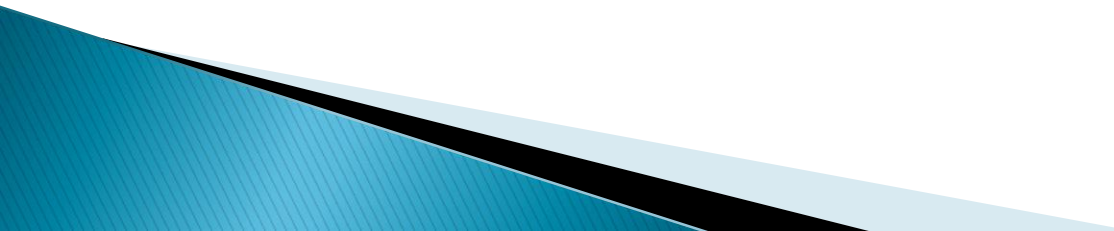


CONTROLLING BUCKTHORN WITH HOGS

PART ONE:
BY NANCY LUNZER

BUCKTHORN IS AN EXOTIC INVASIVE SPECIES

- ▶ IT FORMS AN IMPENETRABLE UNDERSTORY AND CAUSES LONG-TERM DECLINE OF THE FOREST.
 - ▶ IT OUT COMPETES NATIVE TREE SEEDLINGS AND WOODLAND PLANTS.
 - ▶ BUCKTHORN THICKETS SHADE OUT OTHER SPECIES AND LIMIT PLANT DIVERSITY
 - ▶ THE SALE OF BUCKTHORN WAS HALTED IN THE 1930'S.
 - ▶ IT IS A HOST TO OAT CROWN ROT AND A WINTER HOST TO THE SOYBEAN APHID.
- 

**EARLY SPRING AND LATE FALL IS THE
BEST TIME TO IDENTIFY BUCKTHORN.**



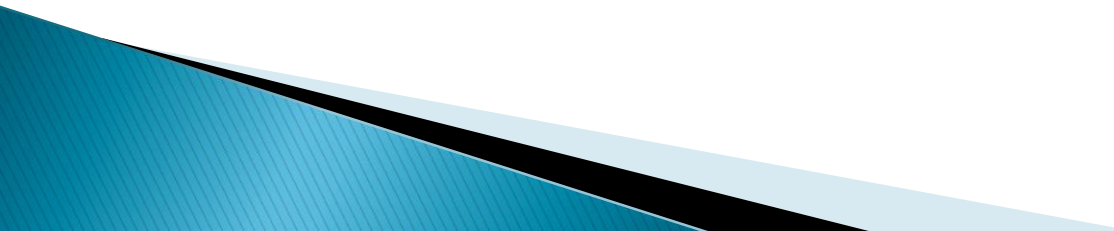
BUCKTHORN HAS THE FIRST GREEN LEAVES OF SPRING AND THE LAST GREEN LEAVES OF FALL





**BUCKTHORN
WAS IMPORTED
BY EARLY
SETTLERS AS A
QUICK-
GROWING
WINDBREAK FOR
PRAIRIE FARMS.**

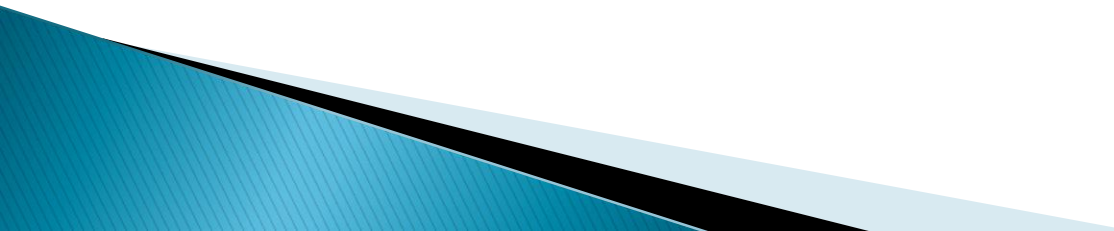
BUCKTHORN IS A MAJOR ECOLOGICAL PROBLEM IN MINNESOTA FORESTS

- ▶ MATURE BUCKTHORN PRODUCES DARK BLUE BERRIES THAT ARE EATEN BY BIRDS.
 - ▶ THE BERRIES HAVE A LAXATIVE EFFECT AND PASS THROUGH THE BIRDS AND ARE SPREAD THROUGHOUT THE BIRD'S HABITAT.
 - ▶ THE BUCKTHORN SEEDS REMAIN VIABLE IN THE SOIL FOR UP TO FIVE YEARS.
- 

