

U.S. Fish and Wildlife Service

Northeast Region, National Wildlife Refuge System

ACCIDENT INVESTIGATION

Tractor Accident Resulting in Injury to Service Personnel and Damage to Government Property

Blackwater National Wildlife Refuge

September 16, 2014



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Submitted by:

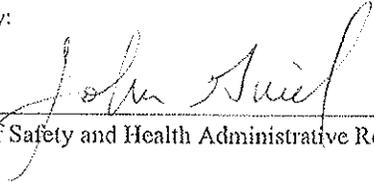


Accident Investigation Team Leader

11-17-2014

Date

Approved by:



Manager of Safety and Health Administrative Regional Engineer

11-19-2014

Date

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Executive Summary

This investigation was predicated upon direction from Scot Kahan, Regional Chief of the National Wildlife Refuge System for the Northeast Region, in accordance Service Policy 240 FW 7 - Accident Investigation and Reporting.

On September 18, 2014, an Accident Investigation Team was assembled to investigate a tractor accident that occurred at Blackwater National Wildlife Refuge (NWR) on September 16, 2014, in Cambridge, Maryland, that resulted in injury to Service personnel and damage to Government property.

On September 22 and 23, 2014, the Accident Investigation Team conducted an investigation at Blackwater NWR and disclosed the following:

On September 16, 2014, at approximately 1351 hours, Forestry Technician (Fire) James Tod Adams, while using an agricultural tractor equipped with a side mounted boom axe mower to clear a fire break on the JD Tract of Blackwater NWR in Cambridge, Maryland, sustained personal injury to his lower right leg as the result of a log penetrating the cab through the lower left portion of the front windshield of the tractor.

Evidence observed at the accident scene indicated that the end of the log was caught between the trailing edge of the front left tire and the leading edge of a counterweight/hydraulic tank situated approximately 2 ¾ inches aft of the front left tire, and approximately 5 inches off of the ground. As a result, the end of the log was lifted off of the ground and was pushed into the cab, pinning Forestry Technician Adams' right leg against the right console of the tractor.

Refuge staff responded to the accident scene, extricated Forestry Technician Adams from the tractor, and transported him to a staging area where Emergency Medical Services administered first aid. Due to the nature of his injuries, Forestry Technician Adams was evacuated from the refuge by a medical helicopter and transported to the Peninsula Regional Medical Center in Salisbury, Maryland for advanced medical care.

Upon arrival at the hospital, Forestry Technician Adams' fractures and wounds were surgically treated. As a result of the blunt force of the log striking his lower leg, Forestry Technician Adams sustained a fractured tibia and fibula. In addition, Forestry Technician Adams sustained multiple contusions, lacerations, and abrasions to his lower right leg. During a subsequent interview, Forestry Technician Adams related that his surgeon performed an intramedullary nailing to repair his fractured tibia.

In addition to injury to Service personnel, the accident resulted in damage to Government property in the amount of \$13,890.25.

In accordance with Service policy, this document serves as the Factual and Management Evaluation Report for the incident. As such, findings and causes related to the accident as well as recommendations to prevent the reoccurrence of similar accidents are contained here within.

Investigative Process

On September 16, 2014, at approximately 1458 hours, Refuge Manager Suzanne Baird, Blackwater NWR, reported the accident as a serious incident in accordance with 054 FW 1 - Serious Incident Notification Procedures.

Subsequently, on September 18, 2014, an Accident Investigation Team was assembled in accordance with 240 FW 7 - Accident Investigation and Reporting. The following Service employees were assigned to the team:

- Team Leader: John Guiel, Manager of Safety and Health Administrative Regional Engineer
- Investigation Team Leader: Mark McGee, Refuge Law Enforcement Zone Officer
- Investigation Team Member: Steve Hubner, Forester
- Investigation Team Member: Bill Starke, Regional Heavy Equipment Coordinator
- Investigation Team Member: John Blich, National Heavy Equipment Coordinator

On September 18, 2014, the Investigation Team had a telephonic conference to coordinate the investigation. Due to the totality of the circumstances, the team agreed to conduct the investigation on September 22 and 23, 2014, and further agreed to meet in Cambridge, Maryland on September 21, 2014, to discuss investigative methodology.

On September 21, 2014, the Investigation Team met in Cambridge, Maryland. Collectively, the Investigative Team agreed to use the investigate methodology established in Chapter 18 – Reviews and Investigations, of the Department of Interior Interagency Standards for Fire and Fire Aviation Operations Manual (NFES 2724).

The investigative process consisted of:

- Conducting an in-brief and interview with the Refuge Manager.
- Conducting a visual inspection of the accident site.
- Conducting a detailed inspection/analysis of the involved equipment.
- Interviewing witnesses and involved personnel.
- Collecting and reviewing reports that were submitted regarding the incident.
- Reviewing records, plans, policies, procedures, and other pertinent documents related to the incident.
- Documenting environmental, equipment, material, procedural, and human factors as they related to the incident.
- Conducting an out-brief with the Refuge Manager

As there were no eye witnesses to the actual accident, the investigation focused on actions occurring prior to and after the incident. Investigative efforts were also focused on operational policies, directives, and orders associated with the operation of heavy equipment.

Accident Investigation – Factual Report

In-Brief with Refuge Manager Suzanne Baird

On September 22, 2014, at approximately 0800 hours, the Accident Investigation Team (Team) met with Refuge Manager Suzanne Baird in the headquarters' conference room at Blackwater National Wildlife Refuge in Cambridge, Maryland.

During the in-brief, Investigation Team Leader Mark McGee advised Refuge Manager Baird that, pursuant to Service Policy 240 FW 7 - Accident Investigation and Reporting, Scot Kahan, Regional Chief of the National Wildlife Refuge System for the Northeast Region, assembled the Team to analyze the factors related to the accident, including:

- Injury to Service personnel and damage to Government property.
- Compliance with Service policy.
- Weaknesses, if any, in Service policy.
- Effective communication of Service policy.
- Environmental factors that may have contributed to the accident.

Refuge Manager Baird was further advised that the Team's responsibilities did not include making suggestions or recommendations regarding criminal, civil, or disciplinary actions as a result of their findings.

After being advised of the Team's responsibilities, Refuge Manager Baird was asked to provide the Team with the following information:

- A list of employees who were involved with the incident.
- A copy of Forestry Technician Adams' training record.
- A copy of all station plans, including Job Hazard Assessments, relevant to the accident.

Subsequently, Refuge Manager Baird provided the Team with a list of employees who were involved with the incident, and related that she would gather the requested documentation.

Visual Inspection of the Accident Site

On September 22, 2014, at approximately 0930 hours, the Team conducted an inspection of the accident site with Fire Management Officer Arthur Canterbury and Equipment Operator Keith Morris.

The accident site was located within the JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, and Cambridge, Maryland. The site was approximately 1.75 miles from Maple Dam Road (closest blacktop road) along a network of refuge service roads and firebreaks. The site was an oak-hardwood forest, and the terrain was flat and low-lying. The firebreak was approximately 17 feet wide.

The tractor was at rest in approximate position 38° 27.225' north latitude and 076 ° 03.366' west longitude, and was oriented in a southerly direction. Reportedly, the tractor had not been moved and the accident scene had not been disturbed since the accident. The perimeter of the accident site was secured with police tape.

As evidenced by the cut path, the boom axe was being used to clear the firebreak of encroaching vegetation. Standing vegetation up to 3 inches in diameter and overhanging vegetation up to 15 feet above the ground had been

cleared by the boom axe. Evidence indicated the operator had cleared the east side of the firebreak and had turned the tractor 180 ° to the left in preparation of clearing the west side of the firebreak. The tractor traveled approximately 35 feet after making the turn.

