

Oakes

Community Threat Assessment Protocol Summary

NDSU



NDSU-NORTH DAKOTA FOREST SERVICE

Prepared by Sharon Bartels
Community Forestry Specialist

April 30, 2013

Table of Contents

Community Threat Assessment Protocol Project Summary	Page 1
Community Tree Inventory Summary	Page 1-2
Street Trees	Page 2
Recommendations	Page 3
Appendix A – Population Summary of Public Trees	
Appendix B – Species Distribution- City of Oakes	
Appendix C – Relative Age Distribution of Top 10 Public Tree Species	
Appendix D – Condition Distribution- City of Oakes	
Appendix E – Annual Benefits of Public Trees by Species	
Appendix F – Replacement Value for Public Trees by Species	
Appendix G – Stocking Rate Math – Identifying Planting Vacancies	
Appendix H – Community Forestry Grant Program Overviews	
Appendix I – Suggested Tree Species for Oakes	
Appendix J – New Tree Planting	
Appendix K – Maps	

Community Threat Assessment Protocol Project Summary

Beginning in the summer of 2012, the NDSU- North Dakota Forest Service (NDFS) began establishing and executing rapid community forest inventories through the “Community Threat Assessment Protocol” project, or CTAP. This effort to establish a new inventory protocol is a response to the increasing concern of forest insect and disease in North Dakota. These resulting inventories are aimed at providing communities with current information about their community forest resources, enabling them to make educated management decisions based on the data collected. This project was funded by a Redesign grant from the US Forest Service.

These CTAP inventories collected data on actively managed, publicly owned trees in easements or planting strips along streets. These street tree inventories are considered “windshield inventories” as they were conducted from inside a vehicle. To complete the street tree inventories, NDFS employees were partnered with community staff or volunteers, when available, to drive every street in the community and collect data regarding all appropriate trees. The information that was collected includes tree location (by marking the tree location using computer mapping), tree species, stem diameter at 4.5 feet, and tree condition (a general statement of a tree’s health at the moment of inventory).

The purpose of this report is to provide the current information to enable the community to make informed decisions to manage their community forest. The next suggested step in Oakes’ community forest management is a complete, overall management plan.

Oakes Community Tree Inventory Summary

In Oakes, there were 470 trees inventoried representing over 19 different species (see Appendix A). The top five species inventoried were green ash, American elm, silver maple, poplar species, and Colorado spruce (see Appendix B). Of these species, green ash was 38.7 % of the total community forest resource. As a rule, no single tree species should be more than 10% of any community’s tree resource. When tree species exceed this 10% threshold, it can signify low species diversity, which can increase the potential impact of insect and disease issues on the community’s trees as a whole. The relative age, or stem diameter distribution, can say a lot about a community’s tree resource. It can provide clues about current or previous planting habits, types of trees being planted, and estimates about the longevity of existing trees. Oakes shows a fairly young forest resource, with 56.7% of all trees 12 inches in diameter or less and 35.7 % from 13 to 24 inch diameter (see Appendix C). Because over 1/2 of the trees are between 1 and 12 inches, we know that much of the tree planting activity occurred around the same time. Studies show that large, shade tree species provide more environmental benefits such as household utility savings, improving air quality and the beneficial use of rain water. With only 7.4 % of the current trees being larger than 25 inches in diameter, we can see that there are not very many “mature,” large trees within the community. The best way to increase the number of large tree specimens within the community is to annually plant a number of large shade tree species, while providing sound tree care and maintenance. Planting high quality, site appropriate trees will reduce the impact of a large population of the trees declining at the same time.

Overall tree condition can be a good way to judge the general health of a tree. In the CTAP inventories, trees were placed in one of four categories based on the overall appearance of the tree at the time of the inventory. These categories are:

- Excellent – Healthy, vigorous tree. No apparent signs of insect, disease, or mechanical injury. Little or no correction work required. Form representative of species
- Good – Average condition and vigor for area. May be in need of some corrective pruning or repair. May lack desirable form characteristics of species.
- Fair – General state of decline. May show severe insect, disease, or mechanical damage, but death not imminent. May require major repair in renovation.
- Poor – No chance of correcting a declining condition, death imminent.

This tree condition designation is not a substitute for in-depth tree inspections which should be completed on all questionable trees. Overall, trees in Oakes appear to be generally healthy with 82.1% of the tree population being in good or excellent condition and only 17.8 % of the tree population being in fair, poor, or very poor condition (see Appendix D). Community trees provide more than just simply a good looking street, boulevard or park. In fact, we can now put monetary values to the energy, CO₂, air quality, storm water, and aesthetic benefits that community trees provide. Using data from the North Dakota Department of Commerce, Oakes' public owned community forest provides total annual benefits of \$54,595 (see Appendix E). Two things a community can do to increase the benefits they receive from the community forest are improve overall tree health in the community and plant more large, canopy shade trees.

An important number for communities to know is the replacement value of their trees. Replacement values are estimates of the full cost of replacing trees in their current condition, should they be removed for some reason. These estimates are meant for the population as a whole and not intended to be used on a tree-by-tree basis. The replacement value for Oakes' public trees is \$516,796 (see Appendix F).

Street and Park Trees

There were 470 public trees inventoried in Oakes, representing over 19 different species (see Appendix A). The top 5 species inventoried during the street and park tree inventory were green ash, American elm, silver maple, poplar species, and Colorado spruce. Green ash (38.7%) is over the 10% diversity threshold. Although American elm is at 17.0%, these trees are very desirable and should be maintained. All other trees were at or below 10% (refer to Appendix B). The public trees in Oakes were in good shape, with only 17.8 % of the inventoried trees in fair or poor condition (see Appendix D).

