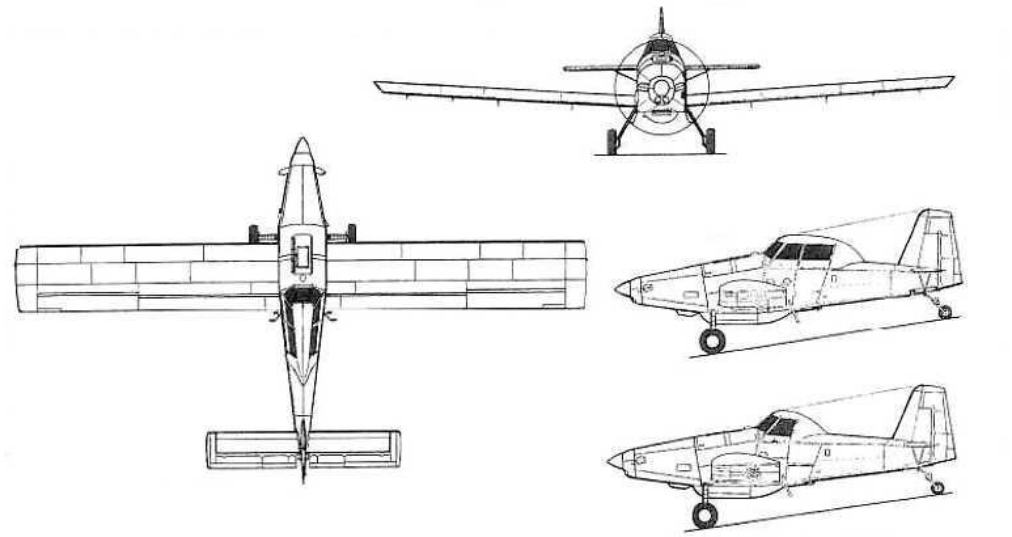
FIREBOSS AND WHEELED SEAT REPORT

MINNESOTA DNR - SPRING FIRE SEASON - 2015

A report on Single Engine Air Tanker Operations to aid in suppression of wildfires in MN.





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Cover: Two Fire Bosses in flight. SEAT diagram. Images not property of MN DNR.

BACKGROUND

In 2014, the State of Minnesota Department of Natural Resources (MN DNR), Division of Forestry, decided to sell two agency owned CL-215 aircraft, which had been the workhorse of the MN DNR's aerial suppression program for 14+ years.

A newer fleet of contracted type three single engine air tankers (Wheeled SEATs and Fire Bosses) would be used to replace the CL-215s.

This report focuses on the MN DNR's use of SEATs and Fire Bosses in 2015, and their future use.

Other changes occurred between 2014 and 2015 within the MN DNR Aviation Program. The most noteworthy of these changes was the determination to use a gel product known as FireIce as the primary suppression product for fixed wing aerial wildfire operations in MN in 2015.

Information on FireIce can be found in separate reports:
- MN DNR FireIce Field Operational Evaluation, 2014. (Cost, handling, mixing, loading, storage)
- FireIce Report, 2015. (Evaluation on the effectiveness of FireIce to aid in suppressing wildfires)

Although SEAT effectiveness can certainly depend on the product they apply, this report will attempt to focus on the capabilities and limitations of SEATs (rather than the product application) and how the MN DNR uses them to aid in the suppression of wildfires.

SEAT use and SEAT operations are not new procedures to the MN DNR, however the new mix of aircraft and the increasing use of SEATs justified additional training for firefighters.

For those reasons, considerable efforts were made by MN DNR Aviation Personnel over the winter of 2014 and early spring of 2015 to provide training and increased firefighter awareness related to the change in aircraft, FireIce, and their uses independently or in combination on wildfires. Firefighters were also re-trained on the importance of dispatching air resources during the early stages of wildfires.

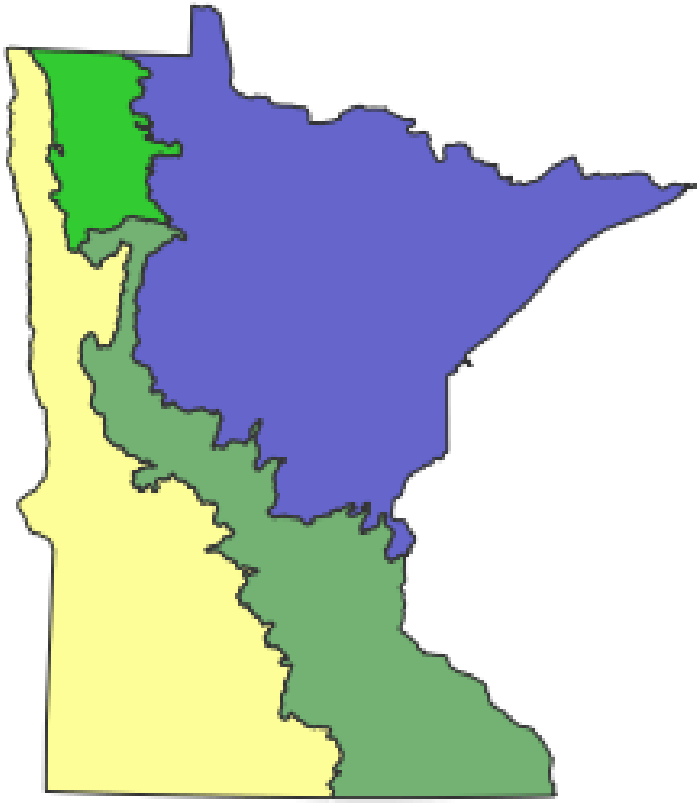
Training, and good training, is the backbone of a successful wildfire suppression operation. The intensive training provided **prior** to the 2015 spring wildfire season benefited the MN DNR's suppression program, and further supported an effective use of SEATs.

It is also important to understand fuel types across MN and established fixed wing base locations, to paint the picture of how the MN DNR used SEATs in 2015.

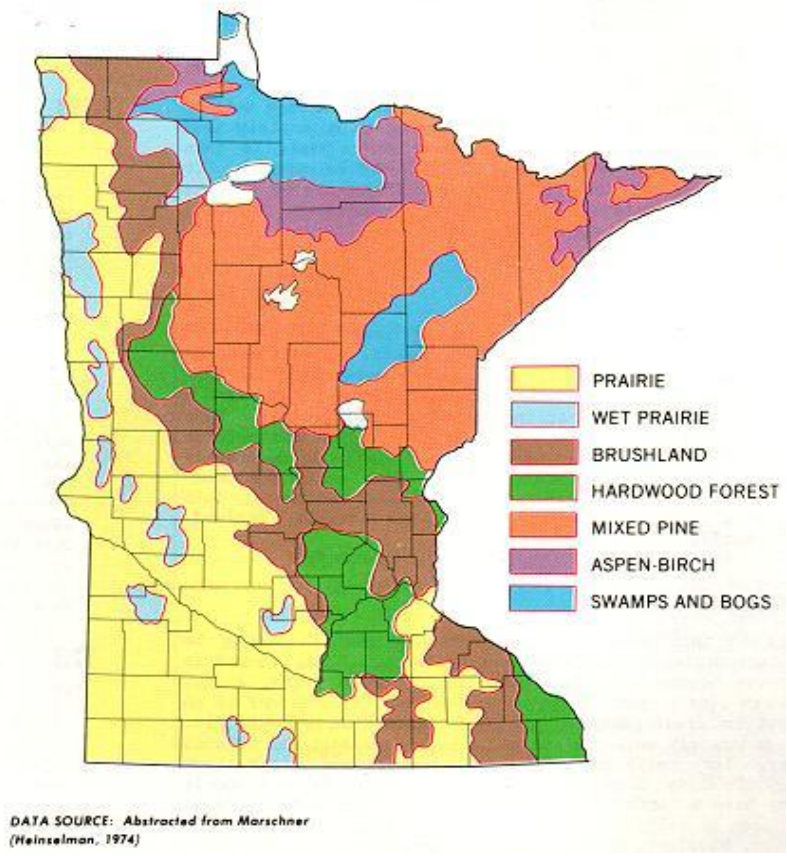
*In this report, the acronym SEAT (Single Engine Air Tanker) will be used to reference Wheeled SEATs and Fire Bosses interchangeably, unless specified otherwise.