In addition to cut vegetation, an oak log, 8.5 feet long and 8 inches in diameter, was lying on the ground adjacent to the tractor's front left tire. One end of the log was freshly cut by a chain saw, and the other end was jagged and appeared to have been recently broken. Another portion of the oak log, 10 feet long and 8 inches in diameter, was lying on the ground at an angle approximately 45 degrees to the rear left tire. Both ends of the log were jagged and both appeared to have been recently broken. A third portion of the oak log, 14 inches long and 8 inches in diameter, was lying on the floorboard in the cab of the tractor. One end of the log was freshly cut by a chain saw, and the other end was jagged and covered in blood.

Investigation Team Leader Mark McGee photographed the accident scene and completed a sketch of the area (see Enclosures 1 and 2).

Visual Inspection of the Equipment

While at the accident site, Investigation Team Member John Blich conducted an inspection of the equipment involved in the accident. The equipment, a John Deere Model 6320 agricultural tractor equipped with an Alamo Model 24 side mounted boom axe mower, was secured in place immediately following the accident.

An inspection of the tractor's operational controls revealed that the tractor was in first gear and at half throttle at the time of the accident. The air conditioner was on high, and the radio volume was in the $\frac{3}{4}$ position.

Apparent damage to the tractor from the accident included a shattered front windshield, bent windshield frame, dented front right engine cover, cracked right side interior console, cracked lower steering panel cover, and a sheered clutch pedal. In addition, the brake pedal was damaged by the chainsaw while extricating the operator from the cab. Other than the damage sustained from the accident, the tractor appeared to be in good working order and well maintained.

Although not deemed to be a factor in the accident, the tractor was not equipped with a side shield or similar protective system designed to prevent propelled objects from striking the operator as required by 243 FW 3.11. In addition, the tractor was not equipped with operator protective structures required of heavy equipment used in forestry operations as per 243 FW 1.4G(15), nor was it equipped with operator protective structures required of land clearing equipment as per 243 FW 3.6.

Investigation Team Leader Mark McGee photographed the equipment damage (see Enclosure 1).

Reconstruction of the Accident

Although there were no eye witnesses to the actual accident, evidence observed at the accident scene indicated that the accident was caused by an oak log, 20 feet long and 8 inches in diameter, that was lying on the ground in the forest at an acute angle to the tractor's direction of travel. The end of the log closest to the tractor's left side was slightly elevated on a root hummock. As the tractor moved forward, the end of the log lodged between the trailing edge of the front left tire and the leading edge of a counterweight/hydraulic tank situated approximately $2\frac{3}{4}$ inches aft of the front left tire, and approximately 5 inches off of the ground (see Enclosure 1, Photograph 1-18 and 1-19). Acting as a conveyor belt, the rotation of the tractor's tire in conjunction with counter pressure from the leading edge of the protruding steel hydraulic tank lifted the end of the log off of the ground and pushed it into the cab, pinning Forestry Technician Adams' right leg against the right console of the tractor (see Enclosure 1, Photograph 1-20). As the tractor continued to move forward, the log broke in half with one section remaining in the cab and the other falling to the ground (see Enclosure 1, Photograph 1-21). The forces associated with the log entering the cabin caused the exterior cabin glass to break, sheered-off the metal clutch pedal, and damaged other interior components.

The tractor continued moving forward approximately 21 feet before Forestry Technician Adams' could stop the tractor.

Investigation Team Leader Mark McGee photographed the accident reconstruction (see Enclosure 1).

Interview of Witnesses and Involved Personnel

Interview of Fire Management Officer Arthur Canterbury:

On September 22, 2014, at approximately 0930 hours, Fire Management Officer Arthur Canterbury was interviewed by Investigation Team Members John Blitch and Bill Starke at the accident site.

Prior to the interview, Fire Management Officer Canterbury provided the Team with a copy of Forestry Technician Adams' Certificate of Completion for Backhoe, Bulldozer, and Tractor Safety Training, dated April 27, 2000 (see Enclosure 3). Fire Management Officer Canterbury also provided the Team with a copy of Forestry Technician Adams' Authorization for Operation of Motor Vehicles and/or Equipment, dated May 12, 2009 (see Enclosure 4). Fire Management Officer Canterbury did not have any documentation of Forestry Technician Adams completing refresher training as required by 321 FW 1.19, and further stated that he was not aware of a refresher requirement. Fire Management Officer Canterbury also stated that a Job Hazard Assessment, as required by 240 FW 1.10, was not completed for this task. Fire Management Officer Canterbury provided the Team with a written statement regarding his involvement with the accident (see Enclosure 5).

During the interview, Fire Management Officer Canterbury related the operational objective on September 16, 2014, was firebreak maintenance. The operation consisted of clearing the ground of fallen debris with a bulldozer, cutting low hanging limbs and brush with an agriculture tractor outfitted with a side mounted boom axe, and mulching the remaining debris with a Geo Boy tractor equipped with a mulching head attachment. Fire Management Officer Canterbury further stated that there was an overgrowth of trees, brush, and grass encroaching on the firebreak as it had not been maintained since 2010.

At the time of the incident, Fire Management Officer Canterbury was on an UTV in Unit D. As Equipment Operator Keith Morris had cleared the firebreaks of heavy debris with the bulldozer the previous week, Forestry Technician Adams was cutting low hanging limbs and brush with an agriculture tractor outfitted with a side mounted boom axe, and Lead Forestry Technician Steve Stack mulching the remaining debris with a Geo Boy tractor equipped with a mulching head attachment. A support truck with tools and emergency response supplies was positioned in Unit D between the work areas.

On September 16, 2014, at approximately 1352 hours, Fire Management Officer Canterbury received a call on his cellular phone from Forestry Technician Adams stating that he was pinned in the boom axe by a tree that had come into the cab. Forestry Technician Adams expressed concern to Fire Management Officer Canterbury that he was going to lose his leg and further asked Fire Management Officer Canterbury to bring a chain saw to cut him out.

Fire Management Officer Canterbury returned to the support vehicle, retrieved a chain saw and fuel, and proceeded to Forestry Technician Adams last known position.

At approximately 1400 hours, Fire Management Officer Canterbury arrived on scene and observed that Forestry Technician Adams' lower right leg was pinned to the right console of the tractor by a log, 8 feet in length, that had entered the cab through the lower left windshield. Fire Management Officer Canterbury further stated that Forestry Technician Adams was conscious and alert, and the tractor was not running.

After assessing the situation, Fire Management Officer Canterbury determined that he would have to cut the log near Forestry Technician Adams' right leg to get him out. After several failed attempts to start the chainsaw and move the log manually, Fire Management Officer Canterbury contacted Lead Forestry Technician Steve Stack on his cellular phone and directed him to return to the support vehicle to get another chain saw. Subsequently, Fire Management Officer Canterbury was able to start the chainsaw and extricate Forestry Technician Adams from the cab of the tractor by cutting the log between Forestry Technician Adams' legs.

Once freed, Forestry Technician Adams placed his belt around his upper calf and applied pressure to control the bleeding. Fire Management Officer Canterbury assisted Forestry Technician Adams out of the cab and onto the UTV. Prior to departing the area, Fire Management Officer Canterbury contacted refuge headquarters via cellular phone and advised Fire Program Assistant Mary Elliott of the emergency. Previous attempts to contact refuge headquarters and the station's emergency medical technician, Maintenance Worker Alex Hardy, were unsuccessful. At approximately 1420 hours, Fire Management Officer Canterbury transported Forestry Technician Adams via UTV to the entrance of JD tract on Maple Dam Road, where Maintenance Worker Alex Hardy, a certified Emergency Medical Technician, administered first aid to Forestry Technician Adams. In the interim, Forestry Technician (Fire) Steve Stack coordinated rescue efforts with the Emergency Operations Center. Subsequently, due to the nature of his injuries, Forestry Technician Adams was evacuated from the refuge by a medical helicopter and transported to the Peninsula Regional Medical Center in Salisbury, Maryland for advanced medical care.

Interview of Forestry Technician Steve Stack:

On September 22, 2014, at approximately 1310 hours, Forestry Technician Steve Stack was interviewed by Investigation Team Member John Blitch, and other members of the Accident Investigation Team in the headquarters' conference room at Blackwater National Wildlife Refuge.

