PRUDENCE ISLAND

COMMUNITY WILDFIRE PROTECTION PLAN

Narragansett Bay Research Reserve &
Rhode Island Division of Forest Environment,
Department of Environmental Management

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PRUDENCE ISLAND COMMUNITY WILDFIRE PROTECTON PLAN

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INTRODUCTION/EXECUTIVE SUMMARY

This plan is designed to provide Prudence Island managers and residents with information on wildfire mitigation and to aid in prioritizing areas for management across numerous property ownerships. The plan identifies wildland fire hazard areas on the island, assesses current wildland fire suppression capabilities, and summarizes methods for educating the public on how to reduce the threat of wildland fire to structures. In addition, this plan meets the federal criteria for Community Wildfire Protection Plans (CWPP) as outlined in the 2003 Healthy Forest and Recreation Act. The three criteria are as follows:

- The plan should be a product of collaboration between state, local, and federal agencies.
- The plan must identify and prioritize areas for hazardous fuel reduction treatments in addition to recommending methods of treatments that will protect at-risk communities and essential infrastructure.
- The plan must recommend measures that homeowners and communities can take to reduce structural ignitability.

COMMUNITY BACKGROUND

Prudence Island is located in the geographic center of Narragansett Bay. The island is approximately 3,565 acres (1443 hectares). According to the 2000 census, there are 88 year-round residents on the island. Prudence Island is part of the town of Portsmouth in Newport County, Rhode Island.

Approximately 8% of the land area of Prudence Island is developed, with 85% of the island protected from development. Conservation properties are either owned in fee by a land conservation agency or have development rights restricted through conservation easements. Much of the island is nature reserve administered through the Narragansett Bay National Estuarine Research Reserve (NBNERR), which was established to preserve, protect and restore coastal and estuarine ecosystems of Narragansett Bay through long-term research, education and training. NBNERR currently focuses efforts on terrestrial and submerged land on Prudence, Patience, Hope and Dyer islands.

Historically, the island was seasonally occupied by the ancestors of Narragansett and Wampanoag people. The Narragansett people named the island “Chibahwese” meaning “place of separation of the passage”. The name Prudence Island was adopted by Roger Williams following his acquisition. The island was jointly purchased by Roger Williams and Gov. Winthrop from the Narragansetts in 1637. All natives were forcibly removed from the island in 1676 following King Philip’s War (Arnold 1859). The island was settled by English immigrants in the mid- 17th century, and by the mid-18th century there were nearly 30 small farms on the island. The island was used primarily for farming until the late 19th century. By the 1930s there were only 3 working farms. Currently, there are about 475 homes on the island, with a strong seasonal shift in occupancy that is highest during the summer months.

Structures on Prudence Island are built primarily near the shoreline. The settled areas are concentrated on the eastern shore, with the exception of the Prudence Park community and a few other smaller neighborhoods located on the western shore of the island. Many structures are built in the Wildland Urban Interface (WUI). The National Wildfire Coordinating Group (NWCG) defines the WUI as “the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.”

The 2001 Federal Register divides the WUI into three categories:

Category 1 – Interface Community:
The interface community exists where structures directly abut wildland fuels. There is a clear line of demarcation between structures and wildland fuels and wildland fuels do not generally continue into the developed area.

Category 2 – Intermix Community:
The intermix community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area.

Category 3 – Occluded Community:
The occluded community generally exists in a situation, often within a city, where structures abut an island of wildland fuels (e.g., park or open space). There is a clear line of demarcation between structures and wildland fuels (USDA and USDI 2001).

Most of Prudence Island is a blend of Interface and Intermix Community types. Structures are generally clustered with a clear line between the developed and wildland areas. Between structures, however, there are often patches of wildland fuels such as tall grass or vine and shrub dominated areas. The best examples of Interface Community are Prudence Park and Warnerville, in which wildland fuels end where the manicured lawns of the neighborhood begin. The best examples of Intermix Community are the houses along Bay Avenue north of Prudence Park and along Pleasant Ave where houses are surrounded by forested and shrub dominated fuels. Examples of Occluded Community on the island could include structures near the lighthouse on the eastern shore where small patches of wildland fuel occur within the developed neighborhoods.