Dan Carroll – ATGS – MN DNR

FUEL TYPES and FUEL MODELS



ORIGINAL VEGETATION
OF MINNESOTA



BLUE: **Laurentian Mixed Forest**
Broad areas of conifer forest, mixed hardwood and conifer forests, and conifer bogs and swamps.

GREEN (NW): **Tallgrass Aspen Parklands**
Prairie, wetland swamps, and scattered hardwood woodlands.

YELLOW: **Prairie Parkland**
Historically tallgrass prairie, converted over time to row-crop agriculture.

GREEN (SE): **Eastern Broadleaf Forest**
Transition from forest and woodland to open grassland.

FUEL MODEL COMPARISON

PRAIRIE: FM 1, FM 2, but mostly Ag lands

WET PRAIRIE: FM 2

BRUSHLAND: FM2, FM 3

HARDWOOD FOREST: FM 8

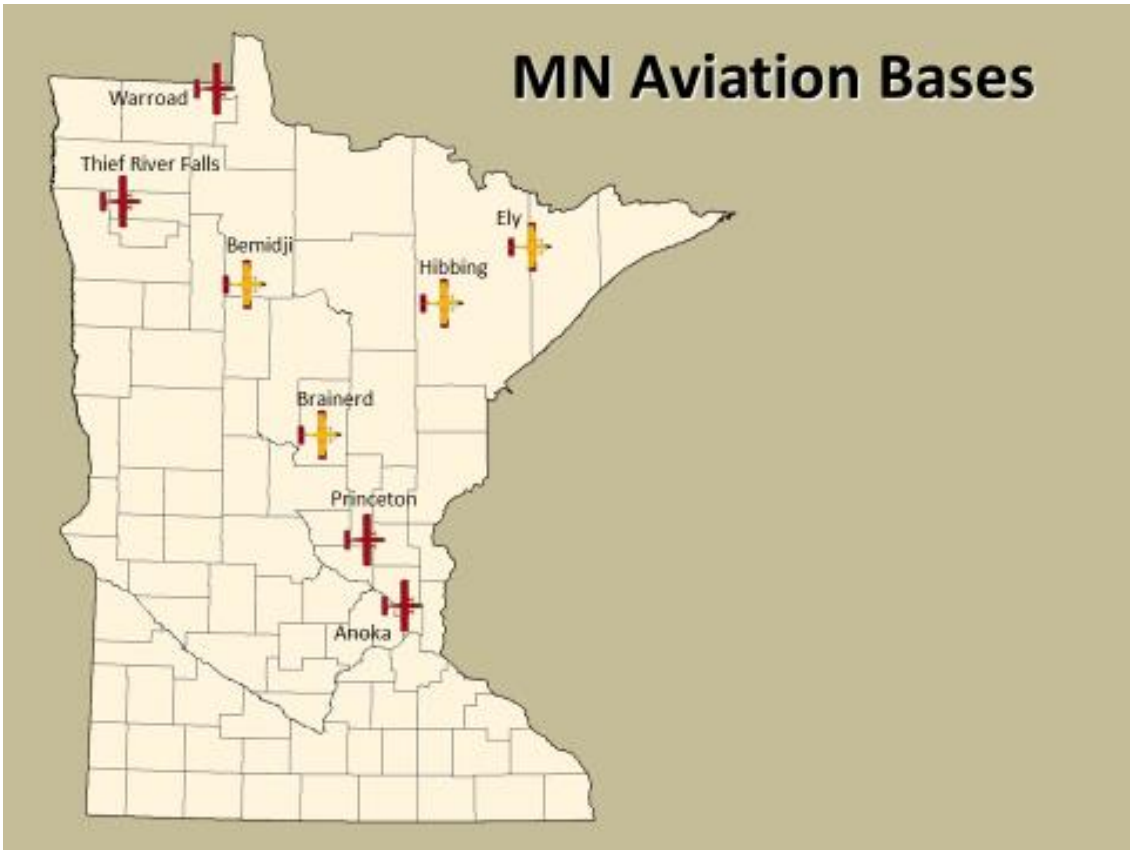
MIXED PINE: FM 2, FM 4, FM 9

ASPEN-BIRCH: FM 10

SWAMPS AND BOGS: FM 3

(These are not exact, simply a comparison)

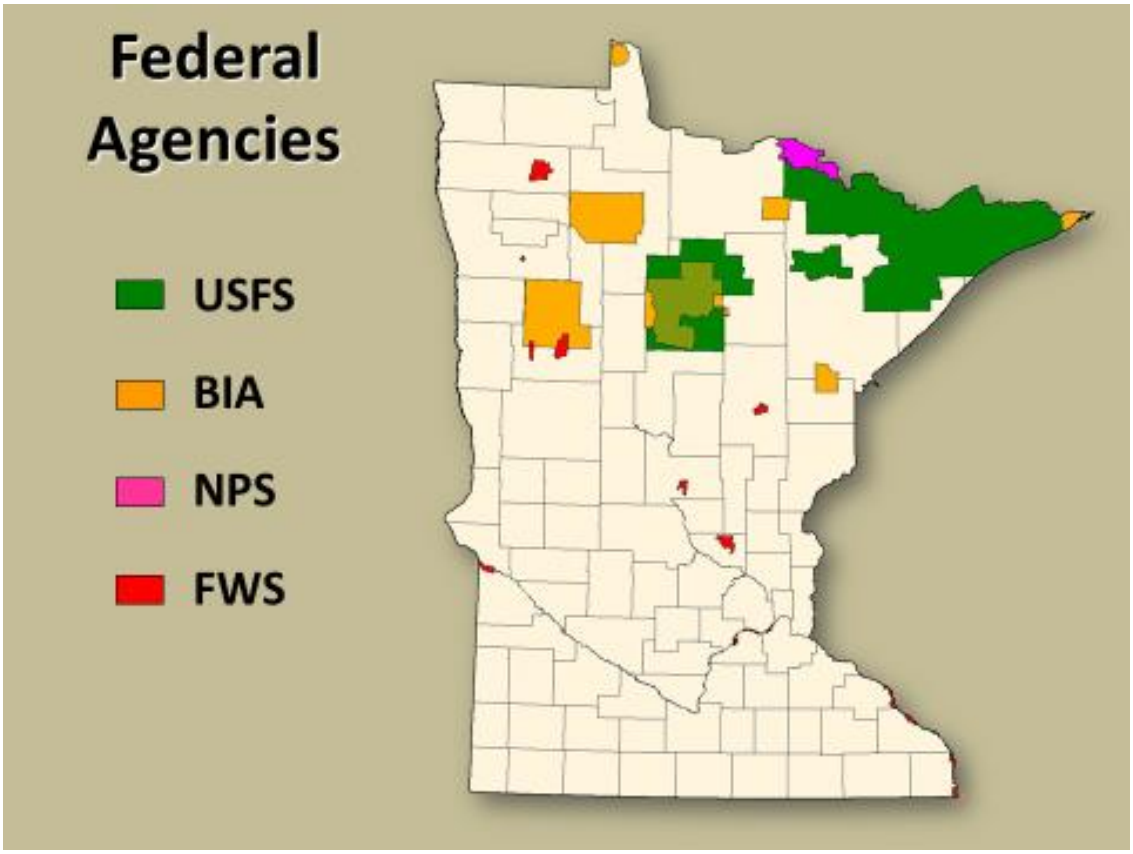
AVIATION SUPPORT



YELLOW: PRIMARY TANKERBASE

RED: SECONDARY FIXED WING BASE

NOTE: ELY IS A USFS BASE



Within the state of MN multiple agencies have jurisdiction for wildfire suppression.