Forestry Technician Stack corroborated Fire Management Officer Canterbury's statement regarding the use of an agriculture tractor outfitted with a side mounted boom axe, along with other heavy equipment, to perform maintenance on a firebreak on September 16, 2014.

Forestry Technician Stack related that the project started on Thursday, September 11, 2014. As firebreak maintenance has traditionally been performed with a Geo Boy tractor equipped with a mulching head attachment, Forestry Technician Stack and Forestry Technician Adams asked Equipment Operator Morris to give them refresher training on the agriculture tractor outfitted with a side mounted boom axe. As requested, Equipment Operator Morris conducted the training. In addition, Equipment Operator Morris spent approximately one hour with each operator monitoring their use of the equipment.

Forestry Technician Stack stated that there were no guards or screens on the tractors they use for mowing, and opined that a "forestry package" (operator protective structures required of heavy equipment used in forestry operations) may have prevented the accident from occurring.

Forestry Technician Stack, a heavy equipment operator for the Service since 1996, related he has not completed heavy equipment refresher training and was not aware of the refresher training requirements contained in 321 FW 1.19.

Forestry Technician Stack also provided information regarding his participation in the response phase of the accident. A review of the response phase of the incident is contained in Enclosure 6.

Interview of Supervisory Facilities Operations Specialist Pat DiDomizio:

On September 22, 2014, at approximately 1345 hours, Supervisory Facilities Operations Specialist Pat DiDomizio was interviewed by Investigation Team Member John Blitch, and other members of the Accident Investigation Team in the headquarters' conference room at Blackwater National Wildlife Refuge.

As the facility manager, Supervisory Facilities Operations Specialist DiDomizio related that he was responsible for maintaining the station's heavy equipment. Supervisory Facilities Operations Specialist DiDomizio acknowledged that the station's tractors used for mowing were not equipped with a side shield or similar protective system designed to prevent propelled objects from striking the operator as required by 243 FW 3.11. Supervisory Facilities Operations Specialist DiDomizio further stated that he was not aware of the requirement as the tractors did not come with a side shield or similar protective system from the factory.

Supervisory Facilities Operations Specialist DiDomizio, a heavy equipment operator for the Service since 1991, related he has not completed heavy equipment refresher training and was not aware of the refresher training requirements contained in 321 FW 1.19.

Supervisory Facilities Operations Specialist DiDomizio also provided information regarding his participation in the response phase of the accident. A review of the response phase of the incident is contained in Enclosure 6.

Interview of Maintenance Worker Alex Hardy:

On September 22, 2014, at approximately 1425 hours, Maintenance Worker Alex Hardy was interviewed by Investigation Team Member John Blich, and other members of the Accident Investigation Team in the headquarters' conference room at Blackwater National Wildlife Refuge.

Maintenance Worker Alex Hardy acknowledged that the station's tractors used for mowing were not equipped with a side shield or similar protective system designed to prevent propelled objects from striking the operator as required by 243 FW 3.11.

Maintenance Worker Alex Hardy, a heavy equipment operator for the Service since 2010, related he has not completed heavy equipment refresher training and was not aware of the refresher training requirements contained in 321 FW 1.19.

Maintenance Worker Alex Hardy also provided information regarding his participation in the response phase of the accident. A review of the response phase of the incident is contained in Enclosure 6.

Interview of Forestry Technician (Fire) James Tod Adams:

On September 24, 2014, at approximately 0805 hours, Forestry Technician Adams was interviewed telephonically by Accident Investigation Team Leader Mark McGee.

Forestry Technician Adams corroborated Fire Management Officer Canterbury and Forestry Technician Steve Stack's statements regarding the use of an agriculture tractor outfitted with a side mounted boom axe, along with other heavy equipment, to perform maintenance on a firebreak on September 16, 2014.

Forestry Technician Adams related that the project started on Thursday, September 11, 2014. Prior to beginning the project, Forestry Technician Stack and Forestry Technician Adams asked Equipment Operator Keith Morris to give them refresher training on the agriculture tractor outfitted with a side mounted boom axe. As requested, Equipment Operator Morris conducted the training. In addition, Equipment Operator Morris spent approximately one hour with each operator monitoring their use of the equipment. After the refresher training, Forestry Technician Adams continued mowing for the remainder of the day, and all day Friday without incident.

On September 16, 2014, at approximately 1030 hours, Forestry Technician Adams commenced mowing operations on the JD Tract of Unit D of the refuge. Forestry Technician Adams took his lunch break at approximately 1200 hours, and resumed mowing operations at approximately 1230 hours.

At approximately 1350 hours, without warning, a log penetrated the cab of the tractor through the lower left portion of the windshield and pinned Forestry Technician Adams' right leg to the right side of the console in the tractor. As the blunt force of the log entering the cabin sheared the clutch pedal from the floorboard, Forestry Technician Adams was unable to immediately stop the forward movement of the tractor. Subsequently, Forestry Technician Adams stopped the tractor by securing the ignition switch.

At approximately 1352 hours, on his second attempt to call for help on his cellular phone, Forestry Technician Adams made contact with Forestry Technician Stack and advised him that a tree came through the windshield and that he was pinned. Subsequently, Forestry Technician Adams called Fire Management Officer Canterbury on his cellular phone, advised him of the situation, and asked him to bring a chainsaw to cut him out.

At approximately 1400 hours, Fire Management Officer Canterbury arrived on scene and extricated Forestry Technician Adams from the tractor by cutting the log, between Forestry Technician Adams' legs, with a chainsaw. Forestry Technician Adams related that he remained conscious and alert throughout the incident.

Once freed, Forestry Technician Adams placed his belt around his upper calf and applied pressure to control the bleeding. Fire Management Officer Canterbury assisted Forestry Technician Adams out of the cab and onto the UTV. Fire Management Officer Canterbury transported Forestry Technician Adams via UTV to the entrance of JD tract on Maple Dam Road, where Maintenance Worker Alex Hardy, a certified Emergency Medical Technician, administered first aid to Forestry Technician Adams. Subsequently, due to the nature of his injuries, Forestry Technician Adams was evacuated from the refuge by a medical helicopter and transported to the Peninsula Regional Medical Center in Salisbury, Maryland for advanced medical care.

Forestry Technician Adams, a heavy equipment operator for the Service since 2000, related he has not completed heavy equipment refresher training and was not aware of the refresher training requirements contained in 321 FW 1.19.

Accident Response Debrief

On September 23, 2014, at approximately 0830 hours, Accident Investigation Team Member Steve Hubner facilitated a debriefing of the accident response (see Enclosure 6). The debriefing identified strengths, weaknesses, and improvements related to the response phase of the accident.

Out-Brief with Refuge Manager Suzanne Baird

On September 23, 2014, at approximately 1100 hours, the Accident Investigation Team met with Refuge Manager Suzanne Baird in the headquarters' conference room at Blackwater National Wildlife Refuge in Cambridge, Maryland.

During the out-brief, Investigation Team Leader Mark McGee advised Refuge Manager Baird of the preliminary findings of the investigation, and further advised her that an Accident Investigation Report containing the official findings and causes related to the accident as well as recommendations to prevent the reoccurrence of similar accidents will be completed within 45 days.

On September 23, 2014, at approximately 1200 hours, the Team concluded the investigation.

Investigator's Note: On October 27, 2014, at approximately 1139 hours, Supervisory Facilities Operations Specialist Pat DiDomizio provided Accident Investigation Team Leader Mark McGee with a service quote for parts and labor to repair the damage sustained by the tractor during the accident. The quote, prepared by Atlantic Tractor, estimated the repair cost as \$13,890.25 (see Enclosure 7).

Findings, Causes, and Recommendations

Findings:

1. The tractor operator did not complete refresher training for heavy equipment in accordance with Service policy 321 FW 1.19. The operator did however; receive on-the-job training prior to starting the task.
2. The tractor was not equipped with a side shield or similar protective system designed to prevent propelled objects from striking the operator as required by 243 FW 3.11.
3. The tractor was not equipped with an operator protective structure required of heavy equipment used in forestry operations as per 243 FW 1.4G(15), nor was it equipped with an operator protective structure required of land clearing equipment as per 243 FW 3.6.
4. A Job Hazard Assessment (JHA) was not completed for the assigned task as required by 240 FW 1.10.
5. The severity of the injury was reduced because of good communications, the close proximity of other crew, and that the fire group already had emergency procedures in place.