Development in the WUI can increase wildfire risk to structures. Fires that ignite in wildlands, such as the middle portion of the island, can burn into areas with structures, putting them at risk for ignition. High flame lengths and long-distance spotting could cause airborne firebrands to fall on and near structures. Fires started along the coastline could burn quickly through coastal grass and shrubland, spreading into residential areas. Also possible on Prudence Island is a structural fire spreading to wildland fuels which then carries the fire to other structures. Strategies to reduce fire hazard in WUI areas are found later in the plan.

WILDFIRE PROBLEM STATEMENT

The 3,565-acre island is mix of forests, shrublands, and open fields. The largest portion of the island (~75%) is forested with oak (*Quercus alba* and *Q. velutina*) and red maple (*Acer rubrum*). In the oak-maple forests, the understory is generally dominated by greenbrier (*Smilax* spp.) and other vines. Pitch pine forests are present on the island and could support high fire behavior, but the pitch pine areas are generally isolated from populated areas. Shrub fuels are abundant in the southwestern corner of the island and in the northern area. Both coastal shrublands and upland shrublands have a heavy greenbrier component with coastal areas containing primarily sumacs (*Rhus* spp.), bayberry (*Morella pensylvanica*) and stunted trees. Upland shrublands contain ericaceous shrubs and hardwood saplings with a heavy greenbrier component.

Under moderate weather conditions, fire behavior would be expected to be low in some areas and moderate to high in others. Under dry and windy conditions, however, the high resin content of greenbrier could escalate fire behavior, creating fire activity that would be difficult to contain. The limited capabilities for wildland fire suppression combined with the delayed response times for mutual aid, increase the wildland fire risk. The greatest wildland fire risk on the island would occur if an ignited structure were to ignite wildland fuels and ignite neighboring structures.

Changes to the forest composition and structure may be leading to increased fire potential on Prudence Island. Numerous years of drought combined with gypsy moth outbreaks has led to widespread oak mortality in the forested areas. The standing dead and downed woody debris increase fuel loading and could lead to more intense fire behavior and excessive smoke production. The large amount of coarse woody debris on the ground may create problems for fire suppression. Engines cannot drive over downed trees, and hose may be damaged if dragged through burned areas with still smoldering heavy fuels. The vegetative response to the increase in light availability in the understory could lead to expanded growth of waxy shrubs and vines causing an increase in potential fire behavior.

LAND USE HISTORY

Prudence Island has a long history of human use. Prior to European contact (c. 1640), the island was seasonally inhabited by the ancestors of the Narragansett and Wampanoag people. The island was mostly forested and subject to frequent disturbance by both natural and human causes (Foster and Motzkin, 2003). Hurricanes and other storms have periodically caused major blowdowns and forest disturbances. American Indians are believed to have frequently utilized fire to remove understory vegetation, creating what was described in early accounts as an open and park-like appearance (Adams, 1883 [Morton, 1632]). During European settlement, the forests were cleared for agriculture. Following the period of farm abandonment throughout the late 1800s and early 1900s, forest succession began, eventually developing into the forests found today.

Steamboat service to Prudence Island began in 1875 and a later ferry service began in 1904, facilitating the transition of the island to a summer cottage destination. Fishing and tourism formed the foundation of the economy on Prudence Island for most of the early 20th century. In 1942, 65 acres in the southeastern portion of the island was established as an ammunition storage site for the U.S. Navy. The facility was intermittently in use until being turned over to the state of Rhode Island in 1980. Conservation efforts have preserved or protected much of Prudence Island, with approximately 85 percent of the island under protected status.