Permanent bases are strategically located across the state.

The MN DNR Aviation Program provides support to all agencies.

These agencies include: MN DNR, United States Forest Service (USFS), Bureau of Indian Affairs (BIA), National Park Service (NPS), and the United States Fish and Wildlife Service (USFWS). **The MN DNR has responsibility on all state lands and all private lands.**

In 2015, all primary and secondary aviation bases were used.

FLEET OF AIRCRAFT

The MN DNR contracted for 4 Fire Bosses and 2 Wheeled SEATs for the spring 2015 wildfire season. The BIA contracted for 1 Fire Boss and 1 Wheeled SEAT.

In most cases, FireIce was loaded onto SEATs and Fire Bosses upon dispatch to wildfires. SEATs could carry an 800 gallon load, Fire Bosses could carry between 500-600 gallons depending on fuel amount.

Assuming scoop-able water was available, Fire Bosses would drop their FireIce load and then begin scooping operations. SEATs would return to base to re-load or hold.

FIRE BOSS



SEAT



Some heavy tankers were also utilized in MN during the spring of 2015, including a P2V, a CL-415, a C-130, and a BAe-146. Despite these additions, the majority of flight time was done by SEATs.

CAPABILITIES and LIMITATIONS

There are many factors that affect the capabilities and limitations of an aircraft. These can range from pilot skill level, real time weather conditions, or an aircraft's original build and purpose.

It is difficult to discuss capabilities and limitations of an aircraft without the tendency to compare it against an aircraft thought to be similar (enough). For this report, that is not advantageous.

What is advantageous, is understanding the capabilities and limitations of SEATs and how those features benefit or provide challenges to suppression operations. Some of these are obvious.

CAPABILITIES/BENEFITS

Turbine engine = Limited warm up time, which enables SEATs to launch very quickly after receiving a dispatch. The sooner a SEAT can start working on a fire, the better.

Cruise speed and fuel duration = Normal cruise speed of 140–150 knots. 3-4 hour fuel load.

Single engine = Single engine maintenance costs are generally lower than twin engine costs. Therefore, the costs associated with contracting for SEATs is generally less than a twin engine.

Ground loading = Allows multiple types of product to be loaded (water, retardant, gel), which enables SEATs to be effective even if scooping water is not available.

Constant flow doors = (see Hydromax Gate page 6).

Mobility = (see page 7).

Short field take off = Minimum 3,000 ft runway, including grass and gravel runways (see page 8).

Jettisoning a load = Fire Boss Pilots can start a scooping mission and if at any time they deem it unsafe, they can quickly jettison the load even if still on the water.

LIMITATIONS/CONCERNS

Winds = Guidelines reference sustained winds at 30 kts or a 15 kt gust spread as the tipping point for ceasing tactical operations. Crosswind limits of 20 kts (or less), and a headwind limit of 35 kts are noted for take-off and landing, and scooping missions.

Load volume = SEATs are not heavy tankers. Maximum volume from a SEAT is 800 gallons.

Constant flow doors = Can limit the amount of 'punch' a load has, especially in timbered fuels. Max coverage level from a SEAT is either a CL 4 or a CL 6 depending on the gate system.

Single Engine = Conventional wisdom suggests that 2 engines is better than 1. Scheduled maintenance, geography, pilot preference, and pilot skill largely define the extent of limitation.

Single pilot = All aspects of the fire mission and flight are handled by 1 person. Stress, awareness, and cumulative fatigue must be monitored.

Hydromax Gate System

Preferred by most aerial supervisors, pilots, and ground firefighters, the Hydromax Gate System is popular and effective.





- Made by Kevin Vondran
- Constant flow system
- Constant flow systems have door controls that allow the delivery system to behave as a single tank. Once the drop controller establishes the flow rate, the coverage level produced remains constant over the duration of the drop. The effect of changing the volume released will only change the length of the drop, not the flow rate.
- Offers a variety of coverage levels, and a variety of load portions, enabling SEATs to maximize their load in a given fuel type and fire situation.
- 250 lbs lighter than Air Tractor gate
- Air Attacks in MN asked leadership to encourage or require all future SEAT contracts to include Hydromax Gate Systems.
- By 2016, all Fire Boss aircraft owned by AeroSpray Inc, will be outfitted with Hydromax Fire Gates.

MOBILITY

Have trailer, can travel.

A requirement of the exclusive use (EU) and call when needed (CWN) MN DNR SEAT Contracts is the ability of the vendor to provide, and staff, a portable trailer capable of loading SEATs.

This requirement allowed SEATs to operate at any airport with ample runway length and space.





The ability to move and station SEATs closer to ongoing fires or geographic areas with elevated fire conditions, allows for better efficiency. It's another commonly accepted best practice with SEATs - keep them flying – reduce turnaround times by setting up a remote reload base as close as possible to the incident.

Mobility allows fire managers to plan ahead to maximize efficiency of resources.

