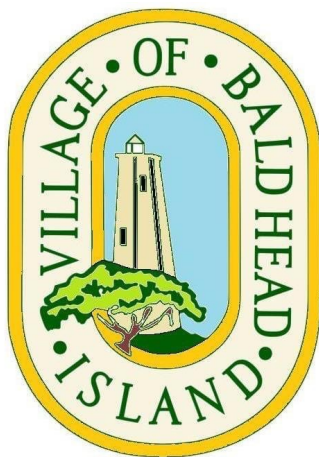


**NOVEMBER 20, 2021  
NORTH BALD HEAD WYND  
STRUCTURE FIRES  
AFTER ACTION ANALYSIS**



## **DISCLAIMER**

The content herein was obtained by numerous sources and through direct communication with Bald Head Island Public Safety Department personnel during a site visit on November 24, 2021 and in email correspondence. The analysis and recommendations have been provided at no cost to the Village of Bald Head Island Department of Public Safety and the consultant assumes no liability for future action or lack thereof.

About the consultant:

Paul Hasenmeier is the Sunset Beach (NC) Fire Chief. Hasenmeier possesses a bachelor's degree in Fire Science from Columbia Southern University as well as a master's degree in Public Administration from Capella University. He is a graduate of the National Fire Academy's Executive Fire Officer Program. Additionally, Hasenmeier is trained as a Firefighter, Paramedic, Instructor, Fire Inspector, and in all of NFPA 1670's technical rescue disciplines.

In addition to his current duties and responsibilities as Fire Chief in Sunset Beach, Hasenmeier is a lead faculty member at Columbia Southern University where he teaches on-line courses in their fire administration program. Hasenmeier is an adjunct instructor for Bowling Green State University and teaches at their annual state fire school. He has presented on fire service topics across the United States and in Canada.

*Consultant curriculum vitae provided to Public Safety Director Alan May for reference.*

## EXECUTIVE SUMMARY

The fire event on North Bald Head Wynd during the evening of November 20, 2021 was catastrophic on many fronts. There were no civilian or firefighter deaths. Opportunities for prevention of future events of this magnitude and a strengthened operational capability to mitigate emergencies will result in a community driven priority to ensure Bald Head Island reduces risk from the threat of fire.

A noted fire service expert observed that, “the post incident critique allows emergency responders to get a clear idea of the effects of their actions on the outcome of the operation. By comparing the expected outcome to the actual consequences, the fire department can make personnel as well as organizational adjustments. And by assessing what worked, and what did not, improvements can be made” (Carter, 2001). The Bald Head Island Department of Public Safety Director, Alan May, has made the review and analysis of this incident a priority, which shows an unwavering service to ensure a high level of emergency services to take care of people on Bald Head Island.

By all accounts the men and woman of the Bald Head Island Department of Public Safety worked tirelessly to extinguish the fire and prevent further conflagration. Both on-duty personnel that were operating alone for an extended amount of time and off-duty personnel that returned to the island to provide operational support chose service above self and should be commended for their efforts.

Bald Head Island Department of Public Safety Volunteers and the Public Safety Auxiliary personnel provided much needed logistical support, transportation of personnel from the ferry, and the coordination of rehab. Continued collaboration will maximize their capabilities, willingness, and love for community during future emergent and non-emergent events.

Although logistically challenging, mainland mutual aid resources from federal, state, county, municipal, and private organizations contributed to mitigation and recovery efforts.



## KEY RECOMMENDATIONS

- **Perform Apparatus Inspections**
- **Perform Equipment Inventory and Operational Deployment Needs Assessment**
- **Perform Assessment of Water Utilities**
- **Advance Community Risk Reduction Practices**
- **Effect Change to Implement Resource Alarm Assignments**
- **Review and Develop Standard Operating Procedures**
- **Conduct Incident Command System Training**
- **Increase Hands-On Firefighter Training**
- **Enhance Volunteer and Public Safety Auxiliary Program**

**TABLE OF CONTENTS**

<b>Executive Summary</b>	<b>3</b>
<b>Key Recommendations</b>	<b>3</b>
<b>Equipment and Apparatus</b>	<b>5</b>
<b>Personal Protective Equipment</b>	<b>7</b>
<b>Timeline</b>	<b>7</b>
<b>Weather</b>	<b>12</b>
<b>Structure(s)</b>	<b>13</b>
<b>Fire Behavior</b>	<b>14</b>
<b>Operations</b>	<b>15</b>
<b>Contributing Factors</b>	<b>17</b>
<b>News Reports</b>	<b>19</b>
<b>Recommendations</b>	<b>22</b>
<b>References</b>	<b>26</b>

## PERSONNEL AND APPARATUS

The Department of Public Safety is charged with ensuring the safety and well-being of the residents, employees, and visitors to the island as well as the security and safety of the properties on the island (Village of Bald Head Island, 2021). All Public Safety Officers are required to become certified in law enforcement, firefighting and as an EMT or paramedic. In addition, they must be trained in water rescue (Village of Bald Head Island, 2021).

**Staff:** The Department is led by the Public Safety Director (Alan May), and Command Staff (Paul Swanson). There are four shifts that are led by a lieutenant, with three to six Public Safety Officers on duty 24 hours a day and seven days a week (Village of Bald Head Island, 2021).

The Administrative Assistant to the Director handles ICE permits, golf cart registrations and general office duties plus clinic registration during the summer season. The department is supported by a volunteer staff who assist with medical emergencies, firefighting, and water rescue (Village of Bald Head Island, 2021).

### **Bald Head Island Personnel On Scene:**

*All paid staff certified at minimum Level II firefighter*

Chief – 1 (not certified)

Captain. - 1

Lieutenant– 3

Sergeant – 2

Public Safety Officer – 10 (includes 2 part-time staff)

### **Bald Head Island Volunteers On Scene:**

Certified Fire II – 2

Non-Certified – 8

During the November 24, 2021 after action review, the Public Safety Auxiliary (PSA) representative expressed some concerns about lack of access to the public safety building to retrieve rehab supplies and delayed notification of the incident. Both the PSA and department volunteer groups were willing to help during this incident and future incidents. Areas they helped with were rehab, transport of firefighters from the ferry dock to the scene, and establishing a receiving point for donations. A lack of coordination and direction for their groups was probably the biggest hurdle these groups expressed concern about.

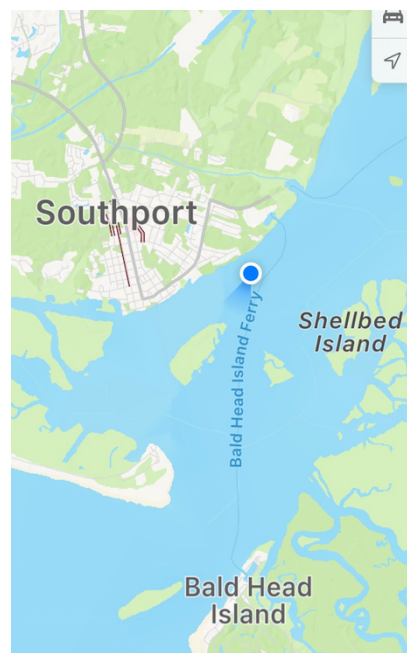
### **Mutual Aid Request Policy:**

- a. If at any time a fire scene presents the need for additional resources outside of our department, C-COMM should be notified *immediately*. They should be advised of which departments you are requested aid from, and also which methods of transport will be utilized (USCG, BHI ferry, etc.). USCG and BHI Transportation must be contacted to mobilize for the event.
- b. The closest mutual aid departments are Southport Fire Department, Yaupon Fire Department, St. James Fire Department and Oak Island Fire Department. Other departments can be requested as needed through C-COMM.