One way foresters analyze the relative number of trees planted in a community is to look at the community's stocking rate. The "rule of thumb" for community forestry is a community is fully stocked when there are roughly 200 trees per street mile. Oakes has approximately 52 miles of roads. This leads to a stocking rate of 9.0 trees/street mile which is rate of 4.5 % of being fully stocked (see Appendix G). For guidelines on identifying current planting vacancies and increasing stocking rates see Appendix G. Based on these guidelines, Oakes has a very under stocked community forest and illustrates the availability of planting sites throughout the community.

Recommendations

To improve the overall community forest within Oakes, here are a few general recommendations regarding management.

1. Due to potential forest health threats, especially Emerald Ash Borer, planting of ash species (*Fraxinus*) should be discontinued.
2. Remove trees that are declining or are of low value, especially ash. Utilize grant monies to assist in this effort. Remove trees that are hazardous immediately (Appendix H).
3. Work to increase stocking rate and decrease planting vacancies by increasing overall tree planting. Utilize grant monies to assist in this effort (Appendix H).
4. Increase planting of less common, yet site appropriate species, (Appendix I).
5. Maintain an annual tree planting regime to work towards an even size distribution among the community trees (Appendix J).
6. Complete individual tree health assessments on problem trees.
7. Work with community maintenance staff, state and local resources to establish a management plan for the community, including an Emerald Ash Borer Response Plan
8. Educate the public in the importance of protecting the forest resource, especially the effects of the movement of firewood from outside the area.

Maps for this report can be found in Appendix K

Appendix A

Population Summary of Public Trees

Population Summary of Public Trees

3/27/2013

Species	DBH Class (in)									Total Standard Error
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42	
Broadleaf Deciduous Large (BDL)										
Green ash	25	22	54	44	26	4	3	3	1	182
American elm	0	0	9	31	27	5	4	4	0	80
Silver maple	3	4	10	7	7	2	1	3	1	38
Cottonwood	2	4	11	5	2	0	0	0	1	25
Maple	20	1	0	0	0	0	0	0	0	21
Northern hackberry	4	3	7	3	2	0	0	0	0	19
American basswood	9	2	5	2	1	0	0	0	0	19
BDL OTHER	6	0	3	0	0	0	0	0	2	11
Total	69	36	99	92	65	11	8	10	5	395 (±NaN)
Broadleaf Deciduous Medium (BDM)										
Baxelder	0	0	1	2	7	0	1	0	0	11
BDM other	3	2	1	1	0	0	0	0	0	7
Siberian elm	0	2	2	1	0	0	0	0	0	5
BDM OTHER	2	3	0	0	0	0	0	0	0	5
Total	5	7	4	4	7	0	1	0	0	28 (±NaN)
Broadleaf Deciduous Small (BDS)										
Apple	11	1	1	0	0	0	0	0	0	13
BDS OTHER	3	1	2	0	0	0	0	0	0	6
Total	14	2	3	0	0	0	0	0	0	19 (±NaN)
Broadleaf Evergreen Large (BEL)										
BEL OTHER	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0 (±NaN)
Broadleaf Evergreen Medium (BEM)										
BEM OTHER	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0 (±NaN)
Broadleaf Evergreen Small (BES)										
BES OTHER	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0 (±NaN)
Conifer Evergreen Large (CEL)										
CEL OTHER	2	2	0	0	0	0	0	0	0	4
Total	2	2	0	0	0	0	0	0	0	4 (±NaN)
Conifer Evergreen Medium (CEM)										
Blue spruce	6	3	15	0	0	0	0	0	0	24
CEM OTHER	0	0	0	0	0	0	0	0	0	0
Total	6	3	15	0	0	0	0	0	0	24 (±NaN)
Conifer Evergreen Small (CES)										
CES OTHER	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0 (±NaN)
Grand Total	96	50	121	96	72	11	9	10	5	470 (±0)

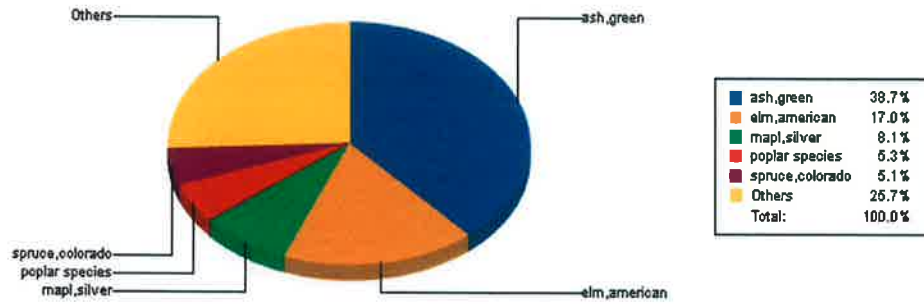
Appendix B

Species Distribution- City of Oakes

Species Distribution

City of Oakes

Report universe: All Subset



Top 20 Species

Species	Percent	Count
ash.green	38.7%	182
elm.american	17.0%	80
mapl.silver	8.1%	38
poplar species	5.3%	25
spruce.colorado	5.1%	24
hackberry.common	4.0%	19
linden.american	4.0%	19
mapl.freeman	3.0%	14
crabapple spp	2.3%	11
mapl.boxelder	2.3%	11
unknown	1.5%	7
elm.siberian	1.1%	5
cedar.western red	0.9%	4
maple spp	0.9%	4
oak.bur	0.9%	4
mapl.nwy crmsn kg	0.6%	3
mtn ash.showy	0.6%	3
apple	0.4%	2
ash spp	0.4%	2
birch species	0.4%	2
Others	2.3%	11
Total		470