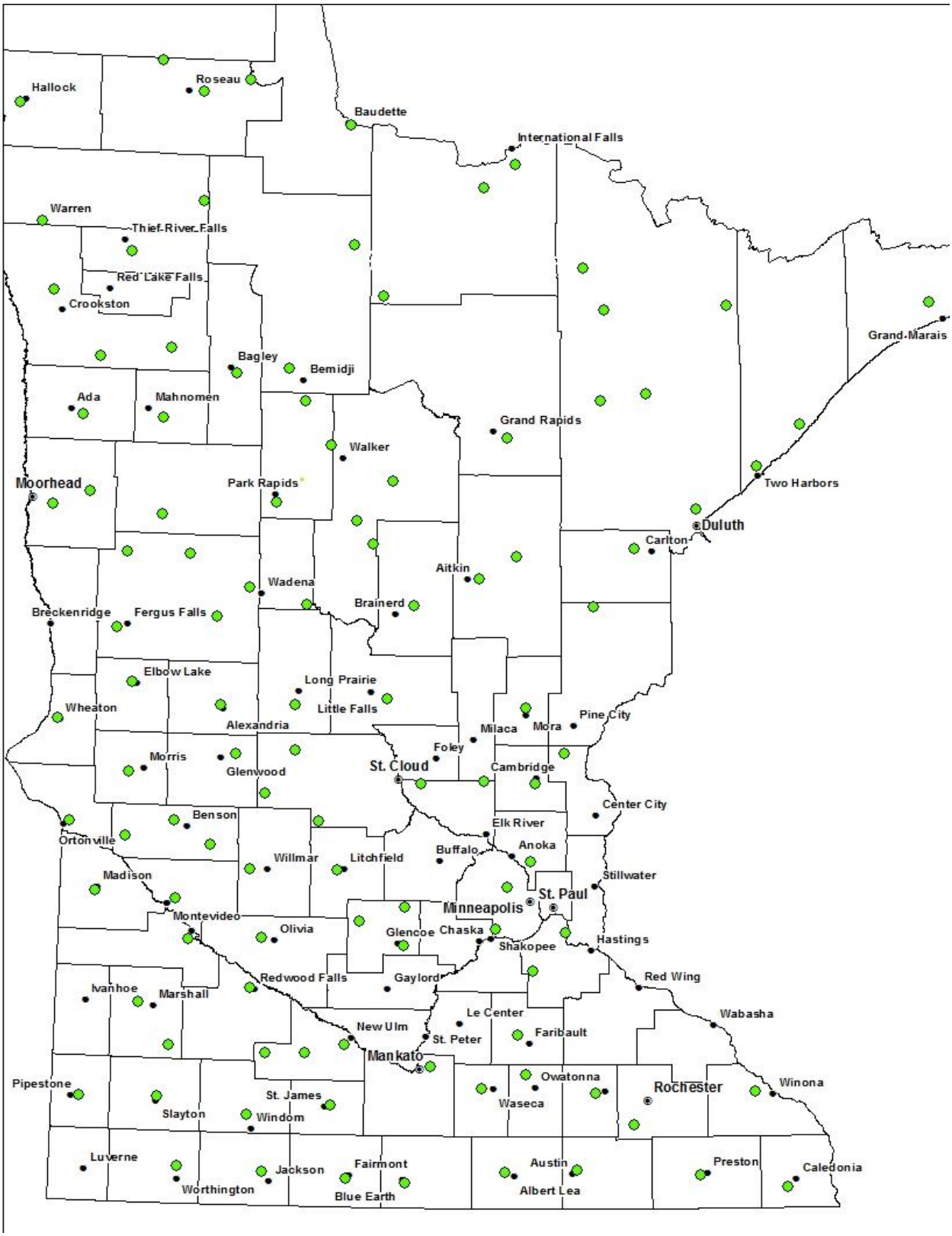
Mobility also allows fire managers to plan ahead to avoid unfavorable conditions, specifically cross winds and smoke inversions, or any other situation that might limit SEAT availability.

<u>Movements made to increase efficiency or avoid adverse weather in the spring of 2015 included:</u>

-Princeton to Anoka (crosswind) – multiple occurrences
-Warroad to Thief River Falls (crosswind)
-Hibbing to Eveleth (crosswind)
-Warroad to Bemidji (hail and severe thunderstorms predicted)

Airports in MN

Based solely on a minimum runway length of 3,000 feet, 108 airports exist in MN that could be used for SEAT Operations. The ability to station SEATs in so many places is highly advantageous.



Although these options exist, the MN DNR would not operate out of airports that compromise safety, performance or efficiency.

USE

Two operational principles that are accepted throughout interagency aviation suppression operations are that SEATs are most effective when dispatched early and when working in groups.

The MN DNR recognizes these principles, and made an effort during the 2015 spring fire season to place and move SEATs to geographic areas where upon dispatch, or shortly after, SEATs could work in groups. Pre-season training to firefighters also re-enforced these principles.

During fire season, many factors helped determine where SEATs would be placed. Factors included: Tankerbase location, available resources, ongoing fires, anticipated weather events, along with inputs from firefighters, fire behavior analysts, fire managers, and aviation personnel.

Once the decision was made, placement was identified daily in the Aircraft Status report.

On April 2nd, 2015, SEATs were grouped in Bemidji, Brainerd, and Princeton.

Location	Agency	Type	Make/Model	ID	Capacity	Status	Pilot
Bemidji	DNR	SEAT	AT 802	T-891	799	AV	Lucas
Bemidji	DNR/BIA	SEAT	AT 802	T-801	799	AV	Vince
Brainerd	DNR	Fire Boss	AT 802	T-885	799	AV	MacDonald
Brainerd	DNR	Fire Boss	AT 802	T-890	799	AV	Johnson
Hibbing	DNR	Fire Boss	AT 802	T-852	799	AV	Smith
Princeton	DNR	Fire Boss	AT 802	T-851	799	AV	Weaver
Princeton	DNR	SEAT	AT 802	T-858	799	AV	Keaton

On May 2nd, 2015, SEATs were grouped in Bemidji, Brainerd, and Warroad.

Location	Agency	Type	Make/Model	ID	Capacity	Status	Pilot
Bemidji	DNR	T-2	P2V Neptune	T-07	2000	AV	Tuttle
Bemidji	BIA	Fire Boss	AT 802	T-851	799	AV	Mitchell
Bemidji	BIA	SEAT	AT 802	T-801	799	AV	Vince
Brainerd	DNR	Fire Boss	AT 802	T-885	799	AV	MacDonald
Brainerd	DNR	Fire Boss	AT 802	T-890	799	AV	Johnson
Ely	USFS	T-1	C130	T131	3200	AV	Salkeld
Grand Rapids	USFS	T-3	CL-415	T-260	1600	AV	Bell
Hibbing	DNR	Fire Boss	AT 802	T-852	799	AV	Smith
Princeton	DNR	Fire Boss	AT 802	T-853	799	AV	Pillatzki
Warroad	DNR	SEAT	AT 802	T-891	799	AV	Lucas
Warroad	DNR	SEAT	AT 802	T-858	799	AV	Leonardi

*With this setup on May 2nd, the SEAT in Princeton and the SEAT in Hibbing would launch alone, but could be quickly grouped with a SEAT from Brainerd or the CL-415 from Grand Rapids.

Placement of SEATs and their early dispatching proved beneficial for fire managers and firefighters.

Because dispatches occurred in the early stages of fires, many SEATs were able to fly missions on multiple fires in a given day.

This combination is beneficial, here's why:

- SEATs were able to work on fires that were manageable to suppress.
- Manageable fires require a smaller # of aircraft.
- Manageable fires allowed shorter on-scene time commitments.
- Shorter time commitments allowed SEATs to return to base and prepare for the next dispatch, or be diverted to a different fire with enough fuel to work (for a while).
- Shorter time commitments helps mitigate the potential that an aircraft 'times out.'

On April 2nd, T-885, a Fire Boss, flew on 4 different fires for a total of 3.79 flight hours.

On April 11th, T-890, a Fire Boss, flew on 4 different fires for a total of 4.34 flight hours.

On April 15th, T-851, a Fire Boss, flew on 3 different fires for a total of 6.73 flight hours.

*SEATs are an initial attack resource, and when used as such, can be very successful.



"These planes can also be split up to help fight more fires on busy days like Thursday."