- c. Coast Guard Station Oak Island will bring firefighters w/ SCBA from Oak Island FR and Yaupon FD. This is generally the quickest way to get additional interior firefighters to our island.
- d. Consider the need for additional apparatus, including Southport's mobile air supply, and contact the BHI Transportation Department for acquisition of the barge.
- e. Send a member to meet the mutual aid departments on the island side dock to provide directions to the fire scene. Consider utilizing the Tram Service, Patrol vehicles, and or golf carts for shuttling personnel and air packs. (Village of Bald Head Island Public Safety, 2017, p. 36)

#### **Mutual Aid Departments Involved with this Incident:**

Sunset Harbor Zion Hill – 2 personnel with pumper tanker  
 Shallotte – 4 Personnel  
 Southport – 6 Personnel  
 Oak Island – 3 Personnel  
 Boiling Spring Lakes – 4 Personnel  
 Winnabow – 4 personnel – 1 engine (not utilized)  
 Leland – 3 Personnel – 1 engine (not utilized)  
 Sunny Point – 5 Personnel – 1 Tanker  
 Bolivia – 2 Personnel – 1 Brush Truck  
 St. James – 6 personnel for rehab  
 North West - 3 Personnel  
 Carolina Beach – 3 Personnel  
 Kure Beach – 3 Personnel  
 Brunswick Co. EMS – 2 personnel for rehab  
 Brunswick County Fire Marshal's Office  
 Brunswick County Sheriff's Office Marine Patrol  
 State Marine Patrol  
 US Coast Guard



#### **Apparatus:**

Bald Head Island Public Safety Officers patrol in the two Quick Response Vehicles which are equipped with a variety of supplies for first response to medical emergencies, fires, and water rescue as well as for law enforcement (Village of Bald Head Island, 2021). The department has two ambulances which are fully stocked for emergencies (Village of Bald Head Island, 2021).

Ladder 3272 is a 1995 Pierce, 6-person cab with a 1250 GPM pump, 500-gallon water tank, 800' of 5" LDH, and 55' ladder (poor mechanical condition reported).

Engine 3273 is a 2002 International Salisbury, 2-person cab with a 1500 GPM pump (reported pump governor issues), 1000-gallon water tank, 1000' of 4" LDH, and an on-board generator that is out-of-service.

Engine 3274 is a 2006 International KME, 2-person cab with a 1500 GPM pump, 1000-gallon water tank, 1000' of 4" LDH, and an on-board generator that is out-of-service.

Engine 3275 is a 1993 New Lexington, 6-person cab with a 1500 GPM pump, 1000-gallon water tank, 2000-gallon drop-tank, 500' of 5" LDH, and an on-board generator that is out-of-service.

## **PERSONAL PROTECTIVE EQUIPMENT**

During the after action review on November 24, 2021, it was noted that Bald Head Island Public Safety Department personnel have one set of turnout gear for firefighting operations. Industry standards and cancer prevention practices recommend two sets of turnout gear. All personal protective equipment must be free of damage and less than 10 years old.

Also mentioned were several issues on scene with volunteers and private citizens on hoselines and in forward operating positions without proper personal protective equipment. Scene security challenges and concern for bystander safety was noted during the review.

## **TIMELINE**

The timeline below was obtained by the Bald Head Island Department of Public Safety from the Brunswick County Sheriff's Office Communication Center. Some information was removed from the CAD report for brevity and irrelevance.

**Report Time 11/20/21 19:54:35 How Reported 911**

### **Non Unit Specific Times**

11/20/21 19:54:35 | New CFS

11/20/21 19:55:58 | RECD ADDTL ON N BALD HEAD WYND

11/20/21 19:56:00 | 2-3 HOUSES ON FIRE.....N BALD HEAD WYND AND LIGHT HOUSE

11/20/21 19:56:19 | UNK IF ANYONE IN THEM

11/20/21 19:58:09 | CALLER WAS UNSURE IF SAME WAS OCCUPIED... SAW SAME WHILE RIDING HIS BICYCLE.

11/20/21 20:00:04 | CALLING COAST GUARD 24/7 NUMBER LISTED IN CAD INFO DATA

11/20/21 20:00:59 | ATT TO CALL 24/7 NUMBER LISTED IN CAD FOR COAST GUARD. NO ANSWER

11/20/21 20:01:33 | 3209 ADV 4 STRUCTURES FULLY INVOLVED

11/20/21 20:02:22 | COAST GUARD ADVISED

11/20/21 20:02:30 | 3209 ADV WILL NEED MULTIPLE MUTUAL AID

11/20/21 20:03:20 | CALLING DUKE POWER...DIRECT

11/20/21 20:05:27 | IC ADV MEDIC UNIT

11/20/21 20:06:08 | 3780 RESPONDING TO STATION

11/20/21 20:07:36 | ADV SUNNY POINT REQ 10-21 FROM IC....AST CH NEW 9104578219

11/20/21 20:07:51 | 173 AT COAST GUARD STATION

11/20/21 20:07:55 | ADV HAS VESSELS TO TRANSPORT IF NEEDED

11/20/21 20:08:04 | 374 10-23 COAST GUARD SATION

11/20/21 20:08:41 | BATT 5 CALLED SAID THEY HAVE AMPLE RESOURCES AND CAN SEND AN ENGINE TO COVER SOUTHPORT/OAK ISLAND OR GO TO THE SCENE ON BALD HEAD

11/20/21 20:09:26 | 3205 ADV OF PS TO CONTACT SUNNY POINT

11/20/21 20:10:37 | ANOTHER CALLER FROM 910-880-9996 STATING THERE IS A MASSIVE FIRE ON BALD HEAD....ADV'D RESOURCES WERE BEING DISPATCHED

11/20/21 20:10:40 | 3205 ADV 10-4 TO SEND LELAND

11/20/21 20:10:42 | RECD ADDITIONAL FROM 910-465-2652...ADV REPORTED

11/20/21 20:10:46 | BC5 DIRECT

11/20/21 20:11:09 | 301 ADV THEY ARE MONITORING CHANNEL ..HAVE ADDT UNIT AVAILABLE ..