TRADITIONAL METHODS TO REMOVE BUCKTHORN

- ▶ **CLEAR CUTTING – FOLLOWED BY YEARLY HERBICIDE TREATMENTS FOR 4–5 YEARS.**
- ▶ **HERBICIDE TREATMENT – OVERSPRAY ALL THE UNDERBRUSH AND RE-APPLY ANNUALLY OR CUT THE BUCKTHORN AND SPOT TREAT STUMPS ANNUALLY.**
- ▶ **HAND PULLING – WITH WEED WRENCH FOLLOWED BY YEARLY PULLING.**
- ▶ **CONTROLLED BURNING IS SOMETIMES USED BUT ONLY IN SAVANNAH AND PRAIRIE AREAS.**


TYPICAL COSTS FOR BUCKTHORN REMOVAL

- ▶ INITIAL MECHANICAL REMOVAL OF MODERATE BUCKTHORN \$170-\$250 PER ACRE.
 - ▶ ADDITIONAL YEARLY COST OF HERBICIDE TREATMENT IS \$150/ ACRE IF APPLIED BY THE LANDOWNER – \$300 IF CONTRACTED
 - ▶ INITIAL REMOVAL MUST BE FOLLOWED BY SPOT SPRAYING WITH HERBICIDE OR HAND-PULLING FOR 4 – 5 YEARS OR UNTIL THE SEEDBANK IS DEPLETED.
- 

THE TARGET AREA

- ▶ THE MAIN SOIL TYPES ARE BRENNYVILLE COMPLEX AND BRENNYVILLE WET CEBANA. THESE SOIL TYPES ARE HEAVY, WET, CLAY AND VERY ROCKY.
- ▶ THE UPPER CANOPY IS OLDER ASPENS AND A SECONDARY CANOPY OF MAPLES AND OAKS.
- ▶ THIS AREA IS HOME TO 7 SPECIES OF REPTILES AND AMPHIBIANS.
- ▶ 10 SPECIES OF MAMMALS AND
- ▶ 47 SPECIES OF BIRDS
- ▶ THE WOODLANDS AND PASTURES DRAIN INTO TWO EPHEMERAL PONDS AND ONE PERMANENT POND WHICH OVERFLOW INTO THE GROUNDHOUSE RIVER. THE GROUNDHOUSE FLOWS TO THE SNAKE RIVER.

THE IMPACT OF TRADITIONAL BUCKTHORN REMOVAL METHODS FOR THIS SITE.

- ▶ USE OF HERBICIDES COULD RESULT IN LEACHING INTO SENSITIVE WOODS AND WETLANDS.
 - ▶ CLEAR-CUTTING WOULD REMOVE THE WINDBREAK TO THE FARMSTEAD
 - ▶ CHEMICALS AND SOIL EROSION WOULD IMPACT WILDLIFE AND SENSITIVE WETLANDS
 - ▶ HAND-PULLING WOULD REQUIRE MUCH TIME AND LABOR.
- 

GOALS:



