6.0 VEGETATION MANAGEMENT

This is one in a series of Syntheses of Best Practices related to the effective management of road salt use in winter maintenance operations. This Synthesis is provided as advice to road maintainers for consideration when developing their own Salt Management Plan. The Synthesis is not intended to be used prescriptively but is to be used in concert with the legislation, manuals, directives and procedures of individual road agencies. Syntheses of Best Practices have been produced on Salt Management Plans, Training, Road and Bridge Design, Drainage and Stormwater Management, Pavements and Salt Management, Vegetation Management, Design and Operation of Road Maintenance Yards, Snow Storage and Disposal Sites and, Winter Maintenance Equipment and Technologies. For more detailed information, please refer to TAC's Salt Management Guide – 1999.

INTRODUCTION

De-icing salt has the potential to negatively impact vegetation (including agricultural crops). Sometimes these impacts can be quite serious. There are several measures that can be taken to help reduce these negative impacts, but short of discontinuing salt usage they cannot be entirely eliminated. Designers should try to implement as many measures as possible.

RELATIONSHIP TO SALT MANAGEMENT

Effective salt management practices can reduce the amount of salt entering the environment. Implementation of the practices discussed in the other chapters will go a long way towards reducing salt loadings to the environment. In areas where road salt must continue to be used to maintain roadway safety and assured access, road authorities should identify salt vulnerable vegetation and agricultural operations and should implement appropriate best management practices on roadways adjacent to these areas.

SALT MANAGEMENT PRACTICES

Minimizing the Impact of Salt Spray

Where road salt spray is problematic, consider whether lower application rates for road salts can deliver acceptable service levels. Where road salt continues to be an issue, there are several precautionary measures that can be taken to avoid negative impacts on vegetation as a result of de-icing salt spray accumulating on foliage and branches.

Optimizing Salt Use

The other Syntheses of Best Practices identify many methods for optimizing salt use that will help to reduce the vegetative impacts of winter operations. Some of these include:

- plan and design roadways to avoid areas with salt sensitive vegetation and agricultural areas;
- apply salt at optimal rates in a proactive manner to prevent ice from bonding with the pavement;
- use liquid anti-icing or pre-wetting to reduce the amount of salt lost to the ditch due to blowing or bouncing;

CONTENTS

- use properly calibrated electronic controllers to ensure that material application rates are accurately regulated;
- use pavement temperature sensors and good road weather information to ensure that salt is applied only when needed;
- use effective plowing to optimize salt use; and
- use snow drift control techniques to minimize the amount of snow blowing onto the roadways that in turn will reduce the need for salt.

Plant Species Selection

Landscape planting should try to:

- always plant salt tolerant species in areas subject to salt spray. Attachment 1 provides a list of salt tolerant species; and
- plant vegetation in groups to maximize protection afforded by other vegetation.

Location Selection

When selecting where to place vegetation the following should be considered:

- do not plant salt sensitive species within salt spray limits; and
- if salt sensitive species must be used within salt spray limits, locate the plants on sites elevated above the roadway surface to minimize salt spray coverage, or in areas physically protected from salt spray.

Maintenance and Prevention

To ensure long-term survival of vegetation:

- in urban areas protect newly planted conifers by erecting burlap screens during the winter months;
- in urban areas consider applying anti-desiccants and anti-transpirants to the tender shoots of sensitive plants;
- sweep salt laden grit from turf areas as soon as possible in the spring;
- shield natural areas from salt spray by planting buffers of salt tolerant species; and
- where feasible and cost-effective consider using snow fences (living or structural) to reduce snow accumulation on roadways or to trap salt spray and prevent it from traveling far from the roadway.

Minimizing the Impacts of Salt Laden Runoff

There are several precautionary measures that can be taken to avoid negative impacts on vegetation as a result of plant roots absorbing salt from the soil and soil water.

Species Selection

Landscape planting should try to:

- use species tolerant of salt laden runoff (see Attachment 1).

Location Selection

To minimize runoff impacts:

- avoid planting sites in heavy runoff collection areas such as depressions; and
- landscaping should be planted on the back side of ditches to permit maintenance access and ensure that salt laden roadway runoff is not directed towards plants.

Drainage Design

When designing drainage facilities:

- place shallow ditches along roadsides or swales around sensitive vegetation to divert salt runoff away from sensitive species;
- incorporate salt splash barriers into median design to redirect and channel away salt spray and water runoff;
- ensure that drainage designs minimize springtime ponding of salt laden water around sensitive vegetation; and
- use hard surface treatments in urban areas heavily impacted by roadway deicing salt.

NOTE: For additional information refer to the Drainage and Stormwater Management Synthesis of Best Practices.