Causes:

1. Service policy 321 FW 1.19, addressing refresher training for heavy equipment, was not effectively communicated to the field.
2. Service policy 243 FW 3.11, addressing the use of guards on equipment used for both rear and side mowing, was not clearly defined and understood and therefore not effectively communicated to the field.
3. Service policies 243 FW 3.6 and 243 FW 1.4G (15) addressing “land clearing equipment” and the use of heavy equipment for "forestry operations" lacks clarity. The terms “land clearing equipment” and "forestry operations” are not defined in Service policy. The Service refers to OSHA 1910.266 which is for logging operations. The OSHA definition of logging operations is not indicative of the operation that was being conducted. The operation that was being conducted could be considered “forestry operations” and the equipment used in a manner such as “land clearing equipment,” as defined by CFR 780.215, and possibly should have had an enclosed cage, i.e. “forestry package” on the tractor. This protective cage may have prevented the injury or at least lessened its severity.
4. A JHA for this operation may have defined the limitations of this equipment and the need for additional protection or administrative procedures.
5. The quick response was partly due to the fact that the crew performing this operation has been trained for emergencies, via the fire program.

Recommendations:

1. The refuge manager should immediately require all station heavy equipment operators to complete refresher training in accordance with Service policy 321 FW 1.19. This will be immediately reinforced regionally by the R5 Heavy Equipment Coordinator and the R5 Manager of Safety and Health.

DOI Learn is currently designed so that once the heavy equipment operators take their first required refresher, from that point forward their next refresher requirement will appear in their required courses when due.

2. The Regional Heavy Equipment Coordinator will instruct all regional field offices that have mowing equipment as to when rear and side shields are required. All inadequately equipped tractors will be retrofitted with the proper side and rear shields where needed. Additional interim safety measures must be evaluated and implemented when feasible, until rear and/or side shields can be installed. See # 4.
3. The refuge manager should immediately have a moratorium on overhead boom mowing until it is determined what guards on station equipment used for overhead boom mowing are required by Service policy 243 FW 3.1. The proper guarding of the equipment, and/or limitations of the equipment, and/or interim safety measures, will be determined upon consultation with the R5 Heavy Equipment Coordinator and the R5 Manager of Safety and Health. At a minimum all agriculture tractors that pull bush hogs or flail mowers, or use boom mowers, will be retrofitted with additional guarding on the rear, and on the rear and the side for boom mowers. Overhead use of the boom axe will be limited to branches of 2 inches in diameter or less.

The National Heavy Equipment Coordinator should coordinate with the Regional Safety Managers, and the Regional Heavy Equipment Coordinators, to amend Service policy 243 FW 3 to clearly define when protective screens or cages (forestry packages) are required. In addition, include definitions of the terms "land clearing equipment" and "forestry operations", respectfully, in 243 3.6 and 243 FW 1.4G (15). The Regional Heavy Equipment Coordinators should work with the National Heavy Equipment Coordinator to ensure that the Service policy regarding the use of guards on equipment used for mowing, forestry work, and land clearing operations, is conveyed to all field stations nationally.

Regionally the purchase of equipment with additional guarding will be incorporated into future decisions on an as needed basis for the refuges that frequently use boom (side-cut) mowers/axes for clearing branches and overgrowth and bush hogs or flail mowers pulled from behind.

4. The refuge manager shall ensure Job Hazard Assessments are conducted for applicable tasks in accordance with Service policy 321 FW 1.19. Generic JHA's should be developed nationally to be included in the Service Policies on Heavy Equipment, similar to other Service Safety Chapters. Interim steps to provide a higher level of safety until equipment can be properly guarded need to be incorporated into the JHA, such as:
 - a. Borrowing equipment that is adequately guarded from another refuge.
 - b. Retrofit one piece of equipment and dedicate it specifically for this operation.
 - c. Postpone operation if feasible until properly guarded equipment is available or retrofitted.
 - d. Initiate safety discussions and additional administrative policies and practices to limit accident potential.
 - e. Restrict the size of branches to be trimmed and/or the height the boom mower can be raised for cutting.
5. It is recommended that all field offices that have operators working in remote locations should provide redundant communication devices, work in teams if possible or have others in the vicinity that can check the status of the operator periodically, and have emergency procedures in place before the operation is to commence.

Enclosures

1. Photograph Log
2. Accident Scene Sketch
3. Copy of Forestry Technician Adams' Certificate of Completion for Backhoe, Bulldozer, and Tractor Safety Training, dated April 27, 2000
4. Copy of Forestry Technician Adams' Authorization for Operation of Motor Vehicles and/or Equipment, Dated May 12, 2009
5. Statement of Fire Management Officer Arthur Canterbury Submitted on September 22, 2014
6. Accident Response Phase Report
7. Service Quote for Repair of Tractor Prepared by Atlantic Tractor, Dated October 22, 2014.

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-1

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-2

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-3

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-4

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-5

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-6

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-7

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-8

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-9

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-10

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR
PICTURE: 1-11
DATE: 09-22-2014
LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland
DEPICTING: Tractor Damage
PHOTOGRAPHER: Zone Officer Mark McGee
DIRECTION FACING: N/A
CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR
PICTURE: 1-12
DATE: 09-22-2014
LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland
DEPICTING: Tractor Damage
PHOTOGRAPHER: Zone Officer Mark McGee
DIRECTION FACING: N/A
CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-13

DATE: 09-22-2014

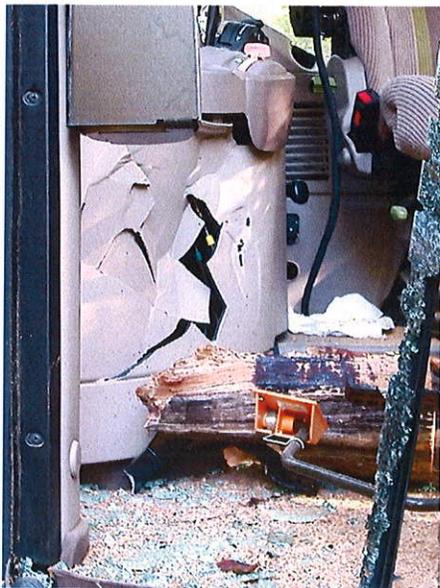
LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-14

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

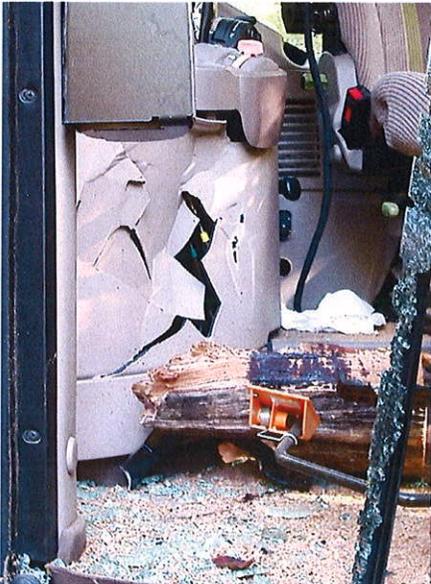
DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR
PICTURE: 1-15
DATE: 09-22-2014
LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland
DEPICTING: Tractor Damage
PHOTOGRAPHER: Zone Officer Mark McGee
DIRECTION FACING: N/A
CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR
PICTURE: 1-16
DATE: 09-22-2014
LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland
DEPICTING: Tractor Damage
PHOTOGRAPHER: Zone Officer Mark McGee
DIRECTION FACING: N/A
CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-17

