# STATE of the STRAIT

# ECOLOGICAL BENEFITS OF HABITAT MODIFICATION

## DETROIT RIVER AND WESTERN LAKE ERIE

2010

**Cover photos:** DTE's River Rouge Power Plant in Michigan by Chris Lehr/Nativescape LLC; Lower left: Legacy Park in Windsor, Ontario by Essex Region Conservation Authority; Lower middle: Elizabeth Park in Trenton, Michigan by Emily Wilke/Detroit River International Wildlife Refuge; Lower right: Fort Malden in Amherstburg, Ontario by Essex Region Conservation Authority.

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# 5.9 Ecological Results of Restoring Fighting Island

## Introduction

BASF Corporation and its predecessor companies have owned Fighting Island since 1918. The southern three-quarters of the island were divided into three settling beds (Figure 1). The beds serve as the final disposition for alkaline by-products predominantly from the manufacture of soda ash and other lime-based products used for the manufacture of plate glass. The beds were in service between 1924 and 1982. The beds hold approximately 15.3 million cubic meters of material.

The alkaline by-products consist mostly of calcium chloride, sodium chloride, coke ashes, unreacted limestone, and limestone impurities such as silica, alumina, and metallic oxides. These by-products were pumped in slurry form to Fighting Island where they were allowed to dry and decant. The grain size typically is in the silt to fine silt range.

*Figure 1. North bed in the 1950s.*

Habitat projects on the 486-hectare (1,200-acre) Fighting Island site benefit wildlife and increase environmental awareness among employees, community members, students and government agencies through implementation of a cohesive, long-term wildlife management plan.

The original management strategy for the site, implemented from the early to mid-twentieth century, included setting aside 121 hectares (300 acres) of land for hunting programs and using the remaining 364 hectares (900 acres) for storage of lime tailings. BASF's current goal for Fighting Island, which is located on the Canadian side of the Detroit River, is to provide a native vegetative cover that eliminates dusting concerns, protects the surface of the dikes and settling beds from erosion, and provides habitat for wildlife while enhancing the community in which the island resides.

BASF planted more than 340,000 seedlings, including *Populus* (poplar), and native and berry-producing shrubs on the island. Between 1982 and the present, vegetative cover of the island increased from 30% to 80%. Employees placed thousands of bales of straw, hay, alfalfa, and scattered leaves from the nearby town of LaSalle, Ontario, to increase the amount of organic material in the soil. They also introduced 300 wild turkeys (*Meleagris gallopavo*) to the island habitat, and 5,000 ring-necked pheasants (*Phasianus colchicus*) are introduced each year. Recently developed projects will convert existing runoff canals into wetlands, control invasive weed species on existing artificial marshes, manage habitat for migratory birds, and add habitat components for cavity-nesting species.

*Opportunities*

The three settling beds, North, Middle, and South, have unique challenges. The North bed was shut down in 1980 at a 7.6-meter elevation above river level. The Middle bed was shut down in 1953 at 10.7 meters above river level. The South bed was shut down in 1982, twenty years before its original plan, which kept it bowl-shaped and regularly accumulating water.

Since the 1970s, BASF has actively encouraged revegetation on Fighting Island. The early efforts targeted increasing the stability of the perimeter containment dikes. The revegetation goals included reducing dust problems, increasing wildlife habitat, controlling runoff, and enhancing the physical appearance.

Many factors discourage vegetative growth in these materials, including: high pH, high moisture content, the absence of organic components, high concentrations of salts, and the very smooth ground surface. The smooth surface promotes transport by wind and discourages resident time for seeds to root. The high moisture content, along with the materials' fine grain size, combined to inhibit any kind of large-scale tilling.

## Methods

BASF's primary methods for increasing vegetative cover fall into six categories. A discussion for each method follows.