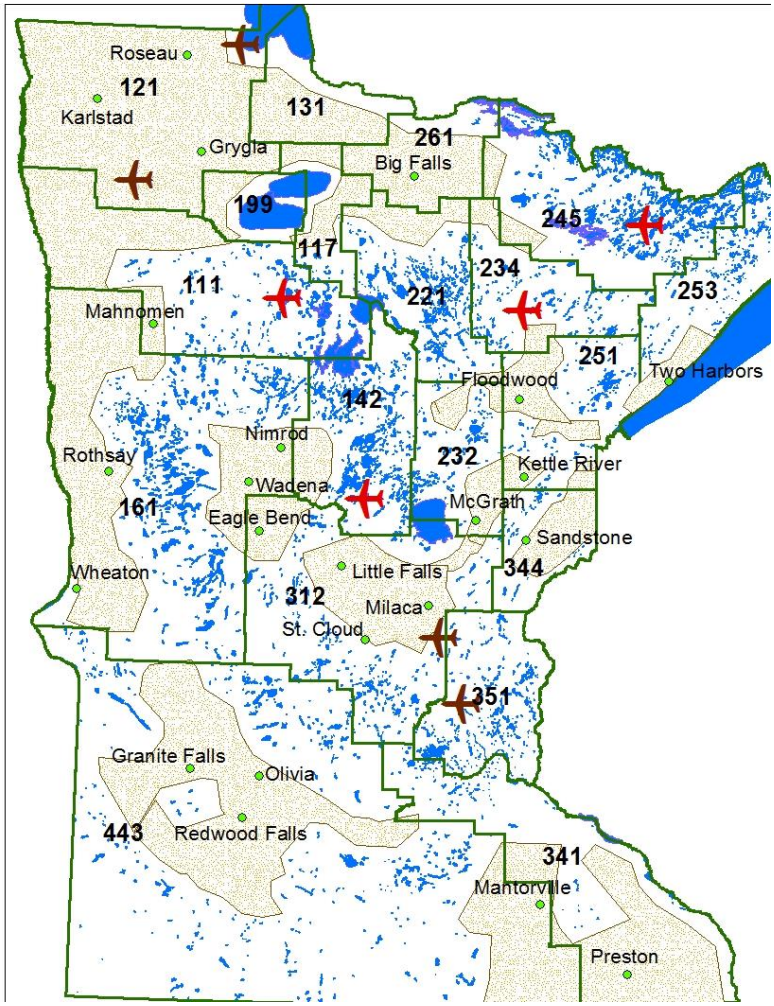
"We probably would have gotten to less fires (with our previous aircraft) than we did yesterday,"

"They're really important for fighting fires on the front lines," "They are very good at knocking a fire down, but it's the firefighters on the ground that knock them out."

Ron Stoffel – MN DNR Wildfire Suppression Supervisor – April 2015

SCOOPING OPERATIONS

The state of MN is benefited in having a tremendous amount of water available to support wildfire suppression operations. This water availability has historically helped to shape wildfire response, both on the ground and from the air. Specific to fixed wing response, scooping aircraft have been heavily involved since 1993, when CL-215s operations began.



Map: Statewide Scooping Water

Scooping water can be described as a water body roughly 1 mile in length.

Turn-around times are a critical factor in scooping operation success.

The light brown colored areas are zones within the state that do not have 'scooping water' within a 5 NM radius.

This map was used to help train firefighters about the importance of dispatching SEATs in pairs, especially in the brown colored areas.

This map does not factor in weather conditions and lake depth, which are also critical factors in a water body being 'scoopable.'

Water and water availability are two completely different variables. When fire season started in early March of 2015, many of the state's lakes and ponds were ice covered.

Due to the amount of 1 hour fuels across the state, fire season starts immediately after snow melt.

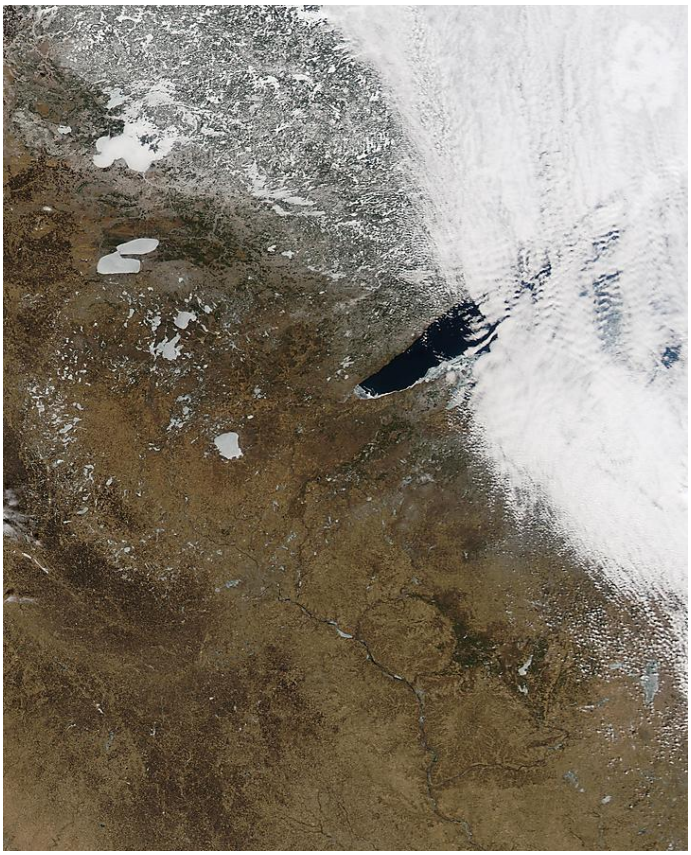
In 2015, early snowmelt started fire season in early March, while ice still covered most lakes.

Ice conditions hindered scooping operations in southern MN until early April. Scooping operations were further delayed in central and northern MN.

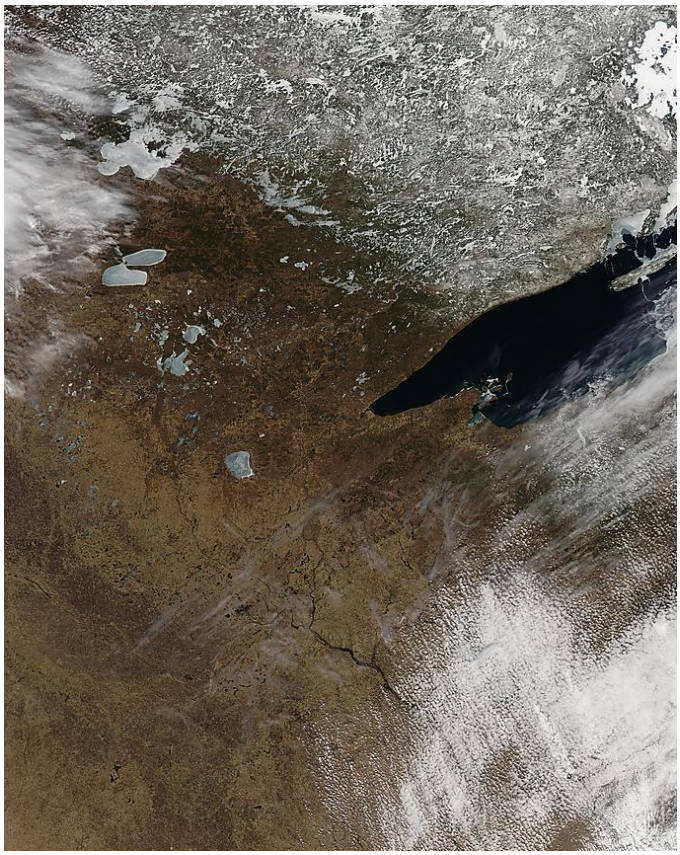
The ability to ground load SEATs proved valuable in the spring of 2015.