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Tractor Damage

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-18

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-19

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-20

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-21

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-22

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-23

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-24

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

PHOTOGRAPH LOG



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-25

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel



CASE NO: Accident Report – Blackwater NWR

PICTURE: 1-26

DATE: 09-22-2014

LOCATION: JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland

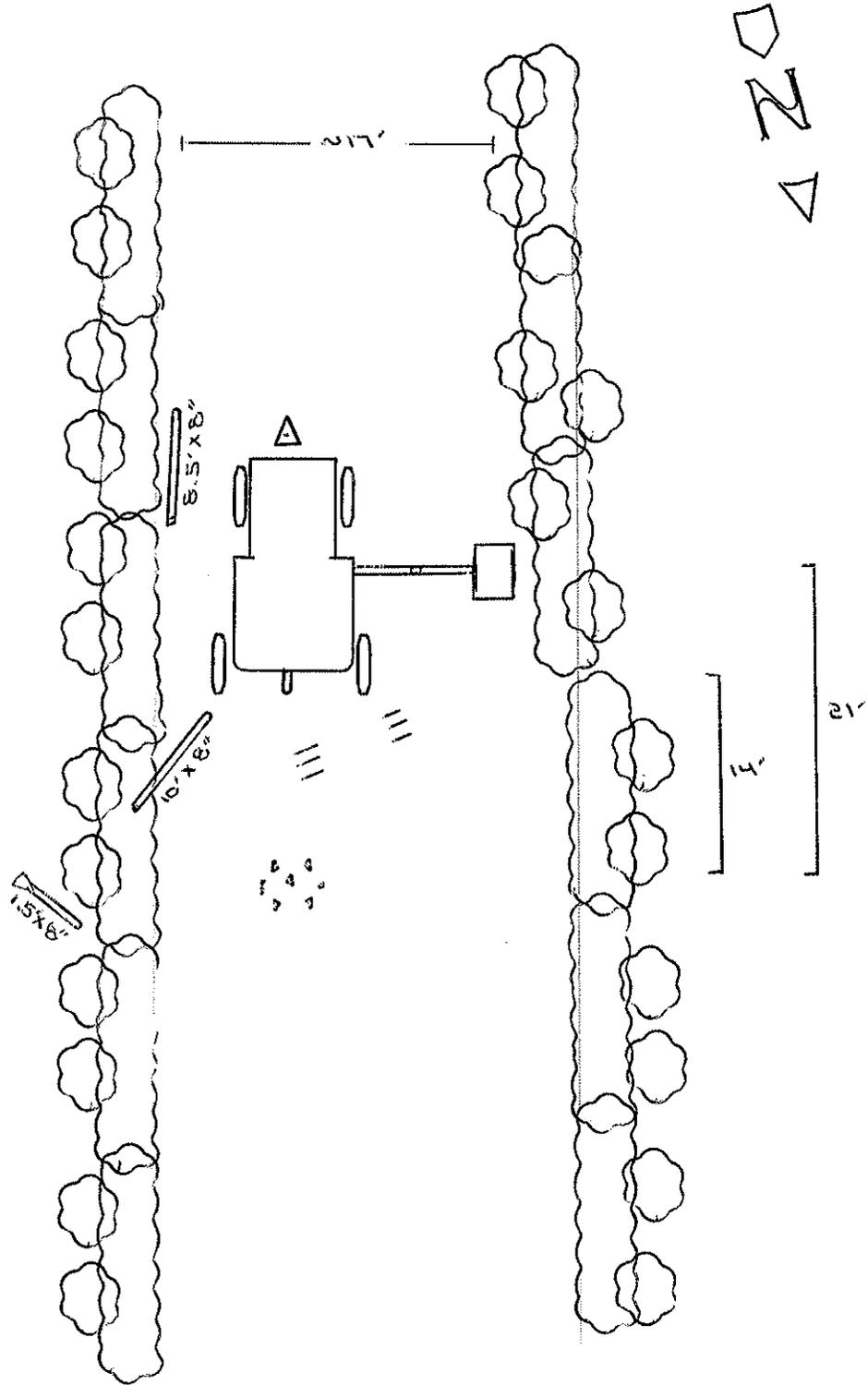
DEPICTING: Accident Reconstruction

PHOTOGRAPHER: Zone Officer Mark McGee

DIRECTION FACING: N/A

CAMERA: Bushnell 3.2 megapixel

BLACKWATER NW/R TRACTOR ACCIDENT
 JD TRACT OF UNIT D, CAMBRIDGE, MD
NOT TO SCALE



LEGEND

△ 38° 27.225' N 076° 03.366' W

☁ TREES - SHRUBBERY

▮ LOG

☼ BROKEN GLASS

≡≡≡ DOZER TRACKS



United States Department of the Interior
FISH AND WILDLIFE SERVICE



Certificate of Completion

to

James Adams

In Recognition Of Your Completion Of
BACKHOE, BULLDOZER, AND TRACTOR SAFETY

Instructor: *Edward M. Dunlop*

Date: April 27, 2000

AUTHORIZATION FOR OPERATION OF MOTOR VEHICLES AND/OR EQUIPMENT

(Supervisor completes. Must be supported by additional training documentation, as appropriate, for each type of motor vehicle or equipment authorized.)

Name of Operator: **Tod Adams** Station: **Blackwater NWR, 51531, Cambridge, MD**

Type of authorization: New **Renewal**

Operator must be either: **Service employee** [or] **Volunteer (Must have Volunteer Services Agreement)**
See 150 FW 1-3

Class of operator: **Full-time operator** **Incidental operator** **Commercial operator**

Does operator carry a valid State license? **Yes** **No**** **Regular** [or] **Commercial**

Does operator carry a valid agency identification card or document? **Yes** **No****

Is operator physically and medically qualified? **Yes** **No** -- Explain**

Does operator's personal and Service driving record continue to demonstrate competence to operate the types of motor vehicles and/or motor equipment to which s/he is assigned? **Yes** **No** -- Explain:**

** If "No" or "Failed" applies, this person is not permitted to operate motor vehicles or equipment for the Service.

Types of Motor Vehicles & Motor Equipment: *[Check those that apply. Attach safety training documentation. Unless required by supervisor, items marked with an asterisk (*) require only a valid State license and Defensive Driving.]*

- | | | | |
|---|--|---|---|
| <input checked="" type="checkbox"/> Sedans* | <input type="checkbox"/> Buses | <input checked="" type="checkbox"/> Station Wagons* | <input type="checkbox"/> Motorcycles* |
| <input checked="" type="checkbox"/> Carryalls | <input type="checkbox"/> Truck Tractors | <input type="checkbox"/> Ambulances | <input checked="" type="checkbox"/> Trucks w/attachments |
| <input checked="" type="checkbox"/> Fire Trucks | <input type="checkbox"/> Garbage Trucks | <input checked="" type="checkbox"/> Light Pickups* | <input checked="" type="checkbox"/> Vans* |
| <input checked="" type="checkbox"/> Crawler Dozers | <input type="checkbox"/> Crawler Loaders | <input type="checkbox"/> 4-WD Loaders | <input type="checkbox"/> Draglines |
| <input type="checkbox"/> Power Excavator | <input type="checkbox"/> Motor Cranes | <input checked="" type="checkbox"/> Farm Tractors | <input type="checkbox"/> Scraper Pans |
| <input type="checkbox"/> Motor Graders | <input checked="" type="checkbox"/> Amphibious (MM) | <input checked="" type="checkbox"/> Soft Trencher (MM) | <input type="checkbox"/> Scrubbers |
| <input type="checkbox"/> Skid Steers | <input type="checkbox"/> Powered Lift | <input type="checkbox"/> Wipers | <input type="checkbox"/> Generators |
| <input type="checkbox"/> Forklifts | <input checked="" type="checkbox"/> All-Terrain | <input checked="" type="checkbox"/> Knitting Mowers | |

Boats < 25'
 Other: Airboat, GeoBoy, Fire Cat, + Camoplast (or Go-Fast) incl. Bombardier, MM, + Fire Cat

ADDITIONAL COMMENTS:

Supervisor's Authorization I conclude that this employee/volunteer is fully trained and otherwise qualified to operate the motor vehicle or motor equipment checked above and authorize operation. I further authorize such operation subject to the following conditions:

Supervisor's Name (Print): **KellyAnn Gorman** Signature: *KellyAnn Gorman* 05-12-09

FWS 3-2267
 12/03 R5:3/08

Boom Axe Incident report from 09/16/2014

-1240 through 1350 I was scouting the fire lines and roads that Steve Stack and Tod Adams were working on clearing. I made visual contact with Tod on the tractor around 1315. After that I continued to ride the lines and headed south to find where Steve Stack was working with the GeoBoy.