11/20/21 20:11:37 | 3208 ADV BY 10-21 MADE CONTACT WITH FERRY ADV ARE AVAILABLE IF NEEDED....ADV UNITS CURRENTLY STAGING AT COAST GUARD STATION\

11/20/21 20:12:39 | 3200 REQ ADDT ALL CALL PAGE ALL FULL TIME AND PART TIME MEMBERS

11/20/21 20:13:07 | JUSTIN DAVIS W/ ST4 ADV VIA PS THEY HAVE A CREW IF NEEDED TO ASSIST

11/20/21 20:13:17 | CLAYTON GASELL...9102641829 ADV SAME

11/20/21 20:13:18 | 602 W/ ST6 ADV HAVE A CREW ENR TO STATION IF NEEDED

11/20/21 20:14:03 | 3205 ADV ONLY 4 MEMBERS HAVE RADIOS ..WILL MAKE CONTACT BY 10-21

11/20/21 20:14:17 | 3205 REQ TO FIND OUT WHO WILL BE GOING TO FERRY...NEED TO SEE IF WE NEED TO HOLD FERRY

11/20/21 20:16:07 | 3208 REQ TO HAVE BSL RSPND TO DEEP POINT MARINA ..FERRY IS WAITING AT DEEP POINT ...

11/20/21 20:16:46 | 381C ENR TO DEEP POINT

11/20/21 20:17:20 | 381C ADV BC3 WILL BE MAINLAND COMMAND

11/20/21 20:17:37 | 401 DIRECT ...WILL BE 10-17 WITH CREW

11/20/21 20:17:59 | 3780 CONFIRMED THEY WILL BE RESPONDING TO ST3 ...GO DIRECT WITH BC3

11/20/21 20:18:29 | CALLER JOHN ADV...FLAMES HEADED TOWARDS GOLF COURSE....FAIR WAY #7 NEAR DOITCHER TRAIL...

11/20/21 20:19:32 | IC ADV FIRE SPREADING TO GOLF COPURSE ..RESPOND TO GOLF COURSE

11/20/21 20:19:48 | 3205 ADV SHALLOTTE CREW 10-12 ...HAVE THEM RESPOND

11/20/21 20:19:57 | RECD ADDITIONAL FROM 703-932-8564

11/20/21 20:20:09 | FEMALE CALLER ADV...FIRE ON ISLAND

11/20/21 20:20:11 | ST15 DIRECT

11/20/21 20:20:25 | 602 HAS FULL CREW 10-12 AT STATION

11/20/21 20:21:53 | 173 371 10-17 TO ISLAND

11/20/21 20:22:55 | 692 10-17

11/20/21 20:23:30 | RECD ADDITIONAL FROM 919-889-8006



11/20/21 20:23:38 | 3205 ADV ALL UNITS RESPOND TO DEEP POINT MARINA  
11/20/21 20:25:13 | 3205 MARK PAR OF 9 ON FIRE TACH  
11/20/21 20:29:46 | 4701 ADV CREW AVAILABLE ...RQ TO BE PAGED OUT AND  
PLACED ON CALL  
11/20/21 20:30:32 | 301 ADV 3205 ON FERRY NOW HEADED TO BHI  
11/20/21 20:31:39 | IC REQ ETA ON UNIT ...WENT DIRECT ON 301  
11/20/21 20:31:51 | 383 PAR4  
11/20/21 20:32:29 | 173 ADV ALL CREW ON COAST GUARD BOAT ...3 MIN TO  
DEPARTURE  
11/20/21 20:33:01 | 3205 10-23 DEEP POINT MARINA  
11/20/21 20:33:42 | MP31 10-17...MARINE 1 WILL BE AVAILABLE TO SHUTTLE BACK  
AND FORTH...BHI FIRE CHIEF IS GOING ON MARINE 1  
11/20/21 20:33:56 | STATE MARINE PATROL ADV THEY ARE ABLE TO ASSIST W/  
TRANSPORTATION TO BALD HEAD ... ADV STATE MARINE PATROL TO GO DIR W/  
BC3  
11/20/21 20:35:24 | IC IS ADVISING 4 STRUCTURES INVOLVED WATER ON 3  
EXPOSUIRES PRIMARY SEARCH DONE ON ONE ADDT BLDG  
11/20/21 20:36:06 | 3205 REQ MARINE PATROL COME TO DEEP POINT  
11/20/21 20:37:34 | 3200 REQ 10-21 FROM M100 ... 910-499-5455  
11/20/21 20:37:37 | M100 DIR  
11/20/21 20:37:55 | MARINE PATROL UPDATED BY 10-21  
11/20/21 20:39:12 | 3221 ON BOARD 1581 10-17 TO DEEP POINT PAR 4  
11/20/21 20:40:34 | BHI IC ADV FIRE SPREADING TO WOODS AND ADJ  
NEIGHBORHOOD  
11/20/21 20:41:03 | 3208 ADV 3209 ADV IN CONTACT WITH BARGE CAPT  
11/20/21 20:42:35 | BHI IC STAYING ON FIRE CHANNEL TO GO DIRECT WITH CCOM  
11/20/21 20:43:43 | MP31 ADV TO SWITCH TO FIRE CHANNEL...ADV HE IS GOING TO  
ST JAMES MARINA  
11/20/21 20:44:51 | PETTY OFFICER GIAN ADV VIA PS ADV THEY ARE CLEAR FROM  
1ST TRANSPORT ADV HE WILL HEAD TO DEEP POINT MARINA TO HELP  
TRANSPORT UNITS  
11/20/21 20:45:22 | ADV 11 FIREFIGHTERS AND EMS WERE ON BOARD 1ST  
TRANSPORT  
11/20/21 20:47:25 | 670 10-23 DEEP POINT  
11/20/21 20:49:35 | 114 N BALD HEAD WYND... SARAH CARLSON...  
9194133477...CALLER ADV CAN SEE FIRE VIA HER SECURITY CAMERAS  
11/20/21 20:49:58 | BC5 REQ TAC CHANNEL TO GO DIRECT WITH BC3...TAC6 ASSGN  
11/20/21 20:51:31 | 683 10-23 DEEP POINT  
11/20/21 20:51:43 | M100 ADV ES2 REQ TO CONTACT AIRLINK AND MAKE THEM  
AWARE OF STRUCTURE FIRE ON THE ISLAND... AIRLINK IS DIR  
11/20/21 20:52:31 | RECD ADDTL 910-520-2315 ADV HE IS NHCO FIREFIGHTER REQ TO  
KNOW IF THE CHAPEL WAS ON FIRE ... ADV CALLER UNABLE TO ADV  
11/20/21 20:52:36 | BC5 RELEASE TAC6