WEATHER

Climate on Prudence island is considered humid subtropical type (Kottek 2006). As is the case for the state of Rhode Island, Prudence Island lies within the "prevailing westerlies", with the majority of winds blowing in an easterly direction. The frequent passing of low air masses brings frequent weather changes to the area. Generally, weather alternates roughly twice a week between fair and cloudy or stormy weather. There are often much longer periods between weather cycles, with no regular pattern existing (RIDEM). Oceanic influences affect weather in Prudence Island. During summer and early fall, hurricanes and tropical storms bring heavy winds and rains; similarly, in the winter, nor'easters bring severe weather which may cause blowdowns and flooding. When combined with high tides, some roadways on the island can be impassible. The following table (Table 1) is a summary of data collected at Quonset State Airport, in North Kingstown, RI, the nearest weather station with a long-term weather data set.

Table 1. Monthly weather data 1945-2017 KOQU (Quonset State Airport, North Kingstown, RI)

Month	Avg. High (°)	Avg. Low (°)	Avg. Mean Temp (°)	Avg. PM Relative Humidity (%)	Avg. Total Precipitation (in)	Avg. Wind Speeds (mph)
January	37	20	29	58	3.90	13
February	39	22	30	56	3.60	13
March	46	29	38	54	4.20	14
April	58	39	48	51	4.10	13
May	68	48	58	55	3.70	10
June	77	57	67	58	2.90	9
July	82	63	73	58	3.20	10
August	80	62	71	60	4.00	9
September	73	54	64	60	3.50	10
October	63	43	54	58	3.60	10
November	52	35	44	60	4.50	11
December	41	25	33	60	4.30	13

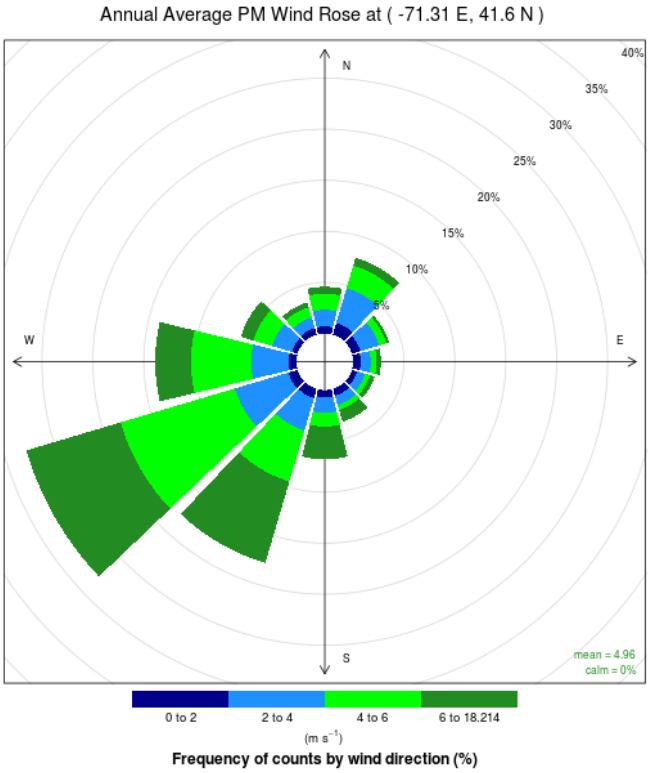

Figure 1: Wind rose of average afternoon wind speed and direction for Prudence Island (VCIS accessed 2018)