-1352 I received a call from Tod Adams and he said he was pinned in the boom axe by a tree that had come into the cab. He said he was going to lose his leg and to please bring a saw to cut him out.

-I was approximately .5 miles south of his location on a UTV. As I turned back north I stopped by the support truck part at the intersection near the grain bin and picked up the chainsaw and fuel.

-1400 I arrived on the scene and Tod was still pinned in the tractor. The tree had come from his left through the front of the cab and had pinned his right lower leg into the side console of the tractor. He was conscious and alert. The tractor was not running.

- A log approximately 8ft was hanging from the tractor. After assessing the situation I told Tod that I would have to cut the log near his right leg to free him and to get him out. He was in severe pain and we still did not know if his leg was broken, bleeding etc.

-I tried starting the saw, but had several failed attempts. I worked on the saw for several minutes to get it started. I removed the spark plug and purged it 3 times before it finally started. Between attempts to get the saw running I used a rogue hoe to try and pry the log off of Tod's leg. It was wedged in the tractor to tight to move even the smallest amount.

-1403 I contacted Steve Stack to ask him to bring another saw since I could not get the first one to start and to call 911. He was almost to the scene when he had to turn back to retrieve the other saw.

-After trying to get the saw started 3 times it finally kicked over and ran. I placed several cuts in the log to relieve the tension and to avoid getting the bar stuck in the log. Once I cut through the log Tod was able to move the end of the log himself. It was clear then once the log was removed and pressure relieved that he had an open wound through a small hole in his pants. I started to cut another section of the log on the opposite side of the tractor and while doing so realized enough tension was relieved that I could pull the log free without needing anymore chainsaw work.

-Tod placed his belt around his upper calf to slow the bleeding. He was able to get out of the tractor on his own and I helped him get into the UTV. I then contacted the refuge office and spoke to Mary to let her know we had an emergency and to pass it on to Refuge management. This was around 1410. I had tried to place calls earlier to the Office without success and also tried to call Alex Hardy (EMT) with no luck.

-I transported Tod to the paved road which was at the JDs tract entrance off of Maple Dam road. When I arrived there Steve Stack was waiting on me and within minutes Pat DiDomizio and Alex Hardy arrived to assist in stabilizing Tod while we waited for the ambulance to arrive.

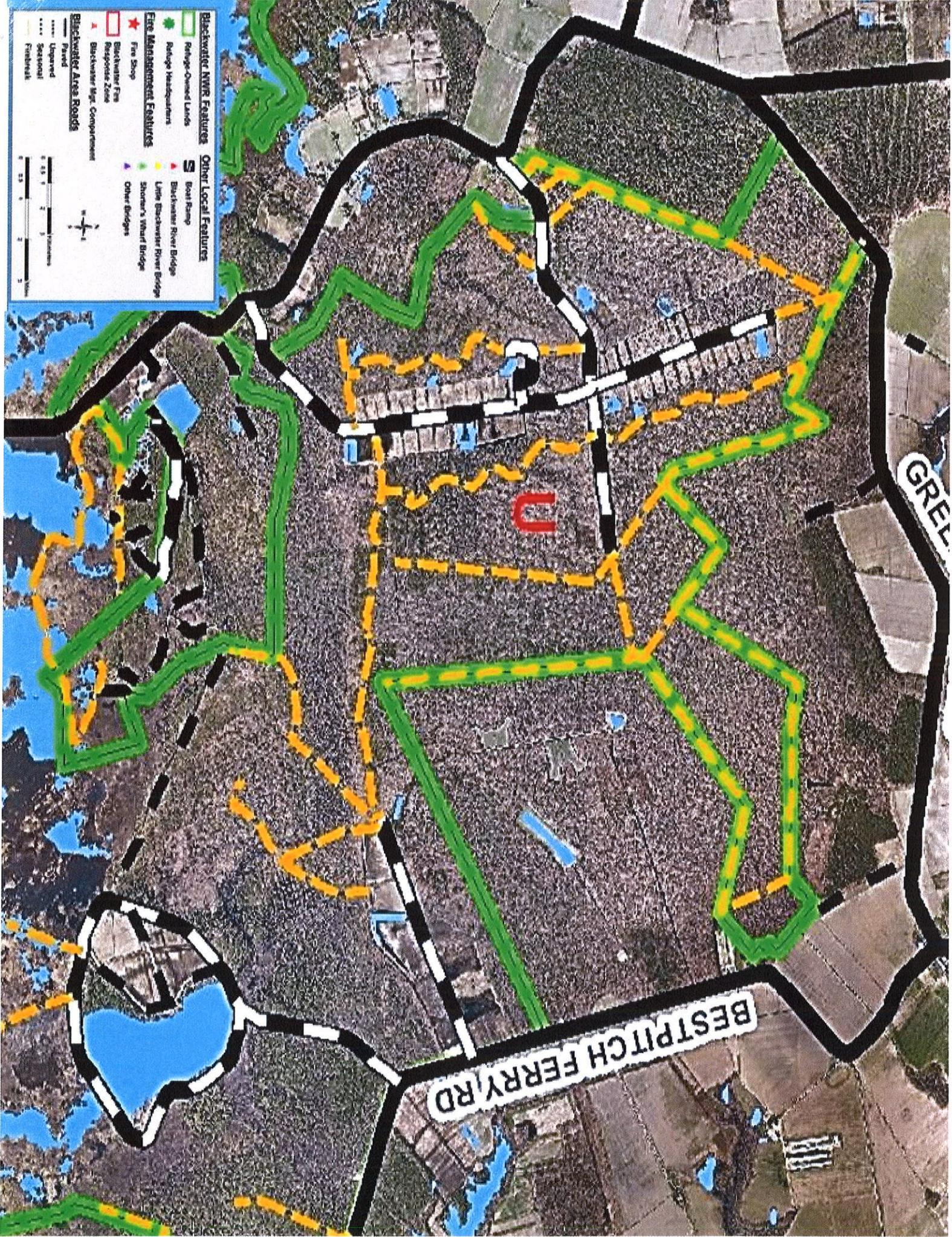
-Alex cut Tod's pant leg off to get to the wound and removed his boot. Using the EMT kit Alex bandaged the wound to slow the bleeding, stabilize his leg and to keep it from getting dirty.

-Ambulance unit showed up and packaged Tod on the back board at around 1430

-One of the local volunteer fire staff asked about a possible air lift site and I recommended the area near the fire shop compound or behind the LE quarters. Pat went with the firefighter/EMT to identify the landing site and the Ambulance left with Tod. Within minutes the helicopter was landing between the fire shop and the fire crew quarters.

-After the helicopter left the refuge I went to PRC in Salisbury to be with Tod and his family. The Doc said he had 2 open wounds a broken shin and possible fracture below his knee. They had him prepped for surgery and waiting.

-I stayed at the hospital until Tod was out of surgery and I visited with him in the recovery room. At the time I left it was around 2200.