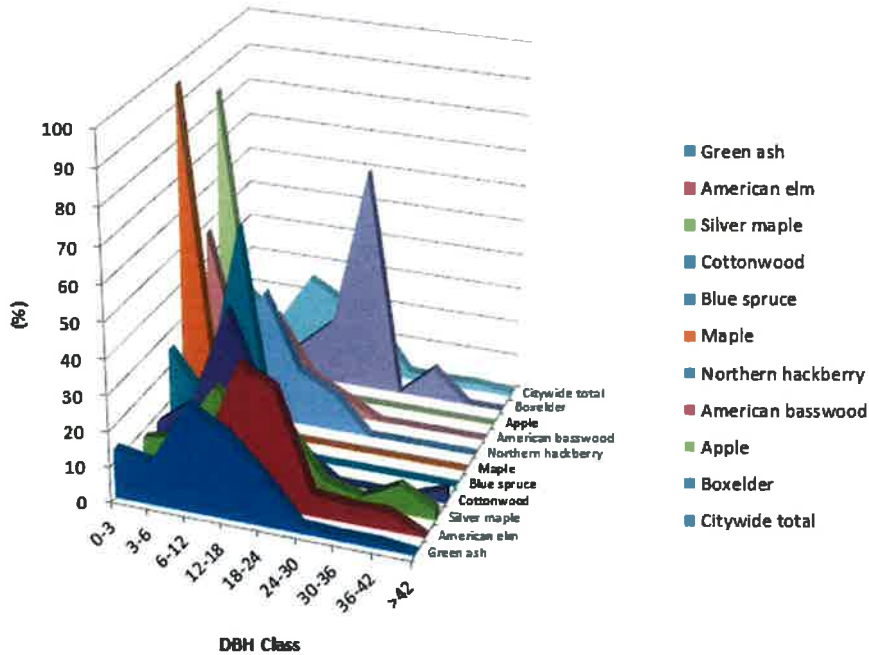
Appendix C

Relative Age Distribution of Top 10 Public Tree Species

Oakes

Relative Age Distribution of Top 10 Public Tree Species (%)

3/27/2013



Species	DBH class (in)								
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42
Green ash	13.74	12.09	29.67	24.18	14.29	2.20	1.65	1.65	0.55
American elm	0.00	0.00	11.25	38.75	33.75	6.25	5.00	5.00	0.00
Silver maple	7.89	10.53	26.32	18.42	18.42	5.26	2.63	7.89	2.63
Cottonwood	8.00	16.00	44.00	20.00	8.00	0.00	0.00	0.00	4.00
Blue spruce	25.00	12.50	62.50	0.00	0.00	0.00	0.00	0.00	0.00
Maple	95.24	4.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Northern hackberry	21.05	15.79	36.84	15.79	10.53	0.00	0.00	0.00	0.00
American basswood	47.37	10.53	26.32	10.53	5.26	0.00	0.00	0.00	0.00
Apple	84.62	7.69	7.69	0.00	0.00	0.00	0.00	0.00	0.00
Boxelder	0.00	0.00	9.09	18.18	63.64	0.00	9.09	0.00	0.00
Citywide total	20.43	10.64	25.74	20.43	15.32	2.34	1.91	2.13	1.06

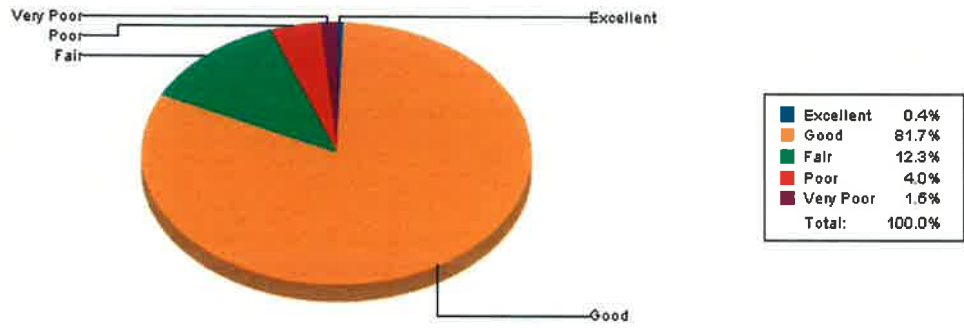
Appendix D

Condition Distribution – City of Oakes

Condition Distribution

City of Oakes

Report universe: All Subset



Condition	Percent	Count
Excellent	0.4%	2
Good	81.7%	384
Fair	12.3%	58
Poor	4.0%	19
Very Poor	1.5%	7
Total		470

Appendix E

Annual Benefits of Public Trees by Species

Oakes

Annual Benefits of Public Trees by Species (\$/tree)