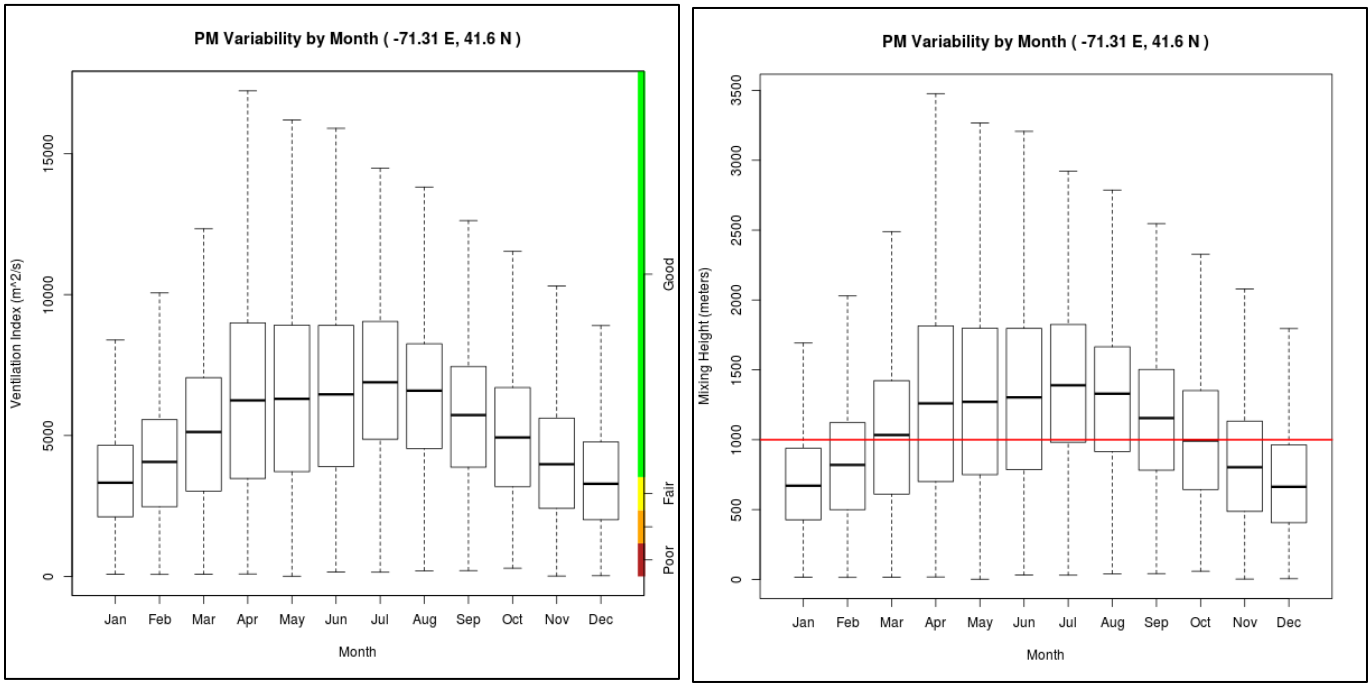

Figure 2 & 3: Afternoon ventilation rate and mixing height for Prudence Island (VCIS accessed 2018)

FUEL TYPES AND FIRE BEHAVIOR

FUEL TYPES

Prudence Island is primarily a forested landscape, but also contains a wide variety of vegetative communities. The vegetation was mapped by NBNERR based on 1997 aerial imagery and is portrayed in the following map (Figure 4).