11/20/21 20:55:12 | 1301 ADV HAVE CREW FOR ADDITIONAL MAN POWER IF NEEDED

11/20/21 21:01:14 | 1581 AT DEEP POINT MARINA

11/20/21 21:02:45 | IC ADV ALL CIVILIAN'S ACCOUNTED FOR AS FAR AS WE CAN TELL IN THE INVOLVED UNITS AT 2102

11/20/21 21:08:03 | 3592 10-23 DEEP POINT MARINA

11/20/21 21:11:12 | 3592 10-17 TO FIRE

11/20/21 21:13:09 | BC3 REQ ST18 REF TANKER GO TO FERRY TO BHI

11/20/21 21:14:58 | 33714 DEEP POINT MARINA

11/20/21 21:15:03 | 1803 10-17 ASTATION

11/20/21 21:16:45 | 3200 REQUESTING TO HAVE SOMEONE FROM AIRLINK CALL HER

11/20/21 21:16:58 | ST18 ACK PAGE

11/20/21 21:18:21 | MADE CONTACT WITH AIRLINK AND ADV'D.....DAVID BROWN WILL BE CONTACTING 3200

11/20/21 21:19:29 | 3205 AT DEEP POINT MARINA WILL BE ASSISTING WITH COORDINATING UNITS AT DEEP POINT

11/20/21 21:22:47 | 3205 GO TO LAST ENTRANCE FOR DEEP POINT WHICH WILL TAKE THEM TO BARGE

11/20/21 21:26:46 | OAK ISLAND 100 ADV HAS DRONE IF NEEDED REQ TO ADV IC

11/20/21 21:27:30 | 3205 ADV ANY OTHER UNIT RESPONDING TO CALL ..GO TO TICKET BOOTH TO GET ON FERRY ...LOADING FERRY AT THIS TIME TO HEAD FOR ISLAND

11/20/21 21:27:54 | MP31 AND VOICE 35 AS MARINE1...REQ TO KNOW IF THEY NEED TO PICKUP FROM DEEP POINT

11/20/21 21:29:28 | 3205 WILL ADV IF DRONE NEEDED

11/20/21 21:31:08 | 3205 REQ ETA ON TANKERS ..ST18 PASSING ST JAMES ...3565 JABBERTOWN RD

11/20/21 21:35:49 | 3575 DEEP POINT MARINA

11/20/21 21:36:04 | 778 10-23 DEEP POINT

11/20/21 21:37:49 | 3205 ADV FERRY WILL BE COMING BACK SHORTLY ...MARINE 1 GOING TO FUEL DOCKS AND MARINE PATROL WILL BE SHUTTLEING BACK AND FORTH

11/20/21 21:41:21 TOTAL LOSS ...

11/20/21 22:06:30 | 100 WITH OAK ISLAND CALLED TO SEE IF THE DRONE WAS NEEDED, ADV'D WOULD CONTACT IF THEY NEEDED THE DRONE, ALSO ADV THAT COAST GUARD STATED THEY COULD ASSIST WITH ADDL UNITS IF NEEDED, ADV'D 100, WE WERE IN TOUCH WITH COAST GUARD ALREADY

11/20/21 22:08:16 | 5371 10-23 DEEP POINT MARINA

11/20/21 22:10:18 | 3205 10-23 FIRE

11/20/21 22:14:26 | MARINE1 10-23 AT DEEPPPOINT

11/20/21 22:32:10 | PETTY OFFICER GUILLEN W/ COAST GUARD REQ SOMEONE MAKE 10-21 CONTACT W/ HIM REF FURTHER TX TO THE ISLAND ...ADV HE IS STANDING BY DEEP POINT MARINA

11/20/21 22:33:20 | 3205 ADV REF CALLING CENTER TO GO DIRECT WITH COAST GUARD  
11/20/21 22:36:14 | PAGED 3205 WITH PS FOR COAST GUARD  
11/20/21 22:46:51 | 5371 GOING TO ST3 FOR 10-12  
11/21/21 00:04:20 | ST4 UNITS LEAVING SCENE ON FERRY ENROUTE BACK TO DEEP POINT  
11/21/21 00:07:02 | BHI IC IS RELEASING SHALLOTTE LELAND SUNNY POINT ...REQ TO HAVE FM4 CONTACT 3200 ON CELL PHONE  
11/21/21 00:10:28 | FM4 ADVISED  
11/21/21 00:18:02 | FM4 UNABLE TO MAKE CONTACT WITH ANYONE AT PS NUMBER PROVIDED FOR 3200 910-499-5455....CAD SHOWING DIFFERENT NUMBER FOR 3200...ATT TO MAKE CONTACT WITH BHI IC TO CONFIRM CORRECT PS AND UNABLE TO GET ANYONE ON RADIO ...ADV FM4 OF PS NUMBER FOR 3205 TO GO DIRECT  
11/21/21 00:31:38 | 5171 RELEASED BY COMMAND  
11/21/21 00:31:47 | 672 RELEASED BY COMMAND  
11/21/21 00:32:09 | 374 371 10-8  
11/21/21 00:33:25 | ST4 10-8  
11/21/21 02:02:16 | 672 10-8  
11/21/21 02:55:20 | BHI ADV COMMAND TX TO 3202  
11/21/21 04:08:04 | CORRECTION ON NOTES IN CAD...692 10-17 AT 2022 HRS ..WILL BE 672 NOT 692  
11/21/21 04:09:25 | 672 10-23 TIME AT DEEP POINT 2046 HRS ..PLAYED BACK RECORDING TO LOCATE SAME  
11/21/21 05:52:52 | 3202 req page out baldhead fire...rekindle at the 17 lighthouse landing  
11/21/21 05:56:51 | SECOND PAGE FOR ST32  
11/21/21 21:13:01 | SPOKE TO 3219 @ 20:21 TO CONFIRM UNITS WERE STILL ON SCENE....3219 STATED SEVERAL UNITS WERE OUT WITH MORE HOT SPOTS THAT HAD REKINDLED.

## WEATHER

The weather reports below show the difference in recorded wind speed at the Brunswick County Airport and the Bald Head Island Conservancy. Crews operating on the incident scene reported fire conditions being wind-driven where embers were being blown across North Bald Head Wynd towards structures along the golf course.

KSUT - Brunswick County Airport	Date / Time	Temp. (F)	Dew Point (F)	RH (%)	Wind Chill	Wind Direction	Wind Speed (mph)	Visibility (miles)	Weather	Cloud Cover	Station Pressure (in)	Sea Level Pressure (mb)	Altimeter Setting (in)	Daily Max (F)	Daily Min (F)
	11/21/21 12:55 AM	47	41	80		NNE	5	10	None Present	CLR	30.32	1027.5	30.34	64	39
	11/21/21 12:35 AM	48	41	79		NNE	5	10	None Present	CLR	30.32	1027.5	30.34		
	11/21/21 12:15 AM	48	41	78		NNE	6	10	None Present	CLR	30.34	1028.1	30.36		
	11/20/21 11:55 PM	48	41	77		NNE	3	10	None Present	CLR	30.34	1028.1	30.36		
	11/20/21 11:35 PM	49	41	75		NNE	3	10	None Present	CLR	30.34	1028.1	30.36		
	11/20/21 11:15 PM	49	41	75		NNE	5	10	None Present	CLR	30.35	1028.5	30.37		
	11/20/21 10:55 PM	49	41	74		NNE	5	10	None Present	CLR	30.36	1028.8	30.38		
	11/20/21 10:35 PM	49	41	73		NNE	5	10	None Present	CLR	30.36	1028.8	30.38		
	11/20/21 10:15 PM	50	41	73		NNE	5	10	None Present	CLR	30.37	1029.1	30.39		
	11/20/21 9:55 PM	50	42	74		NNE	6	10	None Present	CLR	30.37	1029.1	30.39		
	11/20/21 9:35 PM	50	42	73		NNE	5	10	None Present	CLR	30.38	1029.5	30.4		
	11/20/21 9:15 PM	51	43	73		N	6	10	None Present	CLR	30.38	1029.5	30.4		
	11/20/21 8:55 PM	51	42	71		N	6	10	None Present	CLR	30.38	1029.5	30.4		
	11/20/21 8:35 PM	52	43	71		N	5	10	None Present	CLR	30.37	1029.1	30.39		
	11/20/21 8:15 PM	52	43	71		N	5	10	None Present	CLR	30.38	1029.5	30.4		
	11/20/21 7:55 PM	53	44	72		NNE	5	10	None Present	CLR	30.37	1029.1	30.39		
	11/20/21 7:35 PM	53	45	74		NNE	6	10	None Present	CLR	30.38	1029.5	30.4		
	11/20/21 7:15 PM	54	46	73		N	5	10	None Present	CLR	30.38	1029.5	30.4		
	Station	KSUT													
	Elevation	16 ft.													
	Lat/Lon	33.92921 / -78.07223													