4/9/2013

Species	Energy	CO ₂	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	Standard Error
Green ash	40.35	4.17	5.09	34.26	34.04	117.92	(N/A)
American elm	73.48	5.47	9.62	61.38	45.57	195.53	(N/A)
Silver maple	53.03	7.26	6.88	62.20	62.31	191.66	(N/A)
Cottonwood	35.84	3.57	4.53	29.44	30.85	104.23	(N/A)
Blue spruce	13.77	0.75	1.10	13.92	15.97	45.51	(N/A)
Maple	1.77	0.10	0.18	0.48	0.38	2.91	(N/A)
Northern hackberry	35.96	2.31	4.16	20.08	23.19	85.71	(N/A)
American basswood	17.84	1.51	1.94	10.25	10.26	41.79	(N/A)
Apple	3.33	0.27	0.34	0.87	0.68	5.48	(N/A)
Boxelder	58.33	7.35	7.27	57.37	49.61	179.94	(N/A)
BDM other	17.33	1.62	2.03	9.13	14.19	44.30	(N/A)
Siberian elm	25.35	2.29	3.02	16.35	20.92	67.93	(N/A)
OTHER STREET TRI	17.48	1.38	2.43	18.84	10.90	51.03	(N/A)

Appendix F

Replacement Value for Public Trees by Species

Oakes

Replacement Value for Public Trees by Species

3/27/2013

Species	DBH Class (in)									Total Standard Error	% of Total
	0-3	3-6	6-12	12-18	18-24	24-30	30-36	36-42	>42		
Green ash	7,294	7,993	30,209	46,103	47,054	11,199	12,112	16,568	6,387	184,919 (±6)	35.78
American elm	0	0	5,202	34,834	51,948	14,951	17,292	23,690	0	147,937 (±0)	28.63
Silver maple	719	1,465	5,675	7,870	13,468	5,980	4,323	17,767	6,853	64,122 (±0)	12.41
Cottonwood	546	1,441	5,863	5,030	3,391	0	0	0	5,921	22,212 (±0)	4.30
Blue spruce	1,434	863	6,767	0	0	0	0	0	0	9,064 (±0)	1.75
Maple	6,621	404	0	0	0	0	0	0	0	7,025 (±0)	1.36
Northern hackberry	1,306	1,234	4,983	4,128	4,788	0	0	0	0	16,339 (±0)	3.16
American basswood	2,929	823	3,488	2,732	2,394	0	0	0	0	12,393 (±0)	2.40
Apple	3,722	449	753	0	0	0	0	0	0	4,927 (±0)	0.95
Borselder	0	0	591	2,024	11,929	0	4,323	0	0	18,867 (±0)	3.65
BDM other	993	807	649	1,231	0	0	0	0	0	3,680 (±0)	0.71
Siberian elm	0	654	1,144	1,067	0	0	0	0	0	2,865 (±0)	0.55
Bur oak	701	0	1,667	0	0	0	0	0	0	2,368 (±0)	0.46
Mountain mah	716	449	753	0	0	0	0	0	0	1,920 (±0)	0.37
Northern white cedar	449	558	0	0	0	0	0	0	0	1,007 (±0)	0.19
Red maple	327	0	698	0	0	0	0	0	0	1,024 (±0)	0.20
Birch	300	366	0	0	0	0	0	0	0	666 (±0)	0.13
Ash	0	807	0	0	0	0	0	0	0	807 (±0)	0.16
Eastern cottonwood	0	0	0	0	0	0	0	0	12,336	12,336 (±0)	2.39
Amar maple	0	0	698	0	0	0	0	0	0	698 (±0)	0.13
Norway maple	331	0	0	0	0	0	0	0	0	331 (±0)	0.06
Black walnut	327	0	0	0	0	0	0	0	0	327 (±0)	0.06
Quaking aspen	303	0	0	0	0	0	0	0	0	303 (±0)	0.06
Japanese tree lilac	355	0	0	0	0	0	0	0	0	355 (±0)	0.07
BDL other	301	0	0	0	0	0	0	0	0	301 (±0)	0.06
Citywide total	29,685	18,313	69,043	105,079	134,971	32,131	38,051	38,025	31,496	516,796 (±0)	100.00

Appendix G

Stocking Rate Math- Identifying Planting Vacancies

Stocking Rate Math

470 inventoried public trees divided by 52 street miles = 9.0 trees/street mile

9.0 trees/street mile divided by 200 trees/street mile = 4.5 % stocked

(Actual) (Preferred)

200 trees/street mile X 52 street miles = 10,400 trees if Oakes were fully stocked

(Ideal)

Identifying Planting Vacancies

1. Look into community ordinances involving tree planting near streets
2. Visit planting site in question
3. Note the width of the boulevard, distance between the curb and the sidewalk. Boulevards or city right of way, narrower than 4 feet are probably not appropriate for a tree. The larger mature size of the tree, the larger the boulevard should be.
4. Look for overhead power lines and surface obstacles (mailboxes, fire hydrants, etc.)
5. Locate underground obstacles (water lines, power lines, etc.)
6. If no issues found, identify proper tree species for the site.

Appendix H

Community Forestry Grant Program Overviews



North Dakota Forest Service America the Beautiful (ATB) Program Development Grant

America the Beautiful Program Development is a competitive grant program available to North Dakota communities; administered by the NDSU-North Dakota Forest Service in cooperation with the US Forest Service. There are two sign-up periods in 2013 – spring and fall. Also, see the **Supporting Documents** available online at <http://www.ndsu.edu/ndfs> > Grants.

Deadlines: Current applications are due **April 30, 2013.**

Applicants **MUST** contact one of the NDFS personnel below **DURING THE CURRENT SIGN-UP PERIOD**, to review the project prior to submitting an application.