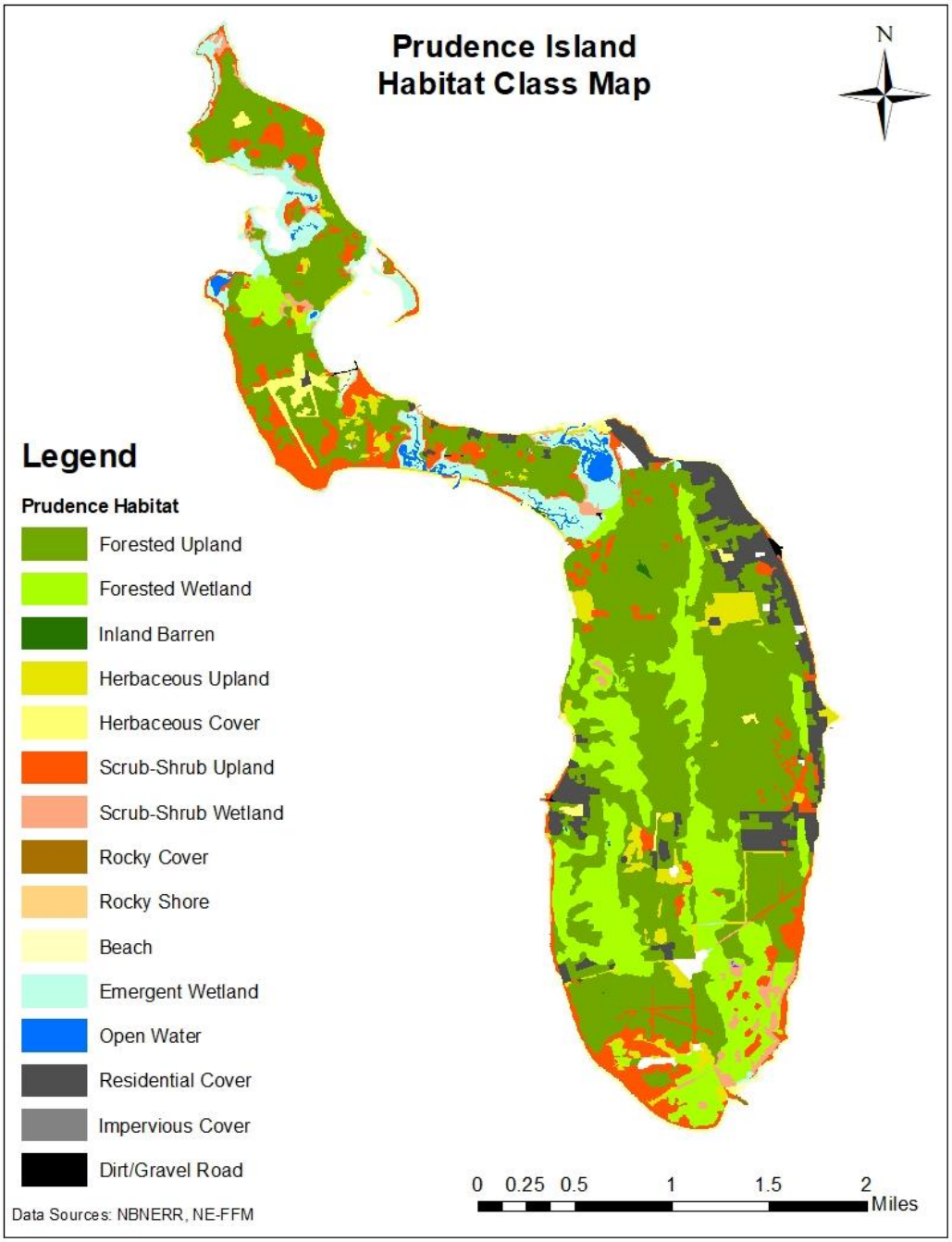

Figure 4: Vegetative Communities of Prudence Island

Deciduous forests dominate the island. Tree oaks and maples constitute the majority of the overstory. Uplands contain more oak, and wetlands more maple. The understory is, for the most part, dominated by greenbrier (*Smilax* spp.) and other vines. Pockets of pitch pine forest/woodland are scattered throughout the island. The largest areas of pitch pine forest are nearly 100% pitch pine overstory with little herbaceous or shrub layer to carry fire. Edges of the pitch pine forests can contain tightly spaced pitch pine saplings. Along the shorelines, grasses are a primary fuel, mixing with shrubs in many areas. In tidally influenced areas, vegetation is dominated by marsh grasses such as smooth cordgrass (*Spartina alterniflora*) and may be bounded in scattered areas by taller species such as common reed (*Phragmites australis*). Some culturally maintained grasslands, such as the Baker Farm and the North End Airstrip, as well as other managed grassland areas contain warm season grasses such as little bluestem (*Schizachyrium scoparium*) and switchgrass (*Panicum virgatum*) which could support fast moving fire. Many roadsides are maintained wide as fire breaks and contain switchgrass and other perennial bunch grasses. The former Navy property, now managed by NBNERR, in the south of the island, has been more intensively managed than most other portions of the island. Because of past land use, prescribed fire history, and mechanical treatments, it has a significant component of early successional forest.