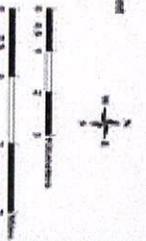


Blackwater NWR Features

- █ Range-Owned Lands
- █ Range Headquarters
- Fire Management Features**
- ★ Fire Shop
- ★ Blackwater Fire Response Zone
- ▲ Blackwater Mgt. Compartment
- Blackwater Area Roads**
- Paved
- Unpaved
- Seasonal
- Foothills

Other Local Features

- S Boat Ramp
- █ Blackwater River Bridge
- █ Little Blackwater River Bridge
- █ Shover's Wind Bridge
- ▲ Other Bridges



BESTPITCH FERRY RD

GREEN

Blackwater Agricultural Tractor Incident

Response Phase Report prepared by Steven Hubner, 09/29/2014

Background

On September 16, 2014, James Tod Adams, a forestry technician since 1995, was operating an agricultural tractor equipped with a centered, right-side mounted boom axe mower to clear an existing firebreak from encroaching vegetation. This work was being performed in the JD tract of Unit D at Blackwater National Wildlife Refuge, Dorchester County, Cambridge, Maryland. The incident site was about 1.75 miles from Maple Dam Road (closest blacktop road) along a network of refuge woods roads and firebreaks. The incident area is an oak-hardwood forest, and terrain is flat and low-lying. Weather was warm and sunny.

A few minutes before 1351, as Tod was progressing down the firebreak, the left-front tire of the tractor along with the adjacent hydraulic tank for the boom axe caught the end of a 20-foot long, 8-inch diameter oak log. The log was lying on the ground in the forest at an acute angle to the direction of travel. The end of the log closest to the tractor was slightly elevated on a root hummock. As the tractor moved forward, the protruding steel hydraulic tank caught the end of the log causing it to rise upward and through the left-front side of the operator cabin pinning Tod's right leg to the right side control console preventing him from moving. As the log entered the cabin, it eventually jack-knifed into two pieces each about 10 feet long. The forces associated with the log entering the cabin caused the exterior cabin glass to break, sheered-off the metal clutch pedal, and damaged other interior components. The tractor continued moving forward about 21 feet before Tod could stop the tractor.



Figure 1. Reconstruction of log and initial point of contact with the tractor.



Figure 2. Reconstruction of log entering tractor.



Figure 3. Reconstruction of log inside tractor at final point of forward progress.

Tod suffered a broken shin and two severe lacerations to his right leg calf requiring a 3 ½ to 4 hour surgery to clean the wounds of glass and debris, and install a metal plate and rod to repair the broken shin bone.

At the time of the incident, Steve Stack, lead forestry technician was operating a GeoBoy in Unit D south of Tod's location. Art Canterbury, fire management officer was on a UTV in Unit D checking on the work progress of both Tod and Steve. A support truck was in Unit D about mid-way between Tod's and Steve's work areas with tools and emergency response supplies.

On September 23rd, as part of the incident review team's site visit, a group debriefing was facilitated with refuge staff who participated in the response phase of the incident. The responders were:

Suzanne Baird, Refuge Manager
Tom Penn, Wildlife Refuge Specialist
Jess Robinson, Administrative Support Assistant
Art Canterbury, Fire Management Officer
Mary Elliott, Fire Program Assistant
Pat DiDomizio, Supervisory Facilities Manager
Alex Hardy, Maintenance Worker
Steve Stack, Lead Forestry Technician

Tod was unable to participate in the response phase debriefing due to his injuries. During a phone call with Tod on September 22nd he said that he was cutting with the boom axe and looking to the right, a tree came in from the left, and he had no idea where it came from.

Keith Morris, Equipment Operator/Firefighter was present for the debriefing but was not involved with the incident.

The following incident review team members were also present: Mark McGee, Zone LE Officer and team leader; John Bitch, FWS National Heavy Equipment Coordinator; Bill Starke, Region 5 Heavy Equipment Coordinator; and Steven Hubner, Region 5 Fire Management Program.

John Guiel, Region 5 Safety Manager was assigned to the team, but was unable to participate in the site visit which took place on September 22-23, 2014.

Response

On September 16, 2014 at about 1351 and 1352 Tod Adams used his cell phone to call Steve Stack (no answer initially) then Art Canterbury for help. There was a refuge radio in the operator cab, but Tod was unable to reach it. Tod told Art that he was pinned in the tractor by a tree that had come into the cab. He feared he was going to lose his leg and told Art to please bring a chainsaw to cut him out. Art was on a UTV about ½ mile south of Tod's location. As Art returned north he stopped at the support truck to pick-up a chainsaw kit and fuel.

Tod placed another cell phone call to Steve who answered this time and told Steve that he was pinned by a tree and needed help. Steve was working south of Tod probably over a mile away and was not sure of Tod's exact location since they were not working near each other. Art knew of Tod's exact location since they had made visual contact only a short

time before the incident as part of Art's effort to monitor both Tod's and Steve's work progress. Both Art and Steve talked by cell phone a number of times, after Tod's initial cell phone calls for help, to coordinate their response.

Art arrived at the tractor at 1400 and Tod was still pinned in the tractor by a 10 foot log having entered the left side of the cab. Tod was conscious and alert. The tractor was not running. Tod was in severe pain and the extent of injury was still not known. After assessing the situation Art used the chainsaw to cut off a 14-inch section of log near Tod's right leg in order to free him. Initially, Art had several failed attempts to start the chainsaw, so he had to take time to clean the spark plug and purge the carburetor before it finally started. Once Tod's leg was free, the release of pressure from removing the log caused the wound to bleed so Tod wrapped his belt around his upper calf to slow the bleeding.

Tod was able to climb out of the tractor and Art helped him into the UTV for transport to Maple Dam Road. Art called Mary Elliot by cell phone to let her know that Tod had been injured and to let refuge management know. Mary informed Suzanne Baird of the incident. Suzanne started to make her way to the incident.

While Art was helping to extract Tod, Steve traveled north from his work site to the staged support truck and called 911. Steve also called Pat DiDomizio at 1411 and asked him to bring Alex Hardy (a certified EMT) and support truck 301 which had an advanced trauma kit to the JD tract. Pat began to drive support truck 301 to Maple Dam Road and tasked Tom Penn to pick-up Alex who was mowing on the refuge. Art began transporting Tod by UTV out to Maple Dam Road. Steve was already at Maple Dam Road when Art arrived with Tod in the UTV. Pat, Alex, Tom and Suzanne arrived within minutes of Art's arrival.