Sharon Bartels
North Dakota Forest Service
PO Box 604
Lisbon, ND 58054
Tel: (701)683-4323
Email: Sharon.Bartels@ndsu.edu

Gerri Makay
NDSU Research Extension
PO Box 219
Carrington, ND 58421
Tel: (701)652-2951
Email: Gerri.Makay@ndsu.edu

Joel Nichols
North Dakota Forest Service
916 E. Interstate Ave. Ste. #4
Bismarck, ND 58503
Tel: (701)328-9948
Email: Joel.Nichols@ndsu.edu

Program Overview

PURPOSE	To stimulate the development of innovative and effective community forestry program development projects.
ELIGIBLE APPLICANTS	Public entities that own or control the land where the project will be located must submit the application.
FUNDS AVAILABLE	A public entity is eligible to receive a maximum grant award of \$10,000 . Bids or price quotes will be required for successful applicants. Grant funds will be distributed on a reimbursement basis.
MATCH REQUIREMENTS	A grant request may not exceed 50% of the total project cost. At least 50% of the total cost of the project must be contributed by the applicant from sources other than federal funds. This amount may be in the form of cash and/or in-kind contributions.
APPLICATION DEADLINE	April 30, 2013. No faxed or emailed application will be accepted. Applications postmarked <u>after</u> April 30 will <u>not</u> be accepted. Mail the original application and eight (8) copies to... NDSU-North Dakota Forest Service Attn: Lisa Stone - CF Grants 916 East Interstate Avenue, Suite#4 Bismarck ND 58503-1227
PROJECT COMPLETION	Projects must be completed before or on August 31, 2014.



North Dakota Forest Service America the Beautiful (ATB) Tree Planting Grant Program

America the Beautiful Tree Planting is a competitive grant program available to North Dakota communities; administered by the NDSU-North Dakota Forest Service in cooperation with the US Forest Service. There are two sign-up periods in 2013 – spring and fall. Also, see the **Supporting Documents** available online at <http://www.ndsu.edu/ndfs> > Grants.

Deadlines: Current applications are due **April 30, 2013.**

Applicants **MUST** contact one of the NDFS personnel below **DURING THE CURRENT SIGN-UP PERIOD**, to review the project prior to submitting an application.

Sharon Bartels
North Dakota Forest Service
PO Box 604
Lisbon, ND 58054
Phone# (701)683-4323
E-mail Sharon.Bartels@ndsu.edu

Gerri Makay
NDSU Research Extension
Box 219
Carrington, ND 58421
Phone # (701)652-2951
E-mail: Gerri.Makay@ndsu.edu

Joel Nichols
North Dakota Forest Service
916 E. Interstate Ave. Ste. #4
Bismarck, ND 58503
Phone # (701)328-9948
E-mail: Joel.Nichols@ndsu.edu

Program Overview

PURPOSE	To stimulate the development of innovative and effective community forestry tree planting projects that increase the diversity of trees in the community.
ELIGIBLE APPLICANTS	Public entities that own or control the land where the project will be located must submit the application.
FUNDS AVAILABLE	A public entity is eligible to receive a maximum grant award of \$10,000 . Bids or price quotes will be required for successful applicants. Grant funds will be distributed on a reimbursement basis.
MATCH REQUIREMENTS	A grant request may not exceed 50% of the total project cost. At least 50% of the total cost of the project must be contributed by the applicant from sources other than federal funds. This amount may be in the form of cash and/or in-kind contributions.
APPLICATION DEADLINE	April 30, 2013. No faxed or emailed application will be accepted. Applications postmarked <u>after</u> April 30, 2013, will <u>not</u> be accepted.
	<u>MAIL COMPLETED APPLICATIONS AND 8 COPIES TO...</u> North Dakota Forest Service Attn: Lisa Stone - CF Grants 916 East Interstate Avenue Suite#4 Bismarck, ND 58503-1227
PROJECT COMPLETION	Before or on August 31, 2014.

North Dakota Forest Service Community Family Forest Grant Program

Funded by the "Trees for North Dakota" Trust Fund



For additional information, see Supporting Documents online at www.ndsu.edu/ndfs > Grants.

Deadline: Current applications are due **April 30, 2013**.

Applicants **MUST** contact one of the NDFS personnel below **DURING THE CURRENT SIGN-UP PERIOD**, to review the project prior to submitting an application:

Sharon Bartels
North Dakota Forest Service
PO Box 604
Lisbon, ND 58054
Phone# (701) 683-4323
E-mail: Sharon.Bartels@ndsu.edu

Gerri Makay
North Dakota Forest Service
Box 219
Carrington, ND 58421
Phone # (701) 652-2951
Email: Gerri.Makay@ndsu.edu

Joel Nichols
North Dakota Forest Service
916 East Interstate Ave. Ste. #4
Bismarck, ND 58503
Phone # (701) 328-9948
Email: Joel.Nichols@ndsu.edu

Program Overview

PURPOSE

This grant is to honor families in the state by planting trees in communities and to strengthen the tradition of annual tree planting.

ELIGIBLE APPLICANTS

Public entities that own or control the land where the project will be located must submit the application.

FUNDS AVAILABLE

A community is eligible to receive a maximum grant award of **\$1,000**. One application will be accepted per community. Grant funds will be distributed on a reimbursement basis.

MATCH REQUIREMENTS

A grant request may not exceed 50% of the total project cost. **At least 50% of the total cost of the project** must be contributed by the applicant. This amount may be in the form of cash, services, and/or in-kind contributions.