1) *Reduce the water content of surficial deposits to promote plant growth:* Assessments by the Ontario Ministry of Environment beginning in 1982 concluded that the high moisture content significantly inhibited plant growth. BASF reduced the soil's moisture content by building and excavating channels through the beds. These channels enhance drainage on all the beds and carry excess water to the decant channels.

2) *Build windbreaks at strategic locations to catch dust, seeds, and blowing soil:* BASF brought in thousands of bales of hay and straw to build approximately 9.7 km of windbreaks that catch dust and seeds. As the windbreaks decay, they provide good organic base matter for plant growth. Additionally, several thousand stick and mulch plots on the beds acted as small isolated windbreaks.

3) *Transplant trees and shrubs to develop deeper root and soil zones:* Since the mid-1980s, BASF has planted approximately 340,000 trees and seedlings on Fighting Island. Early survival rates were marginal, but several species did very well. These species include *Populus* (poplars) and *Elaeagnus angustifolia* (Russian olive). BASF purchased most seedlings and saplings from the Seedling Nursery Stock Program through the Essex Region Conservation Authority. BASF transplanted a significant number of trees and shrubs from the northern marsh area on Fighting Island to the settling beds. Native berry-producing tree and shrub seedlings are now strategically planted each year to provide cover and habitat for wildlife.

4) *Acquire and apply yard wastes from local communities to increase organic content:* BASF acquired and maintains an Organic Soils Conditioning Permit to apply leaves on the island. Beginning in the early 1990s, BASF began accepting leaves from the town of LaSalle free of charge. The leaves are spread inside the perimeter dikes and are allowed to decay for a few years. BASF then seeds the decayed leaves with grasses. Branches are

placed in humps across the beds where they act as small windbreaks and seed areas. The branches also help increase the organic content of surface soils.

5) *Acquire and apply organic biosolids (wastewater treatment plant sludge) if available to increase organic content:* BASF worked with several local groups to increase the fertility of the lime beds through the application of biosolids. In 1981 and 1982, BASF participated in a pilot-scale project using biosolids from the City of Detroit. The sludge was blended with the soils at various percentages to find the optimum mix ratio, and test plots were planted with a variety of vegetation. Although the pilot project was declared an overall success, the project was discontinued because of elevated concentrations of metals in the sludge and perceived political complications. Two additional opportunities arose in the 1990s to apply biosolids from the Windsor Wastewater Treatment Plant to Fighting Island. These initiatives, in cooperation with the Fighting Island Development Group (Dean Construction Company), also were unsuccessful, primarily due to budget concerns in Windsor's City Council.

6) *Encourage use of the island by waterfowl:* Waterfowl and colonial waterbird use is increasing on Fighting Island. Herring gulls (*Larus argentatus*) and ring-billed gulls (*L. delawarensis*) have significant nesting colonies. The contribution of biosolids from this source has been an unexpected benefit to increasing organic content of the soils. Since realistic estimates of the gull population began in 1991, their numbers have increased by over 230% (estimated at over 350,000 individuals; C. Weseloh pers. comm.). While BASF encourages gulls to live on Fighting Island, BASF in fact discourages them from congregating on its other riverfront properties, most notably on the North Works facility.

## Results and Discussion

Overall vegetative cover on the southern three-quarters of the island increased from less than 40% in 1987 to nearly 95% in 2008. The fruits of these rehabilitation efforts include decreased runoff of alkaline waters into the Detroit River, decreased incidents of dust rising from the lime beds that once caused problems for local residents, increased habitat for resident and migratory birds, and a more aesthetically pleasing appearance for residents on both sides of the Detroit River (Figure 2).

*Figure 2. Fighting Island in 2006.*

In 2007, the Fighting Island settling beds were inventoried by two biologists as part of the recertification process for the Wildlife Habitat Council. Table 1 presents a partial list of plants recently found on Fighting Island that provides evidence that the once barren beds show significant ecological results.