The above weather data was obtained from National Weather Service (Wilmington, NC) Meteorologist Jordan Baker (2015 Gardner Drive, Wilmington, NC 28405 – (910) 762-4289) on November 22, 2021.

	Recent Conditions from BALD	
	Bald Head Island Conservancy	
	From the State Climate Office of North Carolina (climate.ncsu.edu)	
Date/Time (Eastern)	Top-of-the-Hour Wind Speed (10m)	Top-of-the-Hour Wind Gust (10m)
11/20/21 13:00	9.3	17.6
11/20/21 14:00	10	14.6
11/20/21 15:00	11.5	14.4
11/20/21 16:00	11.7	18.1
11/20/21 17:00	10.3	16.8
11/20/21 18:00	10.6	15
11/20/21 19:00	9.4	14.8
11/20/21 20:00	12	17.1
11/20/21 21:00	9.6	17.5
11/20/21 22:00	5.2	13.9
11/20/21 23:00	10.3	10.7
11/21/21 0:00	10.2	17.2
11/21/21 1:00	9.7	14.6
11/21/21 2:00	5	15.6
11/21/21 3:00	3.4	7.5
11/21/21 4:00	6	6.9
11/21/21 5:00	6.3	11.4
11/21/21 6:00	7.8	9
11/21/21 7:00	6.2	8.6
11/21/21 8:00	6.9	11.3
11/21/21 9:00	5.5	8.5
11/21/21 10:00	8.5	5.4
11/21/21 11:00	7.9	12.4
11/21/21 12:00	8.6	8.3
11/21/21 13:00	9.4	11.1
11/21/21 14:00	7.1	8.5
11/21/21 15:00	5.6	8.9
11/21/21 16:00	4.3	6.8
11/21/21 17:00	2.1	5.6
11/21/21 18:00	2.7	3.2
11/21/21 19:00	2.3	3.3
11/21/21 20:00	1.5	2.7
11/21/21 21:00	3.6	2.5
11/21/21 22:00	1	4.5
11/21/21 23:00	0.7	2.2

Data provided by BHI Department of Public Safety

## STRUCTURE(S)

Specific information regarding the structures involved in this fire incident were obtained from the Brunswick County Real Estate Search engine.

National Fire Academy (NFA) Fire Flow Calculation Method was used to determine estimated needed gallons per minute of water based on the incident commanders first reported percentage of fire involvement (percentages shown on aerial photo below).

In the 1980s, the National Fire Academy (NFA) developed a simple method of calculating fire flow at the scene of a fire. This method was intended to be used by fire fighters at an incident as a tool to aid in determining the amount of water necessary to fight the fire, the apparatus used to deliver the water, and the number of companies required for the incident. This formula was developed by the NFA through a study of a large number of working fires and a survey of fire officers throughout the country. The fire flow formula is given as:

$$\text{Fire Flow} = L * W / 3(\text{gpm})$$

where L is the length of the involved floor in feet and W is the width of the involved floor in feet. This formula can be expanded to include multiple floors by adding the fire flows for each floor. The NFA suggests that the formula is only reliable if four or fewer floors are involved. This formula can also account for a partially involved floor by multiplying by the percentage involvement of that floor. (National Fire Research Foundation, 2014)

**121 N. Bald Head Wynd Unit 17** is a residential structure with 1,816 heated square footage and 504 unheated square footage totaling 2,320 square feet. Approximate length – 32' x width – 36'. The taxable value is listed at \$518,770.

Fire Flow Requirement: 768 GPM

**121 N. Bald Head Wynd Unit 18** is a residential structure with 2,055 heated square footage and 320 unheated square footage totaling 2,381 square feet. Approximate length – 32' x width – 36'. The taxable value is listed at \$527,420.

Fire Flow Requirement: 768 GPM

**121 N. Bald Head Wynd Unit 19** is a residential structure with 2,055 heated square footage and 326 unheated square footage totaling 2,381 square feet. Approximate length – 32' x width – 36'. The taxable value is listed at \$474,890.

Fire Flow Requirement: 768 GPM





**117 N. Bald Head Wynd** is a residential structure with 2 buildings. The taxable value is listed at \$1,101,650. Building one has 2,256 heated square footage and 1,532 unheated square footage totaling 3,780 square feet. Approximate length – 53' x width – 42'.



Fire Flow Requirement: 1484 GPM

Building two has 320 heated square footage. Approximate length – 34' x width – 26'.

Fire Flow Requirement: 294 GPM



## FIRE BEHAVIOR

It is clear that this fire went from an incipient stage to fully developed stage that spread to exposures quickly. The fire went undetected in early stages due to the lack of occupants and no fire alarm systems to notify first responders. Weather conditions contributed to fire conflagration.



Photos provided by BHI Department of Public Safety

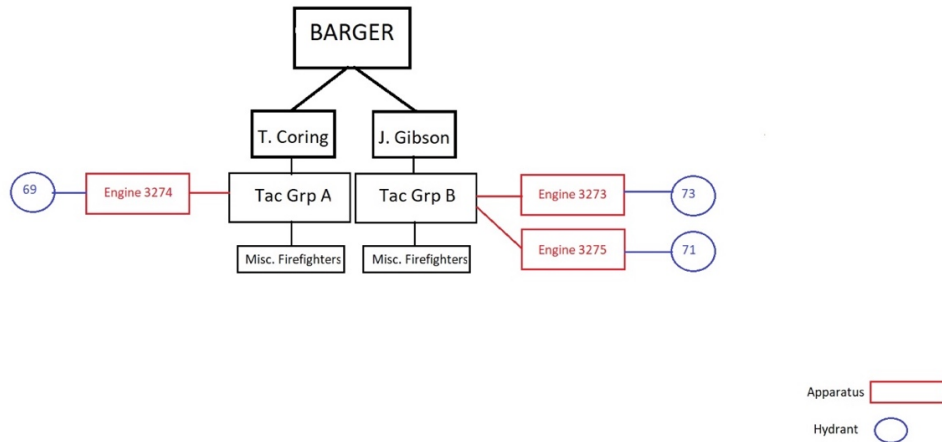
## OPERATIONS

The following narrative and incident hierarchy chart was provided by Bald Head Island Department of Public Safety Sergeant Barger.