REMOVE THE BUCKTHORN USING THE NATURAL ROOTING ACTIVITY OF HOGS



PREVENT LEACHING OF HERBICIDES INTO SENSITIVE WETLANDS





**PRESERVE
THE
WINDBREAK
AND
PREVENT
SOIL
EROSION**

**PUT PRESSURE ON BUCKTHORN
SEEDLINGS BY GRAZING WITH SHEEP
UNTIL THE SEEDBANK IS DEPLETED.**



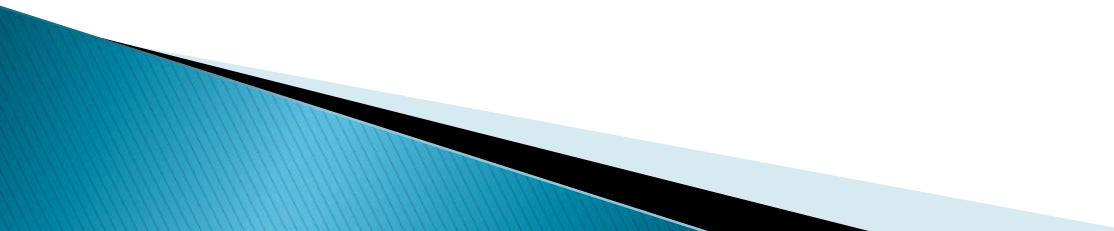
**THE LONG TERM GOAL IS TO
RETURN THE AREA TO NATIVE
PLANT AND TREE SPECIES.**



PART ONE: THE BEAUTY OF HOGS



WHAT A HOG CAN DO THAT MACHINERY CAN'T

- ▶ HOGS CAN WORK THE GROUND AROUND LARGE TREES AND BOULDERS WITHOUT DISTURBING DEEP ROOTED TREE SPECIES AND WITHOUT COMPACTING THE SOIL.
 - ▶ HOGS CAN WORK DAY AND NIGHT, THEY DON'T BURN FOSSIL FUELS, AND THEY DON'T REQUIRE PAY FOR LABOR.
 - ▶ HOGS CAN GLEAN UP TO 40% OF THEIR DIET FROM FOREST AND PASTURE FORAGE.
 - ▶ HOGS CAN DIG TOPSOIL AND REMOVE ROOTS AND STUMPS AND BREAK UP AND TRAMPLE BRUSHY DEBRIS.
- 

**THE AREA IN THE FOREGROUND
WAS HOGGED OFF AND SEEDED.**



THE BUCKTHORN IN THE BACKGROUND IS PART OF THE TEN ACRE TARGET AREA



HOW TO REMOVE BUCKTHORN USING HOGS



TRAIN THE HOGS TO JUMP BACK WHEN THEY TOUCH A FENCE BY PUTTING A HOT ELECTRIC WIRE INSIDE A PERMANENT FENCE.



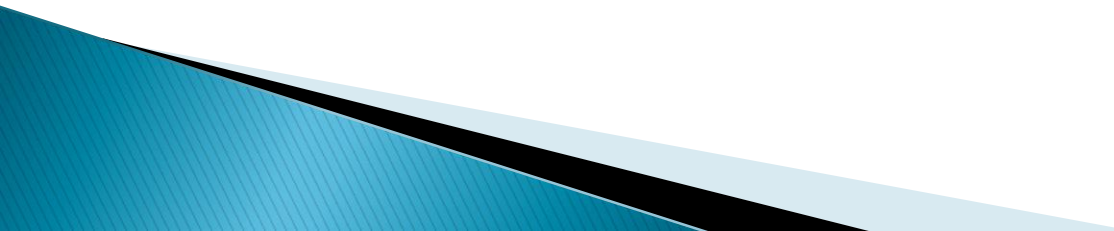
SET UP THE HOG HOUSES, FEEDERS AND WATER.



FENCE THE AREA WITH PIG- QUIK ELECTRO-WEB FENCING



PIG-QUIK FENCE FROM PREMIER 1

- ▶ PIG QUIK ELECTROWEB FENCING AND A PARMAK BATTERY FENCER MOUNTED ON ITS OWN GROUND ROD WAS AN EXCELLENT SYSTEM.
 - ▶ IT IS EASY TO INSTALL WITH ONE PERSON
 - ▶ IT IS SHORT ENOUGH TO STEP OVER TO ACCESS HOG YARDS FOR FEEDING ETC.
 - ▶ IT IS EASY TO FENCE IN ANY SHAPED AREA SO YOU CAN TARGET HEAVILY INFESTED AREAS WHILE LEAVING AREAS OF HEALTHY FOREST UNTOUCHED.
 - ▶ CORNERS WERE BRACED BY TYING TO STEEL FENCE POSTS OR FIBERGLASS POSTS.
- 

HOGS EAT ALMOST ANY VEGETATION AND WHAT THEY DON'T EAT THEY TRAMPLE.



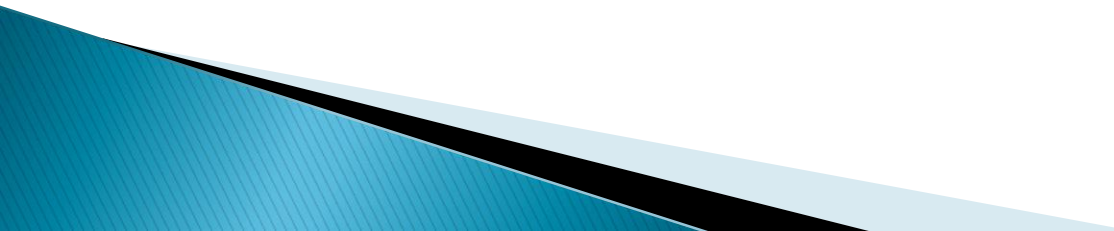
**HOGS EAT WORMS, INSECTS, ROOTS,
MUSHROOMS, PLANTS, ACORNS,
FROGS AND SNAKES.**



**THEY ACTIVELY SEARCH THE
UNDERBRUSH FOR ANYTHING EDIBLE.**




TOO MUCH OF A GOOD THING?