*Table 1. Fighting Island Inventory, 29-Jun-07, Martha Gruelle, Kathy Koelbl-Crews, Wildlife Habitat Council.*

| *North and Middle Beds* | | |
|---|---|---|
| **Native or Alien** | **Scientific Name** | **Common Name** |
| N | *Achillea millefolium* | yarrow |
| N | *Asclepias syriaca* | common milkweed |
| N | *Asclepias tuberosa* | butterfly milkweed |
| N | *Asclepias verticillata* | whorled milkweed |
| N | *Calystegia sepium* | hedge bindweed |
| N | *Carex aurea* | golden sedge |
| A | *Centaurea biebersteinii* | spotted knapweed |
| N | *Cornus drummondii* | roughleaf dogwood |
| A | *Daucus carota* | Queen Anne's lace |
| A | *Elaeagnus angustifolia* | Russian olive |
| N | *Erigeron philadelphicus* | common fleabane |
| A | *Hieracium piloselloides* | tall hawkweed |
| A | *Hypericum perforatum* | common St. John's wort |
| N | *Juniperus virginiana* | eastern redcedar |
| A | *Lotus corniculatus* | bird's-foot trefoil |
| A | *Melilotus alba* | white sweet-clover |
| N | *Penstemon digitalis* | foxglove beardtongue |
| N | *Phalaris arundinacea* | reed canarygrass |
| A | *Phleum pratense* | timothy |
| A | *Phragmites australis* | common reed |
| A | *Populus alba* | white poplar |
| N | *Populus deltoides* | eastern cottonwood |
| N | *Populus tremuloides* | trembling aspen |
| A | *Rhamnus frangula* | glossy buckthorn |
| N | *Rhus typhina* | staghorn sumac |
| A | *Rosa multiflora* | multiflora rose |
| N | *Rubus occidentalis* | black raspberry |
| A | *Sonchus sp.* | sowthistle |
| A | *Verbascum thapsus* | common mullein |
| N | *Vitis riparia* | riverbank grape |
| N | *Parthenocissus quinquefolia* | Virginia creeper |
| A | *Cirsium arvense* | Canada thistle |
| N | *Toxicodendron radicans* | poison ivy |
| N | *Acer negundo* | boxelder |
| N | *Morus rubra* | red mulberry |
| A | *Festuca rubra* | red fescue |
| A | *Ulmus pumila* | Siberian elm |
| N | *Apocynum cannabinum* | Indian hemp |
| A | *Nepeta cataria* | catnip |

| *South Beds* | | |
|---|---|---|
| **Native or Alien** | **Scientific Name** | **Common Name** |
| N | *Rhus glabra* | smooth sumac |
| N | *Sambucus canadensis* | common elderberry |
| A | *Xanthium strumarium* | common cocklebur |
| N | *Rubus occidentalis* | black raspberry |
| N | *Galium aparine* | cleavers |
| N | *Fragaria virginiana* | wild strawberry |
| A | *Plantago lanceolata* | English plantain |
| A | *Trifolium pratense* | red clover |
| A | *Hypericum perforatum* | common St. John's wort |
| A | *Elaegnus umbellata* | autumn olive |
| A | *Pastinaca sativa* | wild parsnip |
| A | *Tragopogon pratensis* | yellow goat's beard |
| A | *Cirsium vulgare* | bull thistle |
| A | *Rumex crispus* | curly dock |
| A | *Leonurus cardiaca* | motherwort |
| N | *Rudbeckia hirta* | black-eyed Susan |
| A | *Phragmites australis* | common reed |
| N | *Asclepias syriaca* | common milkweed |
| N | *Convolvulus sepium* | hedge bindweed |
| A | *Melilotus alba* | white sweet clover |
| N | *Vitis riparia* | riverbank grape |
| N | *Cornus drummondii* | roughleaf dogwood |
| A | *Daucus carota* | Queen Anne's lace |
| N | *Achillea millefolium* | yarrow |
| N | *Rhus typhina* | staghorn sumac |

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