APPLICATION DEADLINE

April 30, 2013. No faxed or emailed applications will be accepted. Applications that are postmarked after April 30 will not be accepted.

Mail the original application and eight (8) copies to...

**North Dakota Forest Service
Attn: Lisa Stone - CF Grants
916 E. Interstate Avenue, Suite#4
Bismarck, ND 58503-1227**

PROJECT COMPLETION

Projects must be completed before or on **August 31, 2014**

Appendix I

Suggested Tree Species for Oakes

Suggested Tree Species for Oakes

Ohio Buckeye *Aesculus glabra*

Height 20-40', Spread 20-40'

Ohio Buckeye has a dense oval to round form, branching quite low. It is one of the first trees to leaf out in the spring. The leaves are palmately compound with 5-7 leaflets that are 4-5 inches long. Foliage is medium to dark green and may develop yellow or orange fall color. In spring the tree is covered with many upright panicles of creamy yellowish flowers. Fruit is a glossy brown nut enclosed in a thick husk. Seeds are poisonous.

Ohio Buckeye Hybrid Cultivars:

Autumn Splendor Buckeye *Aesculus x arnoldiana* 'Autumn Splendor'

Height 35-40', Spread 25-30'

A small, upright oval to round-headed tree, similar to Ohio Buckeye, but has excellent resistance to leaf scorch. It has glossy dark green leaves, which remain in good condition throughout the growing season. It develops an outstanding maroon red fall color, available in the nursery trade but availability by be limited. Introduced by the University of Minnesota Landscape Arboretum.

Prairie Torch Hybrid Buckeye *Aesculus x 'Bergeson'*

Height: 20-28'

A winter hardy hybrid buckeye selected in northern Minnesota. In NDSU trials it grew faster than most buckeyes that were accessions for the first 10-15 years. It produces a dense globose form which broadens with age becoming more mushroom shaped. The foliage is of high quality, fairly coarse and becomes a brilliant orange-red in the fall. Introduced by NDSU Zone 3

Dutch elm disease resistant elms

Discovery Elm *Ulmus davidiana var. Japonica* 'Discovery'

Height 40', Spread 40'

A vase-shaped tree. Reported to be resistant to Dutch Elm Disease, phloem necrosis, elm leaf beetles and aphids. Lower lateral branches need to be removed or the tree becomes somewhat dwarfed and bushy.

Cathedral Elm *Ulmus x 'Cathedral'*

Height, 40-50', Spread 40-60'

The form of the tree is broadly vase shaped. Cathedral is a distinct variety of elm tree, which is characterized by its resistance to Dutch elm disease. This variety is also highly tolerant to Verticillium wilt disease, limited susceptibility to black leaf spot disease, and good resistance of traumatic injury from climatic elements. The tree develops into a broadly vase shaped tree.

Prairie Expedition American Elm *Ulmus americana* 'Lewis & Clark'

Height: 55', Spread: 60

This selection is a TRUE American Elm selected from a lone survivor along the Wild Rice River. When inoculated with the Dutch elm disease fungus the tree showed high resistance. The foliage is dark green and it develops the classic umbrella shape which typifies American Elm .

Vanguard Elm *Ulmus* 'Morton Plainsman'

Height 40-50' Spread 40-50'

This hybrid of Japanese and Siberian Elm closely resembles Japanese Elm. Selected for its excellent Dutch Elm disease resistance, glossy deep green foliage and resistance to elm leaf beetle damage. Vanguard will tolerate drought prone areas of the Midwest and Great Plains. Selected and introduced by Morton Arboretum. Shape: Loosely rounded, Foliage: Dark green in the summer and no significant fall color, prefers full sun.

Prairie Radiance Winterberry *Euonymus bungeana* 'Verona'

Height 18-24' Spread 15-18'

Prairie Radiance is a small tree with a low branched trunk or multiple stems, truly an all-season small tree for the north. The foliage is green and produces an intense pink to reddish fall color. It produces a large quantity of delicately pink colored capsules which begin in mid-August. By mid to late September the capsules split open exposing bright red arils. After the leaves drop, the gray barked twigs set off the sequential color changes of the fruit, a beautiful sight over an extended period.

Hackberry *Celtis occidentalis*

Height,50-75', Spread 50'

Similar in appearance to the American Elm with light green foliage. Hackberry has rough, corky bark and is tolerant to drought, alkaline soil, wind, and pollution. Hackberry develops a deep root system.

Japanese Tree Lilac *Syringa reticulata*

Height 25', Spread 25'

Very hardy and pollution tolerant with large, fragrant, creamy-white flower panicles in June after other lilacs have bloomed, it is grown as a shrub or small tree. There are several tree form cultivars available in the nursery trade.

American Linden *Tilia Americana*

Height 60-70', Spread 40-50'

The tree is pyramidal in youth and matures into a rounded tree. The leaves are large dark green; heart shaped 4-8" long and almost as wide. The fall color is a pale yellow. The trees are a rapid grower once established, provides excellent shade and has fragrant pale yellow flowers. Transplants well, prefer deep, moist fertile soil but will adapt to drier soils. There are many cultivars available in the nursery trade.

Littleleaf Linden *Tilia cordata*

Height 30-35', Spread 25-30'

This tree is native to Europe and has a dense pyramidal to rounded crown. Leaves are dark green, bluish green beneath and turn yellow in the fall. The flowers are creamy-white to pale yellow and very fragrant. There are many cultivars available in the nursery trade.