The vegetation data were classified into fuel models using the Scott & Burgan's (2005) 40 wildland fuel models (Figure 5). The fuel models characterize the composition, structure and depth of the fuel bed, and are used in fire behavior prediction software to predict flame lengths, rates or spread, crown fire potential and other characteristics of wildland fire. Fuel models were chosen that most closely represent the current vegetation (Table 2). Shrub models were used in the forested areas because under high fire conditions, greenbrier and other vines are expected to the primary carrier of fire.

Table 2: Fuel Model by Vegetation Type

Fuel Model	Vegetation Type
NB1 – Non-burnable, urban developed	Developed
NB3 – Agriculture	Managed turf
NB9 – Bare Ground	Beach
NB8 – Open Water	Creeks, Ponds, Pools, etc.
GR3 – Low Load, Very Coarse, Humid Climate Grass (Dynamic)	Smooth cordgrass marsh, switchgrass grassland, mixed grassland, herbaceous old field
GR9 – Very High Load, Humid Climate Grass (Dynamic)	Common reed marsh, cattail marsh
GS3 – Moderate Load, Humid Climate Grass-Shrub (Dynamic)	Coastal dune grassland, coastal dune shrubland, Switchgrass grassland with shrubs
SH6 – Low Load, Humid Climate Shrub	Scrub-shrub upland/wetland, forested wetland
SH8 – High Load Humid Climate Shrub	Forested uplands
SH9 – Very High Load Humid Climate Shrub	Pitch pine saplings
TL5 – High Load Conifer Litter	Pitch pine forest/woodland