SALT VULNERABLE AREAS

The impact zone for salt spray is generally confined to the right-of-way of most low volume roads. However, with high volume roads this spray can extend to areas off the right-of-way, especially on the downwind side. Salt vulnerable crops and vegetation in these impacts zones can be affected. Road authorities should identify these

areas, evaluate the economics of replacing salt vulnerable crops with salt tolerant alternatives, and consider introducing improved salt management practices on roadways in salt vulnerable areas on a priority basis. Attachment 2 provides a listing of field and forage crops and their salt sensitivity.

MONITORING

Regular monitoring of salt spray impacts to vegetation is not routinely carried out. However, road authorities should monitor salt usage in salt vulnerable areas to ensure that only the desired amount is being used.

RECORD KEEPING

In order to show due diligence in proximity to salt vulnerable areas, road authorities should maintain records of salt usage.

TRAINING

Training programs should identify the location of salt vulnerable areas and train operators in these areas on the best practices being employed. Training may also include proper wrapping of salt vulnerable species prior to the winter, if appropriate.

ATTACHMENT NO. 1

Anything listed as invasive by Invasive Species Canada http://www.invasivespecies.gov/geog/canada.shtml or the Canadian Botanical Conservation Network (http://www.rbg.ca/cbcn/en/invasives/i_list.html) should not be planted.

Salt Tolerance in Roadside Trees

Salt Tolerant
Common Horsechestnut (*Aesculus hippcastanum*)
Serviceberry (*Amelanchier canadensis*)
Maidenhair Tree (*Ginko biloba*)
Honey Locust (*Gleditsia triacanthos*)
Tulip Tree (*Liriodendron tulipifera*)
Colorado Blue Spruce (*Picea pungens glauca*)
Mugho Pine (*Pinus mugho*)
Austrian Pine (*Pinus nigra*)
Jack Pine (*Pinus banksiana*)
Hop Tree (*Ptelea trifoliata*)
White Oak (*Quercus alba*)
Red Oak (*Quercus rubra*)
English Oak (*Quercus robur)*
Black Locust (*Robinia pseudoacacia*)

Moderately Salt Tolerant
Amur Maple (*Acer ginnnala*)
Manitoba Maple (*Acer negundo*)
Yellow Birch (*Betula alleghaniensis*)
Paper Birch (*Betula papyrifera*)
White Ash (*Fraxinus americana*)
Large-toothed Aspen (*Populus grandidentata*)
Trembling Aspen (*Populus tremuloides*)
Cottonwood (*Populus deltoides*)
Black Cherry (*Prunus serotina*)
Japanese Pagoda Tree (*Sophora japonica*)
Eastern White Cedar (*Thuja occidentalis*)

Salt Intolerant
Balsam Fir (*Abies balsamea*)
Red Maple (*Acer rubrum*)
Sugar Maple (*Acer saccharum*)
Silver Maple (*Acer saccharinum*)
Eastern Redbud (*Cercis canadensis*)
Shagbark Hickory (*Carya ovata*)
Black Walnut (*Juglans nigra*)
Ironwood (*Ostrya virginiana*)
Norway Spruce (*Picea abies*)
Red Pine (*Pinus resinosa*)
White Pine (*Pinus strobus*)
Scot's Pine (*Pinus sylvestris*)
London Plane Tree (*Platanus acerifolia*)
Douglas Fir (*Pseudotsuga menziesii*)
Basswood (*Tilia americana*)
Littleleaf Linden (*Tilia cordata*)
Hemlock (*Tsuga canadensis*)

Salt Tolerance in Roadside Shrubs

Salt Tolerant
Silverberry (*Elaeagnus commutata*)
Sea Buckthorn (*Hyppophae rhamnoides*)
Common Ninebark (*Physocarpus opulifolius*)
Choke Cherry (*Prunus virginiana*)
Staghorn Sumac (*Rhus typhina*)
Buffaloberry (*Shepherdia canadenis*)
Snowberry (*Symphoricarpus albus*)
Japanese Tree Lilac (*Syringa reticulata*)

Moderately Salt Tolerant
Forsynthia (*Forsynthia ovata*)
Red Cedar (*Juniperus virginiana*)
Mock Orange (*Philadelphus coronarius*)
Smooth Sumac (*Rhus glabra*)
Elderberry (*Sambucus canadensis*)

Salt Intolerant
Grey Dogwood (*Cornus racemosa*)
Red-osier Dogwood (*Cornus stolonifera*)
Winged Euonymous (*Euonymous alatus*)
High-bush Cranberry (*Viburnum trilobum*)

ATTACHMENT NO. 2

Salt Sensitivity Of Field And Forage Crops

Sensitive	Moderate Tolerance	Tolerant
Corn Soybean White Bean Red Clover Alsike Clover	Canola Wheat Barley Oat Reed Canary Grass Meadow Fescue Intermediate Wheatgrass Crested Wheatgrass Bromegrass Alfalfa Sweetclover	Tall Wheatgrass Slender Wheatgrass

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