- ▶ HOGS CAN BE DETRIMENTAL TO A PASTURE BY ROOTING UP FAVORABLE FORAGE AND CREATING MUD WALLOWS.
 - ▶ MOVING HOGS FREQUENTLY CAN REDUCE DAMAGE TO FORAGE, REDUCE THE BUILD UP OF PARASITES IN THE SOIL, AND ALLOW THE FORAGE TO RECOVER.
 - ▶ FREQUENT MOVES ALSO PREVENTS THE BUILD UP OF HOG MANURE AND NUISANCE ODORS AND PROTECTS FROM GROUND WATER CONTAMINATION.
- 

**ONCE THE VEGETATION IS EATEN OR
TRAMPLED THE HOGS ARE MOVED.**



LIMITATIONS OF BUCKTHORN REMOVAL USING HOGS

- ▶ **HOGS WON'T DIG IN DUNGING AREAS**
 - ▶ **HOGS ARE LESS ACTIVE DURING HOT WEATHER**
 - ▶ **HOGS DIG LESS WHEN SOIL IS DRY**
 - ▶ **HOGS CHOOSE EASIEST AREAS TO DIG AND AVOID HARD TO DIG AREAS**
 - ▶ **HOGS WON'T DIG NEAR ELECTRIC FENCE**
- 

MAKING THE MOST OF HOG POWERED BUCKTHORN REMOVAL



PLACE FEED TROUGHS IN BUCKTHORN THICKETS FOR MORE TRAMPLING



LARGER HOGS TRAMPLE AND MOVE MORE DIRT THAN SMALLER HOGS



USE A “PULLER BEAR” WEED WRENCH TO PULL MISSED BUCKTHORN



IF BUCKTHORN ROOTS TOUCH SOIL IT CAN GROW BACK



REMOVING DEBRIS ALSO HELPS IMPROVE SEED TO SOIL CONTACT



SOIL SAMPLES DETERMINED THAT THE SOIL WAS READY FOR PLANTING



MULTIPLE SAMPLES WERE TAKEN FROM THE TOP FOUR INCHES OF SOIL



THE SAMPLES WERE MIXED AND SENT TO THE UNIVERSITY OF MINNESOTA SOIL TESTING LABORATORY



THE BARE SOIL WORKED WELL FOR BROADCAST SEEDING OF GRASS.



SHADE SEED WAS BROADCAST BETWEEN THE TREES

- ▶ SHADE SEED MIX:
 - FINE FESCUES –
CREEPING, HARD AND CHEWINGS VARIETIES
 - KENTUCKY BLUE GRASS –
LIMOUSINE AND BARON VARIETIES.

OLD BEDDING WAS USED FOR MULCH TO KEEP SEEDS MOIST



**SINCE THE SUMMER AND FALL WERE
SO DRY, WE FROST SEEDS IN
MARCH 2012.**



FROST SEEDING IS TO BROADCAST SEED ONTO SNOWPACK IN LATE SPRING



THE FREEZING AND THAWING CONDITIONS OF SPRING



**CAUSE CRACKS TO OPEN IN THE
GROUND WHERE SEEDS SETTLE AND
GET GOOD SEED TO SOIL CONTACT.**



**THE FROST SEEDED AREAS GOT AN
EARLY START AND WERE ABLE TO BE
GRAZED IN EARLY FALL.**



SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION

- ▶ A SPECIAL THANKS TO SARE FOR MAKING THIS PROJECT POSSIBLE
 - ▶ AND A SPECIAL THANKS TO TONY MILLER, OF THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES FORESTRY DIVISION, MORA MINNESOTA WHO OVERSAW THIS PROJECT FROM ITS ONSET IN 2010.
 - ▶ AND A SPECIAL THANKS TO NATE TEIG OF AMERY, WISCONSIN WHO HAS BEEN A GREAT RESOURCE FOR THE MANAGEMENT OF THE HAIR SHEEP.
 - ▶ AND A SPECIAL THANK YOU TO SCOTT WAGNER WHO WORKED ON EVERY ASPECT OF THIS PROJECT TO MAKE IT A SUCCESS.
- 