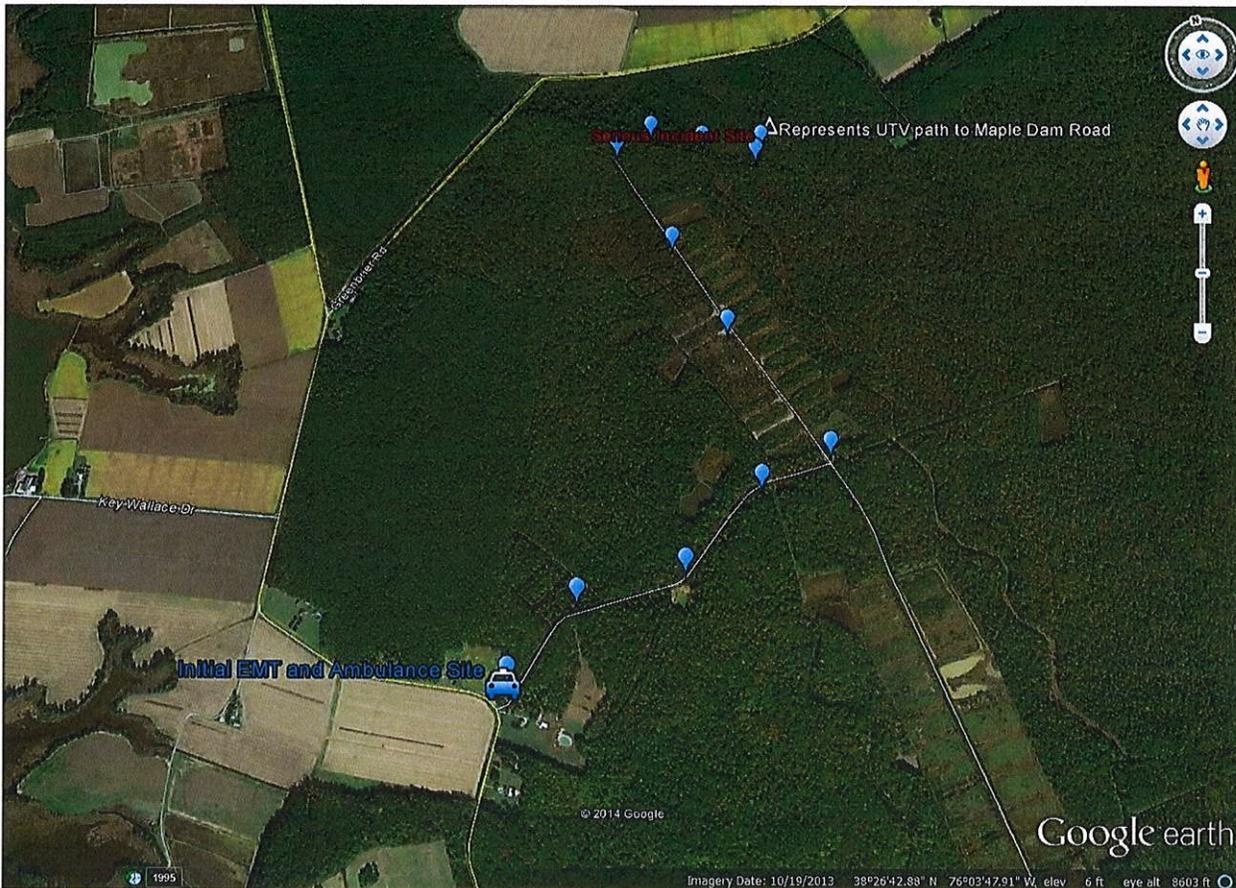


Figure 4. Map of incident site and travel route to maple Dam Road site.

Alex began to assess and stabilize Tod's injuries. Steve continued to coordinate with 911 and continued to pass along updates regarding Tod's condition to 911 based on information from Alex. During this exchange the county emergency response system decided to initiate medical evacuation by helicopter. Two ambulances and other ground-based county emergency responders arrived at the Maple Dam Road site and Tod was placed in an ambulance about 1430. It took approximately 38 minutes from the time Tod called Art for help to placing Tod in an ambulance. Pat coordinated the helicopter landing zone with county emergency responders near the refuge fire shop which was about 1.75 miles from the Maple Dam Road site.

Since the Maple Dam Road site is located on a bend and multiple vehicles were arriving, Tom and Suzanne initiated traffic control on either side of the road bend.

Mary and Jessica Robinson continued to monitor the 911 radio traffic at the refuge headquarters. They were instructed to contact with Tod's wife and other family members so they could meet Tod at the hospital.

Tod was transferred from the ambulance to the helicopter and taken to Peninsula Regional Medical Center, Salisbury, Maryland – about 30 miles away. As Tod's supervisor, Art traveled by refuge vehicle to the hospital to help with patient check-in and to meet with Tod's family.

Pat secured the incident site and began to collect incident information.

Suzanne, referring to her US FWS Serious Incident Notification wallet card, reported the incident at 1458 via the telephone number on the wallet card. Suzanne also notified an acting Refuge Supervisor at the Regional Office.

Art remained at the hospital until Tod was out of surgery and visited him in the recovery room. Art left the hospital around 2200.

Suzanne has made Critical Incident Stress Management available to any refuge employee requesting it. Refuge employees have been asked to help each other to look-out for signs of employee stress related to the incident.

Discussion

After refuge staff finished presenting their roles in the response phase of the incident, a facilitated discussion took place trying to identify areas of strengths and areas for improvement similar to a fire program After Action Review.

Strengths:

- employee training pays off
- everyone has a role in response regardless of grade or position
- there was good situational leadership by individual employees
- staff filled various roles in the response and gave-up that role when it was time
- there was good cross program (fire, maintenance, administrative staff, refuge management) response to the incident
- physically checking on employees working in the field and knowing where they were located
- support trucks were equipped with trauma gear, and that time and funding spent on preparedness is important but sometimes underappreciated until it is needed
- refuge mobile radio system programmed with county 911 800 system
- 38 minutes passed from incident to ambulance response time

Improvements:

- need more accurate 911 addresses for refuge land with no residences
- frustration when having to log-in multiple times to use government cells phone; not an issue when using personal cell phones
- using multiple communication systems – government cell phones, personal cell phones and two-way radios, and having them work, charged, accessible, and answered
- add cage around operator cabin

As part of the response debrief, several follow-up questions were presented in order to learn more about the decision-making process that took place during the response.

1. Did the refuge have a written medical response plan to serve as a guide?

There is no written refuge medical response plan. The response unfolded in an orderly manner due employee preparedness, experience, and training. For example, Alex is a local EMT and collateral-duty refuge wildland firefighter who, as a seasonal firefighter years ago, recommended and developed the trauma bags found in each of the support trucks. Pat is a collateral-duty refuge law enforcement officer. Tom is a former refuge law enforcement officer and a collateral-duty refuge wildland firefighter. Both Tod and Steve are volunteer structural firefighters in each of their town's fire department.

Diversity in job experience and training both on- and off-refuge played an important role in executing a timely and coordinated response without having to rely on a written plan.

2. Was there any thought of not extracting Tod from the tractor, but waiting for county EMS to extract and transport from the tractor site?

No, Tod remained conscious during the extraction and blood loss was controlled quickly once the log was removed. Art was the only person who knew of Tod's exact location because Art had made visual contact with Tod only minutes before the accident while on a UTV. With multiple woods roads and fire breaks in Unit D, it would have taken time to describe the actual incident location and direct multiple emergency vehicles to it. While the roads and firebreaks were dry, having multiple response vehicles traverse narrow woods roads would have led to vehicles getting stuck in wet areas/shoulders or having difficulty turning around. The narrow width of the roads would have led to vehicle congestion. In this case, the UTV was the ideal vehicle platform for transporting Tod to Maple Dam Road – the closest blacktop top county road.

3. How did the 911 coordination go? Where there any difficulties or confusion?

There was some difficulty providing an exact 911 address for the ambulance site selected along Maple Dam Road. 911 systems are designed to direct responders to a specific numbered structure. "Vacant" land such as agricultural fields and forestlands do not have 911 addresses. Steve walked to the nearest mailbox along Maple Dam Road in order to provide a specific 911 address. This did not delay the response, but it does raises questions about how to direct local EMS responders to a parcel of land that does not have a specific 911 address.

4. What drove the decision to medivac Tod instead of using an ambulance? When did this decision take place? Who made the decision? Was there any discussion about switching back to ground transport?

Ambulances were the first medical resources to arrive on-scene. As more information was forwarded to 911 about the patient's injuries, the county emergency medical system dispatched a medivac helicopter. There was no discussion among county EMS about switching back to ground transport after Tod's arrival at Maple Dam Road due to the severity of his wounds.

5. How was the medivac landing zone coordinated? Any confusion or delays in sequencing this portion of the response?

Pat and Art discussed landing zone (LZ) locations and decided that Maple Dam Road was not a good location. Pat took the local fire chief to a large landing zone near a refuge house about 1.75 miles from the Maple Dam Road site. This LZ was communicated to the pilot, but the pilot decided to land across the street near the refuge fire shop. This change in LZs caused the ambulances to turn around and go to the new LZ site. The change in LZs didn't affect the outcome of the response, but it is a reminder that pilots make the final decision on where they can and want to land their aircraft.

6. Once the ambulance arrived, what additional medical action was performed on Tod beyond those provided by Alex?

EMS inserted an IV in Tod and began transport to the LZ via ambulance. Prior to the ambulance's arrival, Alex confirmed that Tod's injuries warranted a medivac. Tod's leg was swollen and purple due to lack of blood circulation from the belt that he had applied to his calf. Alex cut away the pant leg and boot, took blood pressure, pulse, talked with Tod to make sure he didn't pass out, released the belt slowly to restart blood flow, bandaged the open wounds, and covered Tod with a blanket to keep him warm. Art assisted Alex. Trauma supplies were available and taken off support truck 301.

End of Report