ICE

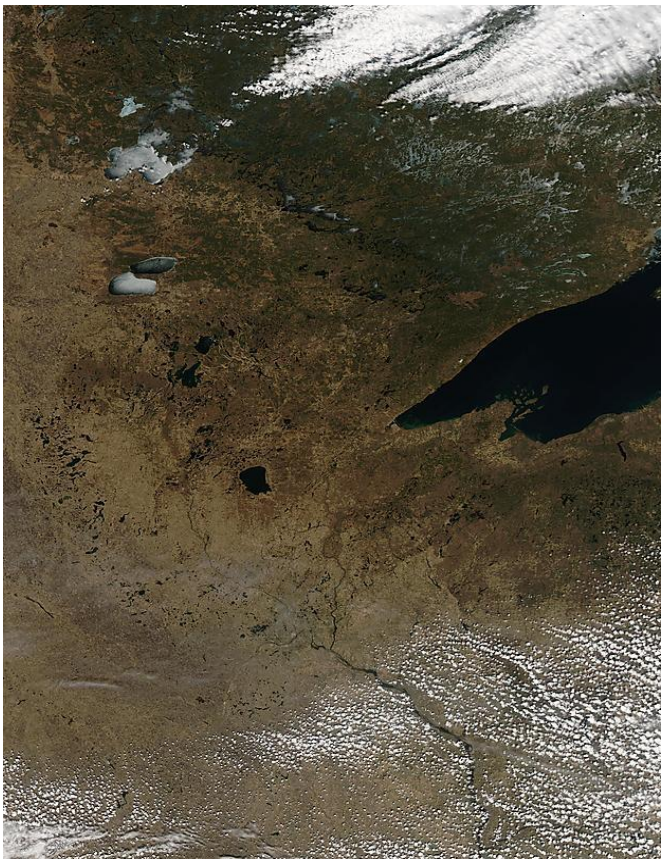
March 14th 2015



April 3rd 2015



April 17th 2015



How Lake Ice Melts

In early March, as the air warms and the sun gets more intense, snow melts, allowing light to penetrate the ice.

The ice acts like glass in a greenhouse, the water beneath it begins to warm, and the ice begins to melt from the bottom. When ice thickness erodes to between four and twelve inches, it transforms into long vertical crystals called "candles." These conduct light, so the ice starts to look black, because it is no longer reflecting sunlight.

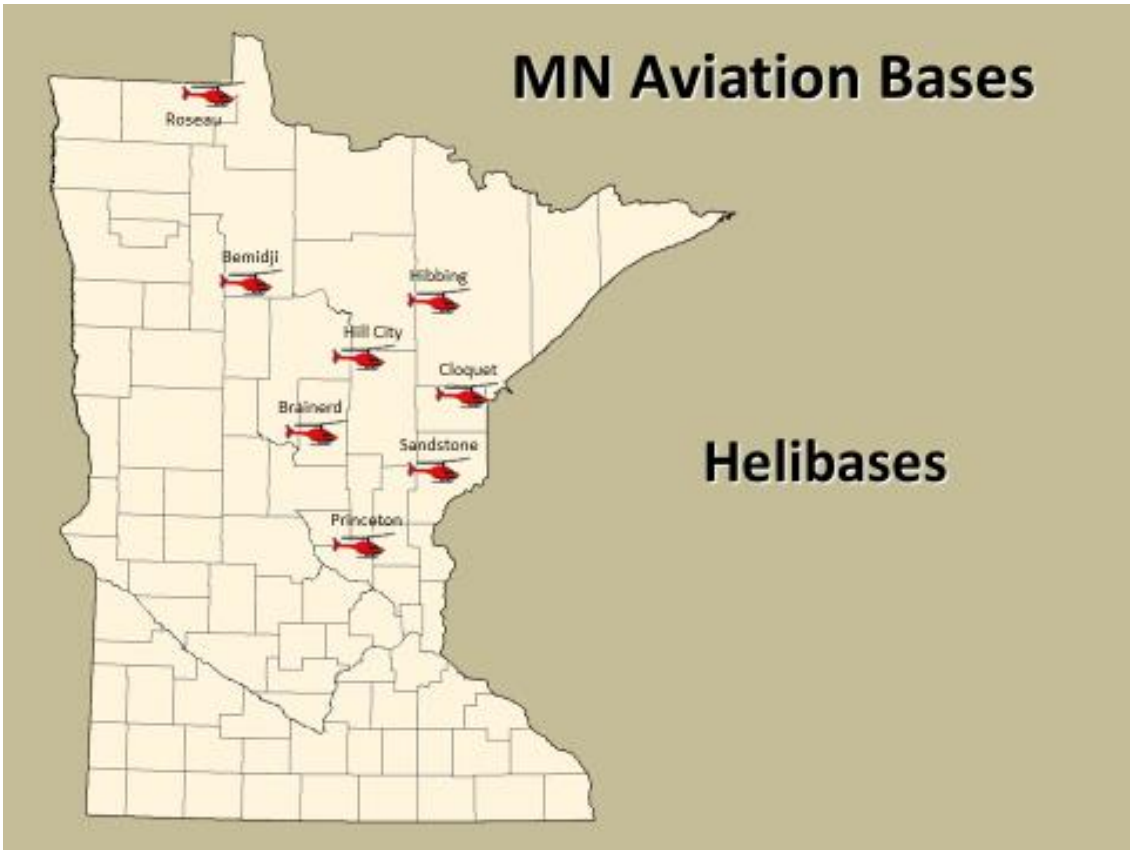
Warming continues because light energy is being transferred to the water below the ice. Meltwater fills in between the crystals, which begin breaking the ice apart.

The wind comes up, and breaks the surface apart.

WILDFIRE RESPONSE

Understanding a typical wildfire suppression response in MN is important. This also helps spell out SEAT use in 2015.

MN is somewhat unique in its elaborate helicopter program, and its use of 'tracked vehicles.' It is typical upon wildfire dispatch that Type 6 Engines, tracked machines, and one helicopter respond. Fixed wing resources (Air Attack and SEATs) are dispatched soon after.



Eight MN DNR helicopter contracts are exclusive use, and 42 days in length.

Start dates are based on anticipated fire danger.

Two CWN helicopters were added in 2015 to support suppression response.

Elaborate training presented by the MN DNR Aviation Program over the winter of 2014 and early spring of 2015 conveyed the importance of dispatching air resources 'early' upon report of a wildfire. It was also suggested by Aviation Personnel, and supported by ground firefighters, that fixed wing suppression resources be dispatched in groups of two whenever possible to increase their effectiveness. It is common knowledge that SEATs work best in groups of two or more.

On a large scale, these messages were received and acted upon.

*Consistently 'early' dispatches of fixed wing resources enabled wildfires to be attacked during the early stages of initial attack.

Early dispatches will remain a critical step in SEAT use and SEAT operational success.

AVIATION DISPATCHES

The 2015 spring fire season in MN totaled 1,579 fires for 27,758 acres.

The MN DNR was responsible for 962 fires totaling 23,334 acres.

All other agencies (USFS, BIA, NPS, and USFWS) had a total of 617 fires for 4,424 acres.

The MN DNR Aviation Program received 482 aircraft requests on 194 fires.

The rundown: Helicopter requests = 219, Air Attack requests = 93, **Tanker requests = 169.**

Aviation resources logged 822 hours of flight time responding to those requests.

Helicopter

Flight hours: 373
Responded to 141 fires.

Missions were flown throughout the spring, and active days occurred throughout late March, April and May.

Air Attack

Flight hours: 214
Responded to 95 fires.

The first mission was flown on March 12th, the last on June 16th. 90% of the missions were flown between March 28th and May 5th.

The most active days were April 2nd, April 11th, April 15th, May 2nd, and May 5th, where a total of 42 fires were responded to.

Fixed Wing Tanker

Flight hours: 235
Responded to 140 fires.

The first mission was flown on March 11th, the last on May 29th. 90% of the missions were flown in the time period between March 28th and May 6th.

The most active days were April 2nd, April 11th, April 15th, May 2nd, and May 5th, where a total of 64 fires were responded to.

Frequency Management

MN is not benefited by terrain features that might provide break points in what aerial firefighters can hear over the radio waves. In MN, you hear everything.

Frequency management is paramount for successful SEAT Operations and SEAT use.

This involves correct information to be provided on dispatch forms, divert information, and communication between Air Attacks and Fire Center Dispatch.