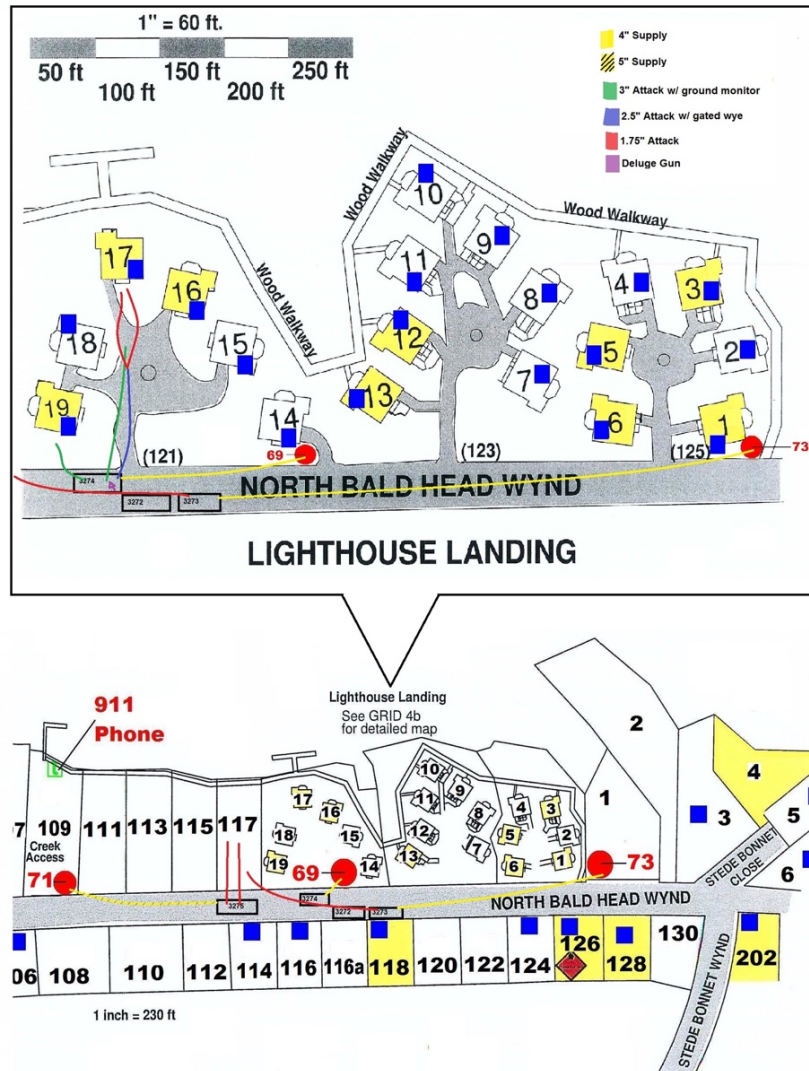
BHI Department of Public Safety was dispatched to 114 North Bald Head Wynd (NBHW) for multiple houses on fire. 3224 and 3209 arrived and found 4-6 structures on fire. 3209 established IC and was assigned Tac 1. IC requested all responding units to move to Tac 1 for assignments. Only 1 unit (Ladder 3272) moved to TAC 1. 117 NBHW, 18 Lighthouse Landing, and 19 Lighthouse Landing were all fully involved and 17 Lighthouse Landing was 10-20% involved. Engine 3274 arrived and positioned where shown on the preceding diagram and the 4in supply line was hand jacked to the nearest hydrant. The decision to deploy resources down Lighthouse Landing was made because wind driven fire was threatening structures in that direction. IC and 3224 deployed two 3in lines to establish two portable master stream devices; the first directed onto 17 Lighthouse Landing and the second directed onto 18 and 19 Lighthouse Landing. A 2.5in line was deployed with a gated wye and two 1.75 hand lines that were initially placed to reduce the spread of fire into 17 Lighthouse Landing. 3213 and a volunteer left the scene to turn on the emergency fire pump at utilities at the request of IC. Complications with the fire pump caused it to only be active for approximately 5 minutes before failure.

Lighthouse Landing units were grouped into FIRE ATTACK GROUP A and placed under Chief Coring. After a few moments IC reevaluated conditions and strategic objectives and both master streams on the 3in lines were deployed to the bulk of the fire at 18 and 19 Lighthouse landing and the hand lines were used as exposure control of 17 Lighthouse Landing. The deck gun on Engine 3274 was initially deployed towards #19 Lighthouse Landing but then repositioned for a vertical fog pattern to protect against wind driven embers threatening Engine 3274 and structures across NBHW. Crews were experiencing low pressure and volume from hydrant #69 so IC requested an additional hydrant be tapped by Engine 3273. A 1.75 hand line was deployed from Engine 3273 to the shared driveway of 115 and 117 NBHW for exposure protection until 3275 arrived. Once Engine 3275 arrived it tapped its own hydrant and two additional 1.75 hand lines were deployed for fire attack and exposure control. This created FIRE ATTACK GROUP B under Lt. Gibson (3205).

Crews continued to experience low water pressure and volume which was assumed to be due to inline hydrants so IC requested Engine 3275 to use tender water from mutual aid companies. Multiple attempts were made to facilitate an interior attack on 17 Lighthouse Landing but conditions were not improving and the structure became dangerous until the fires at 18 and 19 Lighthouse Landing were extinguished. Staging was established at Ladder 3272. Mutual aid units were deployed as needed from this location for a variety of roles. As assignments were completed firefighters were sent to rehab and returned to staging after being cleared.



The following diagram was completed by Bald Head Island Department of Public Safety to show involved structures, hydrant locations, apparatus placement, and hose placement.





## CONTRIBUTING FACTORS

### Fire Hydrants

Below is fire hydrant flow test data for the hydrants used during this incident. Three hydrants were used on the same line. Personnel reported a lack of water supply pressure and volume. Reported PSI prior to jockey pump activation was 57 PSI, after activated pressure rose to 67 PSI. Required fire flow was provided in a previous section.