Mongolian Linden *Tilia mongolica*

Height 30', Spread 25'

This is one of the smallest of the lindens has a typical attractive rounded habit. The leaf of Mongolian Linden is more birch-like than linden-like and is fine textured for a linden. The leaves are a lustrous dark green and develop a nice yellow fall color. The species seems to be aphid resistant. Zone 3

Thornless Honeylocust *Gleditsia triacanthos var. inermis*

Height 50-60', Spread 50-60'

A medium to large deciduous tree, branching is upright to arching, rather loose and open in appearance and casts only light shade. Leaves are 6-8" long, bright green glossy leaves turning yellow in the fall. Seed pods are flattened 7" to 18" long and twisted. Several cultivars available in nursery trade, some are seedless.

Amur Maple *Acer tataricum subsp. ginnala*

Height 15-20' Spread 15'

Small rounded graceful tree or large shrub with an overall irregular head with spreading slender branches. Foliage is medium green developing to a scarlet red in the fall. Several tree form cultivars are available in the nursery trade.

Freeman Maples Hybrid maple, parents are red maple and silver maple, we do not know if they are full adapted for North Dakota winters and soils. The trees should be planted in limited numbers until more is known about these cultivars. Iron chlorosis has been a problem in higher pH soils.

Tatarian Maple *Acer tataricum*

Height 20-25', Spread 18-20'

Has dark green foliage turning to yellows, orange red in the fall. Samaras (seed) are often red and showy. Large shrub or small tree, which is similar in many respects to Amur Maple. Tatarian Maple will tolerate alkalinity and dry conditions better than Amur Maple.

Amur Maackia *Maackia amurensis*

Height 20-30', Spread 20-25'

Small, upright vase shaped tree with a rounded crown. White blooms in July-August the foliage emerges with a silvery pubescence becoming green with maturity. Bark shiny brown, peels as it matures. Adaptable to a wide range of soils and prefers moist well-drained sites. Legume, fixes its own nitrogen, no serious disease or insect problems.

European Mountain Ash *Sorbus aucuparia*

Height 20-30', Spread 20-25'

Foliage is clear deep green becoming orange to red in the fall. In the spring white flowers are produced developing into showy orange red fruit, August-September. The fruit may persist on the tree into the winter. The tree has an upright, rounded appearance at maturity. Bark is grayish brown, usually smooth, but may become somewhat roughened with age. Several cultivars are available in the nursery trade.

Showy Mountain Ash *Sorbus decora*

Height 20-25', Spread 20'

The hardiest of the Mountain Ash species. Smaller ornamental tree grown for its white flowers, handsome dark green foliage, showy red fruit, and the foliage turns red in the fall. It is slower growing than European Mountain Ash but more disease resistant.

Bur Oak *Quercus macrocarpa*

Height 60-80', Spread 60-80'

Tolerates a wide range of soil types and is drought resistant The tree has an impressive crown, massive trunk and stout branches. The stems have corky ridges on them. This oak will adapt to various soils where other oaks sometimes fail.

Prairie Stature Oak *Quercus x bimundorum 'Midwest'*

Height 50', Spread 40' Zone 3

A hybrid of English and white oak, this tree has proven very cold hardy in North Dakota State University trials. Prairie Stature Oak is broadly pyramidal with dark green foliage shows mildew resistance and can change to a good red coloration in autumn.

Ussurian Pear *Pyrus ussuriensis*

Height 15-30', Spread 15-20'

The hardiest of all pears, native NE Asia. When in bloom the tree is a mass of large, clustered white flowers, foliage is semi-glossy and dense. Growth habit is dense and upright, becoming rounded with age. Fruit is a one-inch pome, greenish yellow. Foliage develops an orange to yellow fall color. Several cultivars are available in the nursery trade.

Amur Chokecherry *Prunus maackii*

Height 20-30', Spread 25-30'. Zone 2

A hardy small tree producing white flowers and black fruit, usually eaten by the birds before fully ripe. Bark golden brown or dark red with a glistening metallic color, flaking off similar to birch. Foliage is light green turning yellow in the fall

Laurel Leaf Willow *Salix pentandra*

Height 30-35', Spread 30' Zone 2

A medium sized tree with a broad oval to rounded crown. It grows rapidly and is drought tolerant once tree is established. The leaves are dark green and extremely glossy. Fall color is green to yellow-green.

There are additional tree species and cultivars available in the nursery industry which may be appropriate to plant within the community. Work with your local nursery and the North Dakota Forest Service to identify additional species and cultivars for your community.

Appendix J

New Tree Planting

New Tree Planting

http://www.treesaregood.com/treecare/tree_planting.aspx

Think of the tree you just purchased as a lifetime investment. How well your tree, and investment, grows depends on the type of tree and location you select for planting, the care you provide when the tree is planted, and follow-up care the tree receives after planting.