SEATs can't work if they can't enter into a fire traffic area, and SEAT Operations are less effective if establishing communication is difficult, or if the information presented is incorrect.

In MN, the DNR has permission to use 5 Air-to-Air frequencies. Additional Eastern Area Frequencies are also available upon request. In the spring of 2015, 3 additional frequencies were utilized in addition to the customary 5 frequencies.

Collectively, these frequencies are referred to as the ABC Plan.

The DNR has chosen to arrange them as follows:

Primary Initial Attack Frequency = 122.925
Alpha Plan = 124.650
Bravo Plan = 119.950
Charlie Plan = 119.850
MNICS All Risk Plan = 123.025 (not used for suppression related activities)

It is the responsibility of the Air Attacks in coordination with Fire Center Dispatch to assign, establish, and/or make known the frequency or frequencies in use on a particular fire.

Without this coordination, challenges occur. Most common is multiple fires working on the same air to air frequency, which leads to being 'walked on', general confusion, a decrease in awareness, and an increased chance for bad stuff to happen.

A 'Lessons Learned' document and a 'SAFECOM' document were filed in 2015 regarding appropriate frequency management. They are not included in this report.

The specific challenge for pilots, aerial firefighters, aircraft dispatchers, and aviation supervisors, is to ensure frequencies aren't overloaded, so that fire operations can remain safe and effective.

Page 16 shows the Aircraft Status Report from 05/02/15. Most aircraft flew fire missions.

Aerial Supervision Platforms

Location	Agency	Type	Make/Model	ID	Tail No.	Status	Pilot	ATGS
Bemidji	DNR	Air Attack	Beech Queen Air	AA4	111AR	AV	Morrison	Perleberg
Brainerd	DNR	Air Attack	Cessna-T303	ATK 3	5ER	AV	Robinson	Novak
Ely	USFS	ASM	Beech King Air	LP08	N618	AV	Bell	Lenmark
Hibbing	DNR	Air Attack	Beech Queen Air	ATK1	441MC	AV	Anderson	Leidholm
Warroad	DNR	Air Attack	Beech Queen Air	ATK 6	78E	AV	Gerber	Danzl

Air Tankers

Bemidji	DNR	T-2	P2V Neptune	T-07	2000	AV	Tuttle	Biggerstaff
Bemidji	BIA	Fire Boss	AT 802	T-851	799	AV	Mitchell	Schaar
Bemidji	BIA	SEAT	AT 802	T-801	799	AV	Vince	Greco
Brainerd	DNR	Fire Boss	AT 802	T-885	799	AV	MacDonald	Spargur
Brainerd	DNR	Fire Boss	AT 802	T-890	799	AV	Johnson	Spargur
Ely	USFS	T-1	C130	T131	3200	AV	Salkeld	Wells
Grand Rapids	USFS	T-3	CL-415	T-260	1600	AV	Bell	Crosby
Hibbing	DNR	Fire Boss	AT 802	T-852	799	AV	Smith	Hemphill
Princeton	DNR	Fire Boss	AT 802	T-853	799	AV	Pillatzki	Toivonen
Warroad	DNR	SEAT	AT 802	T-891	799	AV	Lucas	Kobberdahl
Warroad	DNR	SEAT	AT 802	T-858	799	AV	Leonardi	Nelson

Fixed Wing

Ely	USFS	Floats	DHC-2 Beaver	Beaver 3	125	AV	Loe	
Grand Rapids	DNR	Wheels	Cessna 206	527NR		AV	Noles	
Grand Rapids	DNR	Wheels	Cessna 310	37250		AV	Ettl	
Grand Rapids	USFS	Floats	DHC-2 Beaver	Beaver 2	125	U/A		
Grand Rapids	USFS	Floats	DHC-2 Beaver	Beaver 1	125	AV	Miller	

Helicopters

Bemidji	DNR	T-3	Bell 206 B-3	7CH	108	AV	Jessop	Tisler
Bemidji	BIA	T-3	Bell 206 L-3	83BH	120	AV	Young	Seki
Brainerd	DNR	T-3	Bell 206 B-3	56BH	108	AV	Kubista	Westerman
Cloquet	DNR	T-3	Bell 206 L-4	57Z	144	AV	Cox	Johnson
Ely	USFS	T-3	Bell 206 L-3	1HA	120	AV	Heffner	Wagner
Hibbing	DNR	T-3	Bell 206 L-3	16K	120	AV	Yamada	Splinter
Hill City	DNR	T-3	AS 350-B2	8PT	180	AV	Bosek	Hertle
Hinckley	DNR	T-3	Bell 206 L-4	19BH	144	AV	Baumann	Allshouse
Orr	DNR/BIA/USFS	T-2	Bell 205 A-1	89H	325	AV	Weidinger	Fasteland
Park Rapids	DNR/BIA	T-3	Bell 206 B-3	56P	108	AV	Gregorius	Lichter
Princeton	DNR	T-3	Bell 206 B-3	101	108	AV	Magne-Acebo	Anderson
Princeton	DNR	T-3	Bell 206 L-4	2TC	144	U/A	Carisch	Wilson
Roseau	DNR	T-3	Bell 206 L-4	3TD	144	AV	Phillips	Normandin
St Paul	State Patrol	T-3	Bell 407	Trooper 8	144	AV	Grothem	Wilson

Flight Following

In 2015, the MN DNR flight followed 33 aircraft using verbal 15 minute check in periods. This resulted in congested radio traffic.

In 2016, the MN DNR will incorporate Automated Flight Following (AFF) statewide and Wildcad at three fire response areas.

The real time information provided by AFF will allow dispatchers and aviation managers to coordinate and track aircraft movements more efficiently.

The reduction in radio traffic will also benefit SEAT Pilots and SEAT Operations.

WILDCAD - (Wildfire Computer Aided Dispatching)
In the spring of 2016 the MN DNR will initiate Wildcad at 3 pilot sites. Sites included are the Minnesota Interagency Fire Center (MIFC), Brainerd Tanker Base, and Park Rapids Area Initial Attack.

Wildcad was developed for wildland fire agencies. It provides instant sharing of communications between dispatchers, Initial Attack Areas, Regions and MIFC.

The information sharing Wildcad offers will improve situational awareness for fire managers setting priorities when dispatching aircraft. The information from AFF can be easily transferred to Wildcad with a couple clicks of the computer mouse thus being shared with all offices instantaneously.

Instant sharing of information will reduce redundancy of radio transmissions and multiple telephone calls between offices regarding aircraft.

Increased efficiency and productivity in dispatch offices will assist with launching SEATs and Fire Boss's quickly with accurate information.

If the pilot project is successful, MN DNR will implement Wildcad throughout MN in the fall of 2016 or spring of 2017.

COSTS

The first MN DNR contracted aircraft in 2015 started in early March and the last MN DNR contract (200 day Fire Boss contract) continues through October 17th. The following costs reflect these time spans and commitment as well as our agency partner aircraft, the BIA.

FIRE BOSSs: ***Daily rate = $4,100, Hourly rate = $4,100***

T-890 = $406,095 = 63 days of availability + all flight time

T-851 = $345,825 = 50 days of availability + all flight time

T-852 = $489,957 = 168 days of availability + all flight time

T-853 = $351,448 = 77 days of availability + all flight time (projected)

T-885 = $366,171 = 60 days of availability + all flight time

$1,834,696 Total Fire Boss Costs as of 6-18-15 for MN

$239,563 BIA Fire Boss Costs

$1,595,133 DNR Fire Boss Costs Less BIA Total

WHEELED SEATs: ***Daily rate = $2,152, Hourly rate = $2,152*** *(average price of three contracts)*

T-801 = $200,878 = 47 days of availability + all flight time

T-858 = $194,809 = 62 days of availability + all flight time

T-891 = $148,158 = 41 days of availability + all flight time

$543,845 Total Wheeled SEAT Costs

$141,159 BIA Wheeled SEAT Costs

$402,686 DNR Wheeled SEAT Costs less BIA Total

*It should be noted that Tanker 852 spent 89 days in the state of Washington staring in early June of 2015, and returned in September.