**09/19/2021 Flow Test for Hydrant 69**

Flow Test Data
Files/Images

Start Date/Time 09/19/2021 11:16:52 Now

Tested By Homick, Paul M Me

Test Hydrant

Static Pressure	40 psi
Residual Pressure	5 psi
Desired Pressure	20 psi
Volume at Desired Pressure (Calculated)	679 gpm

Flow Hydrants

Downstream Hydrant	Port Diameter	Friction Coefficient	Pitot Pressure	Flow (Calculated)
	2.5 in.	0.9	30 psi	919 gpm

Add Another Flow Hydrant

Result ☒ Passed ☐ Failed

**09/19/2021 Flow Test for Hydrant 71**

Flow Test Data
Files/Images

Start Date/Time 09/19/2021 11:11:19 Now

Tested By Me

Test Hydrant

Static Pressure	55 psi
Residual Pressure	15 psi
Desired Pressure	20 psi
Volume at Desired Pressure (Calculated)	604 gpm

Flow Hydrants

Downstream Hydrant	Port Diameter	Friction Coefficient	Pitot Pressure	Flow (Calculated)
	2.5 in.	0.9	15 psi	650 gpm

Add Another Flow Hydrant

Result ☒ Passed ☐ Failed

**09/19/2021 Flow Test for Hydrant 73**

Flow Test Data    Files/Images

Start Date/Time 09/19/2021 11:18:39 Now

Tested By Homick, Paul M Me

Test Hydrant

Static Pressure	55 psi
Residual Pressure	5 psi
Desired Pressure	20 psi
Volume at Desired Pressure (Calculated)	536 gpm

Flow Hydrants

Downstream Hydrant	Port Diameter	Friction Coefficient	Pitot Pressure	Flow (Calculated)
	2.5 in.	0.9	15 psi	650 gpm

Add Another Flow Hydrant

Result ☒ Passed ☐ Failed

### Fire Hydrant Pressure Relief Valve

Used for controlling pressure during fire hydrant operation as well as to enable safe maintenance of a fire hydrant or associated hydrant system piping. One of these valves was on hydrant #73. Personnel admitted delayed operation of this hydrant due to lack of understanding that the hydrant needed to be closed before large diameter hose could be attached.



### Emergency Fire Pump Operations

The incident commander by all accounts followed the department guideline to activate the emergency fire pump. However, the emergency fire pump had mechanical issues and was ineffective. During the November 24, 2022 after action review, water utility personnel noted they were notified of the fire at 2037 hours and had an operator on the scene at 2200 hours.

- a. Bald Head Island Department of Public Safety has an emergency fire pump located at the Utilities Department. This pump can be activated during a structure fire requiring water flow rates greater than normally available. This pump, previously maintained and operated by Public Safety, will now be maintained by the Public Services/Utilities Department.
- b. The decision to activate this pump should be at the discretion of the Incident Commander. Prior to activating this pump a minimum quantity of hose lines should be flowing water, and a pressure need identified, to prevent damage to other structures from the increased water pressure. This minimum quantity should consist of one (1) master stream device and four (4) additional hose lines *in conjunction with* inadequate water pressure.
- c. The emergency fire pump should only be activated in the event the above listed lines are flowing water and/or there is insufficient water pressure to combat the fire. The Utilities Department shall be contacted as soon as possible to advise them of the situation. During after hours events the Utilities Department can be contacted by the after-hours numbers located in the Map Books.
- d. The Incident Commander should send personnel to stand by at the Utilities plant to be ready to activate the pump. Someone must be present at the pump, with radio or phone contact with the Incident Commander, to assist at the time the pump is activated.
- f. The Bald Head Island Department of Public Safety, 2017, p. 37)

## NEWS REPORTS



Village of Bald Head Island  
NORTH CAROLINA

HOME > ANNOUNCEMENTS > LIGHTHOUSE LANDING FIRE

### LIGHTHOUSE LANDING FIRE

NOVEMBER 21, 2021

At approximately 7:56 p.m. last night Bald Head Island Department of Public Safety was dispatched to respond to a structure fire in the vicinity of the Lighthouse Landing area of the island. A strong north wind caused the fire to quickly spread to adjacent structures and threaten the surrounding area. In total, there was a loss of three units in Lighthouse Landing and one home and crofter on North Bald Head Wynd. There were no casualties and no reported injuries.

<https://villagebhi.org/announcement/lighthouse-landing-fire/>

[News](#)
[US](#)
[Politics](#)
[World](#)
[COVID-19](#)
[Climate Change](#)
[Originals](#)
[Health](#)
[Sc](#)

## Bald Head Island fire: What we know about the fire and what happened so far

**Joyce Orlando, Wilmington StarNews**  
Mon, November 22, 2021, 12:50 PM · 2 min read

A massive fire that broke out on Bald Head Island on Saturday night brought fire departments from across Brunswick County to help battle the blaze.

According to a Facebook post from the Bald Head Island Department of Public Safety and several other social media posts Saturday night, it began at Lighthouse Landing and spread to multiple homes near Bald Head Island lighthouse. A strong wind caused the fire to spread quickly. While the flames could be seen across the skyline.

[https://news.yahoo.com/bald-head-island-fire-know-202557176.html?fr=sycsrp\\_catchall](https://news.yahoo.com/bald-head-island-fire-know-202557176.html?fr=sycsrp_catchall)



FREE ROOF  
INSPECTION

NEWS MORE NEWS WEATHER SPORTS COMMUNITY VIDEO TV SHOP ABOUT



Small Craft Advisory (Minor) - North Carolina:

## Investigation underway after fire destroyed multiple homes on Bald Head Island

November 21, 2021 by Celeste Smith



<https://www.wwaytv3.com/investigation-underway-after-fire-destroyed-multiple-homes-on-bald-head-island/>

WRAL.com

News Coronavirus Weather Sports Business Opinion Consum

Local State @NCCapitol Politifact Education Traffic Investigations WRAL Da

## Homes destroyed, firefighter hurt in Bald Head Island fire

Tags: Bald Head Island, fire

Posted November 20, 2021 11:19 p.m. EST

Updated November 22, 2021 7:45 a.m. EST



<https://www.wral.com/homes-destroyed-firefighter-hurt-in-bald-head-island-fire/19994082/>



By WECT Staff

Published: Nov. 20, 2021 at 9:30 PM UTC | Updated: Nov. 22, 2021 at 4:23 PM UTC

[https://www.wect.com/2021/11/21/crews-respond-massive-fire-bald-head-island/#:~:text=BALD%20HEAD%20ISLAND,%20N.C.%20\(WECT\)%20-%20Crews%20are,is%20advised%20to%20stay%20out%20of%20the%20area](https://www.wect.com/2021/11/21/crews-respond-massive-fire-bald-head-island/#:~:text=BALD%20HEAD%20ISLAND,%20N.C.%20(WECT)%20-%20Crews%20are,is%20advised%20to%20stay%20out%20of%20the%20area)

**TRIBE NOW**  
months. Save 98%.

**StarNews**  
ONLINE

**Sports Entertainment Port City Life Opinion USA TODAY Obituaries E-Edition Legals**

NEWS

## Photos, videos show devastation caused by the Bald Head Island fire

**Kim Luciani** Wilmington StarNews

Published 12:10 p.m. ET Nov. 22, 2021 | Updated 12:13 p.m. ET Nov. 22, 2021

[View Comments](#)



<https://www.starnewsonline.com/story/news/2021/11/22/bald-head-island-nc-fire-damage-pictures-video/8718962002/>

## RECOMMENDATIONS

### Perform Apparatus Inspection

Discussion: Given the age of apparatus, noted out-of-service generators, reported pump pressure governor issues, and unspecific comments about poor mechanical issues with the ladder; a thorough inspection by a certified fire apparatus mechanic should be performed. *NFPA 1911 Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles* is applicable to any public or private organization that uses fire apparatus. This standard helps ensure in-service fire apparatus are serviced and maintained to keep them in safe operating condition and ready for response at all times.