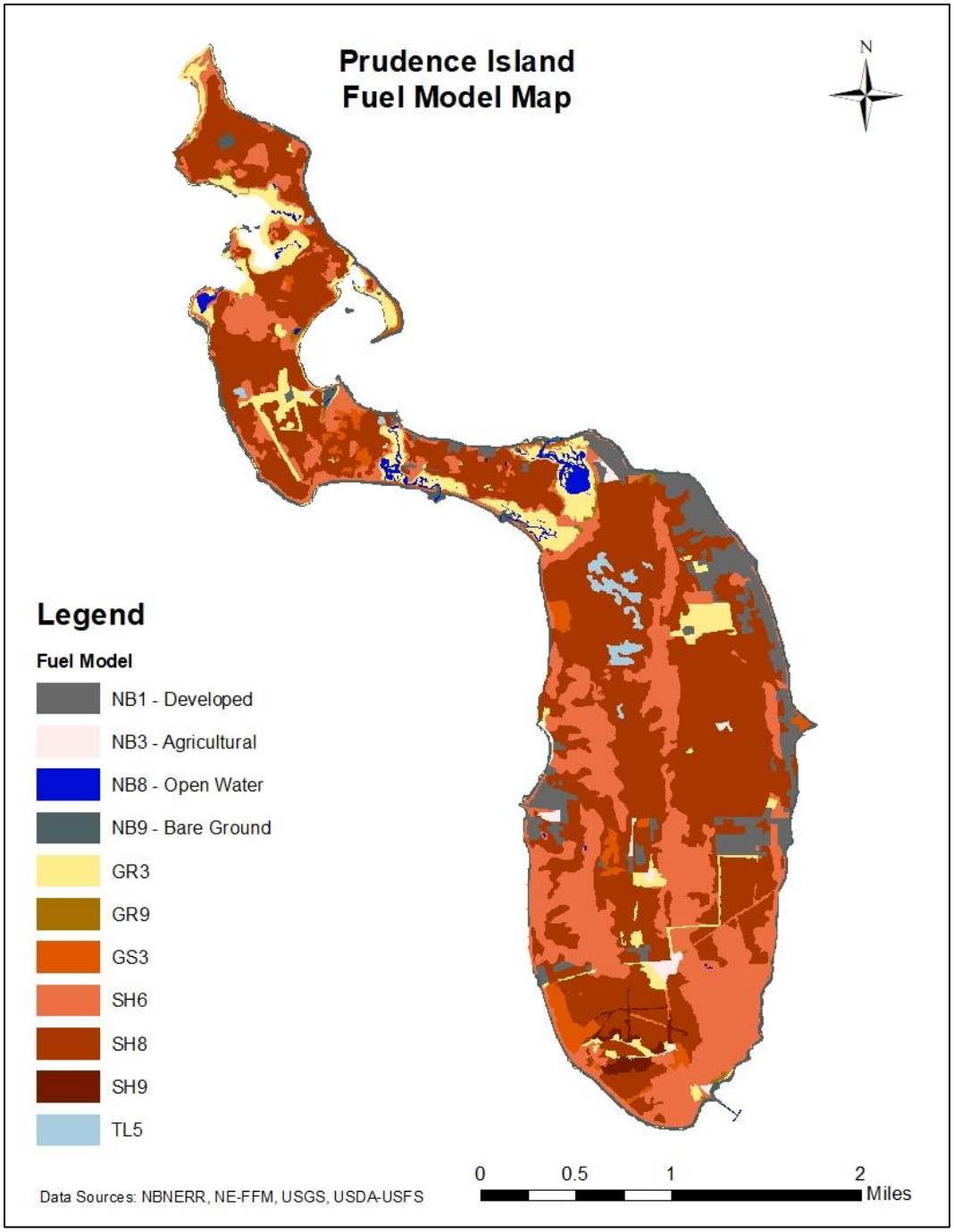

Figure 5: Fuel Model Map of Prudence Island

FIRE BEHAVIOR MODELING

Fire behavior was modeled to identify areas of potential for high wildfire risk. Areas of high fire risk may be prioritized for fuel treatments in order to reduce fire behavior near residences.

Vegetative and topographic characteristics including canopy cover, canopy bulk density, canopy height and canopy base height, elevation, aspect and slope were acquired from LANDFIRE, a federal online fire and resource management tool. LANDFIRE data were combined with the fuel model classifications and weather inputs using FlamMap, a fire modeling system, to estimate potential flame lengths, rates of spread and crown fire potential under worst-case conditions. Some outputs were edited to compensate for errors in the LANDFIRE data set.

The weather data used were based on conditions reported during the 1957 Plymouth wildfire, a mid-late spring fire, the time when most local wildland fires occur. The 1957 fire is one of the larger wildfires in southern New England having burned 15,000 acres in southeastern Massachusetts. Fuel moistures were modeled as higher for wetland forests to reflect increased moisture availability and shading.

Table 3: Fire behavior modeling design parameters

Design Variable	**Design Condition**	
20' wind speed:	25 mph	
Class	Uplands	Wetland Forests
1-hour fuel moisture:	5%	8%
10-hour fuel moisture:	8%	12%
100-hour fuel moisture:	12%	50%
Live herbaceous fuel moisture:	30%	300%
Live woody fuel moisture:	30%	300%
Foliar fuel moisture:	100%	100%

The maps displayed in figures 8, 9 , 10 show FlamMap outputs for maximum rates of spread, maximum flame lengths, and crown fire potential under the worst-case weather scenario. Rate of spread is the activity of a fire extending in horizontal dimensions. It is measured in chains per hour (1 chain = 66 feet). Flame length (Figure 6) is defined as the distance between the flame tip and the midpoint of flame depth at the base of the flame (generally the ground surface). Generally, the flame length limit for direct attack of a wildfire for hand crews is four feet. When flames are greater than four feet, engines are needed to attack with water. When flame lengths are beyond eight feet, engines are generally not effective and indirect attack is recommended.