OFFLOADED FIRE BOSS Costs

T-852 = $1,250,942 = (89 days of availability + all flight time)

A considerable benefit in contracting with turbine SEATs, is the ability to offload their costs to other states if/when fire conditions have moderated in MN.

The $1,250,942 dollars offloaded in 2015 is $ that tax payers in MN will not have to foot the bill for. This capability is outstanding, and a fiscally sound decision, when appropriate.

SAFETY RECORD

MN DNR contracted SEATs logged 1 day of unavailability in 2015. This is an outstanding commitment to preventative maintenance, pre-flight checklists, honest accounting and reporting of problems, efficient solutions, and a systematic path to advise and document all actions.

Multiple chip lights occurred during flight missions throughout the spring fire season. A process exits to handle chip light situations, which involves elaborate coordination between flight crews, contractor maintenance personnel, Tankerbase personnel, and the Fixed Wing Specialist.

The documenting of actions typically involves log book entries, log book approval, and Safecom reporting.

Multiple Safecoms were filed in 2015 related to SEAT use and SEAT Operations.
Subject matter included:

- Negative AFF confirmation
- Air to Air Frequency Management
- Malfunctioning gate system
- Loss of prime in Tankerbase pump during loading
- Over filling retardant tank
- Hydraulic leak in landing gear actuator
- Air Speed Indicator not indicating air speed
- Airspace de-confliction with Detection aircraft

The MN DNR Aviation Program recognizes safety as its primary responsibility.

At the program level, actions are undertaken throughout the year to maintain an excellent safety record and further improve aviation operations for the future.

This is accomplished through required classroom and job specific training, annual ASAT (Aviation Safety Action Program) visits, annual aviation workshops, pilot in-briefings, mission debriefs, pilot exit interviews, and annual Tankerbase/Helibase audits.

AVIATION PROGRAM NEEDS

SEAT use and SEAT Operations were a tremendous success in 2015. The MN DNR is interested in continuing that success. Needs exist in the aviation program to ensure that success continues.

Personnel and Training

SEAT MANAGERS (SEMGs)

Existing SEMGs are experienced and versatile in all aspects of Tankerbase operations. In 2015, two new SEMGs were certified. In 2016, one more SEMG is expected to be certified.

Concern: Aviation Program is not deep in SEMGs. The increased use of SEATs requires an increased number of trained and qualified personnel. This concern is compounded by inevitable retirements of existing SEMGs.

Need: More qualified SEMGs.

How to fill the need: Identify candidates, develop training plans, and develop work assignments in state and out state to achieve SEMG certification.

How it benefits the Aviation Program: By establishing a cadre of SEMGs, you also build a cadre of future Air Tanker Base Managers (ATBM) and Fixed Wing Base Managers. This cadre also enables SEAT Mobility benefits to be maximized. If you move a Fire Boss to St. Cloud, you need a SEMG to go with. A cadre of SEMGs also allow existing Tankerbase Managers to focus solely on Tankerbase Operations, not SEMG duties.

Additional yearly needs specific to SEMGs and ATBMs in MN is training in Automated Flight Following (AFF), WildCad, and standard dispatching procedures.

Other SEMG needs for next year: Include an Aircraft Base Radio Operator (ABRO) or Radio Operator (RADO) at all fixed wing bases, and continue to train more Mixmasters (MXMS).

AIR TACTICAL GROUP SUPERVISORS (ATGSs)

Existing ATGSs are experienced. In 2015, one new ATGS was certified. In 2016, one more ATGS is expected to be certified.

Concern: Aviation Program is not deep with permanent personnel ATGSs, and the existing cadre could walk away at any moment. The increased use of SEATs requires a more regular and sustained staffing commitment from the ATGS Cadre.

Need: More trainee ATGSs, and subsequent certification of those trainees.

How to fill the need: Identify candidates, develop training plans, and develop work assignments in state and out state to achieve ATGS certification. These needs cannot be overstated. The Aviation Program is behind in this need.

How it benefits the Aviation Program: A cadre of ATGSs help to supervise the use and efficiency of SEAT Operations across the state, and for multiple agencies. They are the connection between actual fire suppression and the decisions makers at the Minnesota Interagency Fire Center. This connection is timely and needed. They also act as safety officers in the airspace, and help to identify areas that need improvement in the short term or long term. This knowledge also proves beneficial when developing training simulations or training documents for firefighters and fire managers across the state. Enough smoke and hot air….

The MN Aviation Program has benefited from a consistent and active ATGS Cadre.

New Technologies

Fire Boss Mixing/Injection System, Blazetamer

The MN DNR Aviation Program is always interested in becoming more effective and more efficient. In the summer of 2015 an advanced water enhancer called Blazetamer was tested in an Aero-Spray owned Fire Boss near Hibbing MN. The Fire Boss used for the test has an on-board mixing/injection system that has been used successfully in Australia.

Blazetamer was loaded onto the Fire Boss for use in the injection system. Loading setup shown.



The potential of this technology is tremendous. Fire Bosses would be capable of applying gel with every drop. With many areas of MN having scoopable water, the ability for a Fire Boss to apply gel during the entirety of a fuel cycle is a game changer.

The use of Blazetamer was also impressive from an ATGS, firefighter, and loading point of view.

SUMMARY and the FUTURE of SEATS in MN

It cannot be overstated that training, and good training, is the backbone of a successful wildfire suppression operation. The intensive training provided **prior** to the 2015 spring wildfire season benefited the MN DNR's suppression program, and further supported an effective use of SEATs.

The training was developed over the winter of 2014 and was presented by aviation personnel across the state of MN during annual wildland refresher training days (RT-130) in 2015. The information presented included SEAT capabilities, SEAT limitations, and how to best use SEATs effectively and efficiently to aid in suppressing wildfires.

Firefighters took note and responded with a proactive approach toward SEAT Operations in 2015. That approach was necessary for success, and will remain necessary in the future.

Leadership within the Aviation Program were also proactive in the placement, movement, and dispatching of SEATs across the state. This constant attention to detail was critical to success.

Successes in 2015 also helped to identify needs and/or any corrective actions. The Aviation Program has developed work plans, assigned tasks, and continually pursues action items and new technologies for 2016 and future years.

Specific to SEAT Operations, multiple areas or work are being pursued and updated:

- Need for additional Tankerbase Staff and ATGSs (hiring and training plan development)
- AM Frequency management (updating contract requirements for ATGS platforms, training)
- Flight following with AFF (training, hardware upgrades, implementation)
- Facility improvements (MIFC Dispatch, storage tanks and loading equipment for bases, ramp space and maintenance, Princeton base upgrade)
- Continued emphasis on early dispatch training and effective SEAT use (training)
- Expect more aircraft to be added to the compliment, and expect more temporary base use
- Injection systems for Fire Bosses and the use of Blazetamer

This report was written by Dan Carroll, with inputs from the MN ATGS Cadre, Jeff Nelson (MN SEAT Operations), Linda Bruss (Lead Aircraft Dispatcher), and Paul Wannarka (Fixed Wing Specialist).

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