After inspection, an educated decision can be made regarding the need to place an apparatus out-of-service, repair, and/or initiate replacement.

### Perform Equipment Inventory and Operational Deployment Needs Assessment

Discussion: During the November 24, 2021 incident review and brief walkthrough of apparatus, several notable equipment issues were mentioned by personnel and observed by the consultant. An inventory review to identify aging, obsolete, needed, or inoperable equipment should take place as soon as possible. This can be completed by Bald Head Island Department of Public Safety (BHIDPS) personnel, which would lead to a prioritized list of needs the administration staff can seek funding for immediately and/or in future capital equipment replacement planning to improve operational efficiency and effectiveness. Some equipment needs already identified, but not limited to include:

- Standardization of large diameter hose (LDH) size. Some apparatus has 4" LDH and others have 5" LDH.
- Ground monitors should be in good working order and pre-connected if possible on all apparatus to maximize a rapid deployment of 500 gallons per minute (GPM).
- The 1 3/4" handlines are older double jacketed hose. Due to the limited personnel on the island, new fire hose with lower friction loss values would reduce pump pressures and allow for quicker deployment and maneuverability.
- Nozzles are older models that can be replaced with higher GPM / lower pounds per square inch (PSI) options. Smoothbore nozzles for select handlines should also be considered. In combination with previously noted handline considerations, replacement nozzles would reduce pump pressures, increase GPMs on the fire, and allow for quicker deployment and maneuverability.
- Lighting on the scene of the incident was a noted problem because of out-of-service generators and extension cord pigtail incompatibility. Consider generator repairs, ensure extension cords and adaptors are compatible, and portable battery powered lights.
- Chainsaws and rotary saws should be in good working order on each apparatus or replaced.

### Perform Assessment of Water Utilities



Discussion: Notable water supply issues were identified during the November 24, 2021 incident review and in this after action analysis. The water utilities personnel acknowledge a forthcoming review of jockey pump and fire pump mechanical condition. Policy should ensure early notification to water utility personnel during any fire event so they can support operations. BHIDPS should educate personnel on installed pressure reducing valves on select fire hydrants to ensure immediate operations if needed.

### **Advance Community Risk Reduction Practices**

Discussion: One priority of the U.S. Fire Administration is to reduce the risk of fire in communities. An area of responsibility related to community risk reduction should be assigned to a member of the BHIDPS. Further education to help facilitate and analyze community needs can be obtained at the National Fire Academy. Community risk reduction topics to educate the community on include:

- The need for working smoke alarms in all residences.
- The need for monitored fire alarms especially for residences without routine occupancy.
- Work in conjunction with the NC Forestry Service to develop community protection plans to prevent wildfires and mitigate fire hazards that threaten communities.  
[https://www.ncforestsERVICE.gov/fire\\_control/fc\\_wui.htm](https://www.ncforestsERVICE.gov/fire_control/fc_wui.htm)
- The need to ensure clear access and visibility of fire hydrants.

### **Effect Change to Implement Resource Alarm Assignments**

Discussion: After review of this incident, there are a great number of communication, deployment, and response issues that include:

- Self-dispatching. This should not occur and can be fixed with county-wide run cards and alarm assignments.
- The incident commander does not have time to make phone calls or coordinate response of numerous random units.
- The US Coast Guard, Brunswick County Marine Unit, Bald Head Island Ferry and Barge resources should be activated to pre-planned transportation departure locations upon notification of a working fire requiring resources from the mainland.
- Considerable delay (as noted in the timeline) in mutual aid agencies being transported to the island.
- Pre-planned staging locations on the mainland should be established.
- A chief officer or emergency services representative should be assigned as the staging officer on the mainland to coordinate resources the BHIDPS incident commander requests.

### **Review and Develop Standard Operating Procedures**

Discussion: The department should define fireground strategy and tactics for an occupancy that is based upon the organization's standard operating procedures. Incident commanders should base strategy and tactics on the community risk assessment, building occupancy, pre-incident planning, staffing, and available resources.

The BHIDPS policies included in this analysis related to mutual aid requests and the emergency fire pump operations may be outdated and need to be revised.

All operational policies should be reviewed and amended to industry standards with consideration given to local variables including, but not limited to: apparatus, equipment, training, and staffing.

### **Conduct Incident Command System Training**

Discussion: Communication issues are in the “NIOSH 5” that are routinely noted in firefighter line of duty death reports. Fortunately, in this incident no civilian or firefighter deaths occurred, however, notable communication issues were noted that include, but not limited to:

- Delayed establishment of a stationary command post to coincide with personnel accountability.
- Missed radio traffic by multiple units that were not monitoring the tactical channel.
- The incident commander must have 2 radios to monitor the fire channel and coordinate operations on the tactical channel.
- All fireground personnel should have portable radios to communicate emergent, urgent, and tactical messages.

An incident command training program such as the “Blue Card” ([https://bshifter.com/about\\_01.aspx](https://bshifter.com/about_01.aspx)) training program would provide all members of the BHIDPS with beneficial incident management knowledge.

### **Increase Hands-On Firefighter Training**

Discussion: Training has the biggest effect on organizational moral and fireground operations. The department training officer should provide training topics to each shift via calendar to be completed daily. Consideration should be given to prioritized topics based on department weaknesses and predicted operational scenarios identified by department personnel.

It is understood that personnel have three disciplines (fire, emergency medical services, and law enforcement) of training to complete routinely. “If it is important to you, you will find a way. If not, you will find an excuse” personal communication with JD Vasbinder, Lieutenant (Ret.) Columbus (OH) Division of Fire.

### **Develop Volunteer and Public Safety Auxiliary Programs**

Discussion: Since no two departments are alike, there is no standard scale to measure and evaluate frequency and severity of risk. Some departments will have a greater or lesser degree of tolerance for risk than others (NIOSH, 2017, p. 24).

Scene security must be initiated as soon as possible to prevent unnecessary injury or death. Volunteer personnel should have personal protective equipment for tasks they are expected to perform, to exclude hot zone tasks if they are uncertified firefighters.



The BHIDPS should collaborate with the volunteers and public safety auxiliary to establish areas of responsibilities that maximize their capabilities, willingness, and love for community. Some areas to consider include, but are not limited to:

- Incident scene traffic control
- Transportation of mutual aid resources arriving at the ferry dock
- Rehab for operating personnel
- Incident scene lighting

## References

Carter, H. (2001). Post-operation critique. *Firehouse*.

National Fire Research Foundation. (2014). Evaluation of fire flow methodologies.

<https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics-and-reports/Emergency-responders/RFEvaluationofFireFlowMethodologies.ashx?la=en>

National Institute for Occupational Safety and Health. (2017). Career fire fighter dies and another is seriously burned fighting an arson fire at a commercial strip mall – Texas.

<https://www.cdc.gov/niosh/fire/pdfs/face201714.pdf>

Village of Bald Head Island Department of Public Safety. (2017). Standard Operating Guidelines and Procedures Manual.

Village of Bald Head Island. (2021). Public safety. <https://villagebhi.org/departments-services/public-safety/>