of contaminants of concern found at Eastland Woolen Mill (MEDEP 1999; Harding Lawson Associates 1999; Harding Lawson Associates 2000).

	Soil (mg/kg)		Water (µg/l)			Sediment (mg/kg)	
Contaminant	Soils	Mean U.S.[a]	Ground-water	Surface Water	AWQC[b]	Sediment	TEL[c]
TRACE ELEMENTS							
Arsenic	39	5.2	20	< 3.0	150	16	5.9
Cadmium	4.7	0.06	57	< 1.0	2.2[d]	56	0.596
Chromium	610	37	1.4	5.0	11	390	37.3
Copper	370	17	N/A	34	9[d]	49	35.7
Lead	2,700	16	11	9.0	2.5[d]	330	35
Mercury	1.5	0.058	<0.2	< 0.2	0.77	1.2	0.174
Nickel	55	13	2.1	7.0	52[d]	51	18
Silver	3.1	0.05	<1.0	< 1.0	0.12	0.56	1.0[e]
Zinc	2,800	48	49	29	120[d]	2,600	123.1
ORGANIC COMPOUNDS							
Chlorobenzene	1,800	NA	6,300	0.46	50[f,g]	< 0.25	NA
1,2-Dichlorobenzene	3,300	NA	3,700	0.55	763[f,h]	3.9	NA
1,3-Dichlorobenzene	2,300	NA	660	0.66	NA	1.4	NA
1,4-Dichlorobenzene	3,400	NA	2,700	< 1.0	763[f,h]	4.6	NA
1,2,3-Trichlorobenzene	280	NA	1,100	< 1.0	NA	2.5	NA
1,2,4-Trichlorobenzene	750	NA	4,800	< 1.0	NA	35	NA
Total PAHs	250	NA	ND	ND	NA	74	4.022[e]

NA Screening guidelines not available
N/A Data not available
ND Not detected above the value presented.
a Shacklette and Boerngen (1984), except for cadmium and silver which represent average concentrations in the earth's crust from Lindsay (1979).
b National Recommended Water Quality Criteria (USEPA 1993). Freshwater chronic criteria presented
c TEL; Threshold Effects Level; freshwater sediment value. Concentration below which adverse effects were rarely observed (geometric mean of the 15 percent concentration in the effects data set) as compiled by Smith et al. (1996).
d Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L
e TEL not available; marine Effects Range-Low (ERL) presented. ERL represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al. (1995).
f Lowest observable effect level
g Value for chemical class
h Value for the summation of all isomers

screening guidelines. The greatest concentrations of trace elements and PAHs in soils were found in the floodplain next to the river.

Several waste samples collected from within the mill building were contaminated with chromium, lead, and several chlorobenzene compounds (Table 2; Harding Lawson Associates 1999). Samples of liquid waste collected from the mill building contained substantial concentrations of arsenic, chromium, lead, and mercury (Table 2; Harding Lawson Associates 1999).

A groundwater plume contaminated with chlorobenzene extends east and southeast from the EWM complex for approximately 490 m (1,600 ft) (Figure 2; USEPA 1999b). Chlorobenzene was detected in groundwater at concentrations two orders of magnitude greater than the AWQC. The greatest concentrations of chlorobenzene in groundwater were detected in the UST excavation area and downgradient of the central mill building (Figure 2; MEDEP).

Chlorobenzenes were detected in river sediment as far as 1.1 km (0.7 mi) downstream from the mill facility and as deep as 3.7 m (12 ft) (MEDEP 1999). All chlorobenzene concentrations in surface water samples were below 1 µg/L, although copper and lead were detected at concentrations slightly greater than the AWQC. Trace elements were detected in river sediment at concentrations that exceeded screening guidelines.

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