Planting the Tree

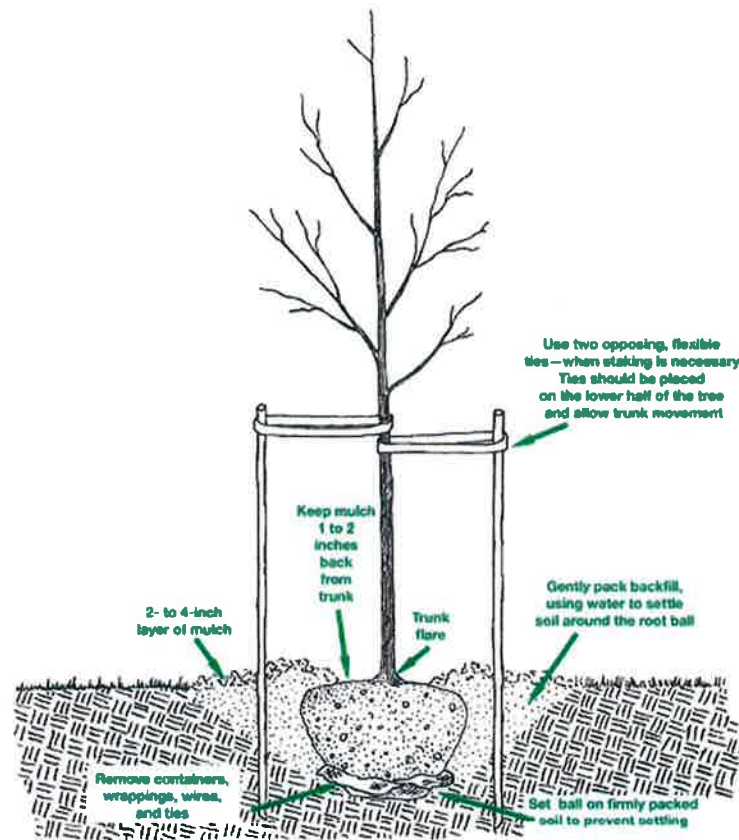
The ideal time to plant trees and shrubs is during the dormant season and in the fall after leaf drop or early spring before budbreak. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In tropical and subtropical climates where trees grow year round, any time is a good time to plant a tree, provided that sufficient water is available. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.

If the tree you are planting is balled or bare root, it is important to understand that its root system has been reduced by 90 to 95 percent of its original size during transplanting. As a result of the trauma caused by the digging process, trees commonly exhibit what is known as transplant shock. Containerized trees may also experience transplant shock, particularly if they have circling roots that must be cut. Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting coupled with good follow-up care reduces the amount of time the plant experiences transplant shock and allows the tree to quickly establish in its new location. Carefully follow nine simple steps, and you can significantly reduce the stress placed on the plant at the time of planting.

1. Dig a shallow, broad planting hole. Make the hole wide, as much as three times the diameter of the root ball but only as deep as the root ball. It is important to make the hole wide because the roots on the newly establishing tree must push through surrounding soil in order to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.
2. Identify the trunk flare. The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.
3. Remove tree container for containerized trees. Carefully cutting down the sides of the container may make this easier. Inspect the root ball for circling roots and cut or remove them. Expose the trunk flare, if necessary.
4. Place the tree at the proper height. Before placing the tree in the hole, check to see that the hole has been dug to the proper depth and no more. The majority of the roots on the newly planted tree will develop in the top 12 inches of soil. If the tree is planted too

deeply, new roots will have difficulty developing because of a lack of oxygen. It is better to plant the tree a little high, 2 to 3 inches above the base of the trunk flare, than to plant it at or below the original growing level. This planting level will allow for some settling (see diagram). To avoid damage when setting the tree in the hole, always lift the tree by the root ball and never by the trunk.

5. Straighten the tree in the hole. Before you begin backfilling, have someone view the tree from several directions to confirm that the tree is straight. Once you begin backfilling, it is difficult to reposition the tree.
6. Fill the hole gently but firmly. Fill the hole about one-third full and gently but firmly pack the soil around the base of the root ball. Then, if the root ball is wrapped, cut and remove any fabric, plastic, string, and wire from around the trunk and root ball to facilitate growth (see diagram). Be careful not to damage the trunk or roots in the process.



Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and

settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.

7. Stake the tree, if necessary. If the tree is grown and dug properly at the nursery, staking for support will not be necessary in most home landscape situations. Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism, or windy conditions are concerns. If staking is necessary for support, there are three methods to choose among: staking, guying, and ball stabilizing. One of the most common methods is staking. With this method, two stakes used in conjunction with a wide, flexible tie material on the lower half of the tree will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth.
8. Mulch the base of the tree. Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, it moderates soil temperature extremes, and it reduces competition from grass and weeds. Some good choices are leaf litter, pine straw, shredded bark, peat moss, or composted wood chips. A 2- to 4-inch layer is ideal. More than 4 inches may cause a problem with oxygen and moisture levels. When placing mulch, be sure that the actual trunk of the tree is not covered. Doing so may cause decay of the living bark at the base of the tree. A mulch-free area, 1 to 2 inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.
9. Provide follow-up care. Keep the soil moist but not soaked; overwatering causes leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less-frequent watering.

Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting and wait to begin necessary corrective pruning until after a full season of growth in the new location.

After you have completed these nine simple steps, further routine care and favorable weather conditions will ensure that your new tree or shrub will grow and thrive. A valuable asset to any landscape, trees provide a long-lasting source of beauty and enjoyment for people of all ages. When questions arise about the care of your tree, be sure to consult your local ISA Certified Arborist or a tree care or garden center professional for assistance.

E-mail inquiries: isa@isa-arbor.com

(c) 1998, 2004 International Society of Arboriculture. UPDATED JULY 2005

Developed by the International Society of Arboriculture (ISA), a non-profit organization supporting tree care research around the world and is dedicated to the care and preservation of shade and ornamental trees. For further information, contact:

ISA, P.O. Box 3129, Champaign, IL 61826-3129, USA.

© 2007 International Society of Arboriculture.

UPDATED SEPTEMBER 2005

Appendix K

Maps







City of Oakes
CTAP Elms