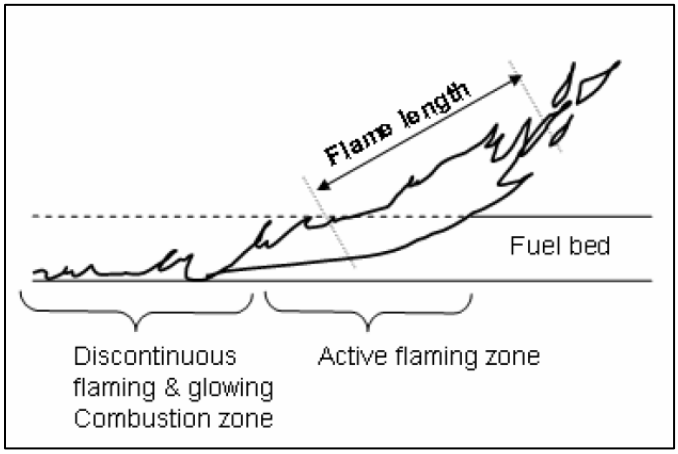

Figure 6: Flame length (from BehavePlus Fire Modeling System, Version 4.0: Variables).

Crown fire potential is classified into four categories: surface fire, passive or torching, active crown fire and independent crown fire (Figure 7). Surface fire does not spread into the crowns of the trees. Passive or torching climbs into single or small group of trees but does not carry through a canopy. Active crown fire moves through the tree tops at the same pace as fire moves through the understory. Independent crown fire burns through the canopy independent of ground fire. FlamMap is not capable of differentiating between active and independent crown fire potential.

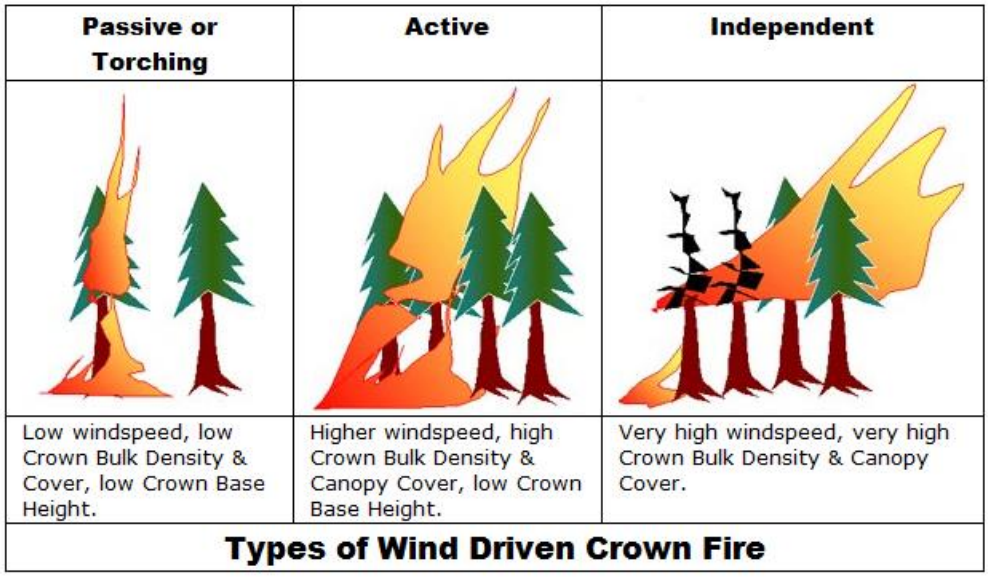

Figure 7: Three Types of Wind Driven Crown Fires (U.S. Forest Service 2011).

The outputs show that upland forests have the potential for relatively high rates of spread and flame lengths under severe fire conditions. Direct attack of fire in the upland forests may be unsafe and difficult because high flame lengths and tree torching. The vines and shrubs are so dense in areas that they would pose a risk of entrapment for firefighters attacking fire interior to the forest. Fire behavior would be dramatically reduced in the wetland forests because of increased fuel moistures. Attacking fire in the wetlands may be the best opportunity to suppress a large flaming front. High crown fire risk areas are generally somewhat distant from residences, however, under dry windy conditions embers from torching trees could easily travel the distance necessary to impact populated areas. Fuel treatments in upland areas near residential zones may decrease flame lengths, torching and rates of spread.

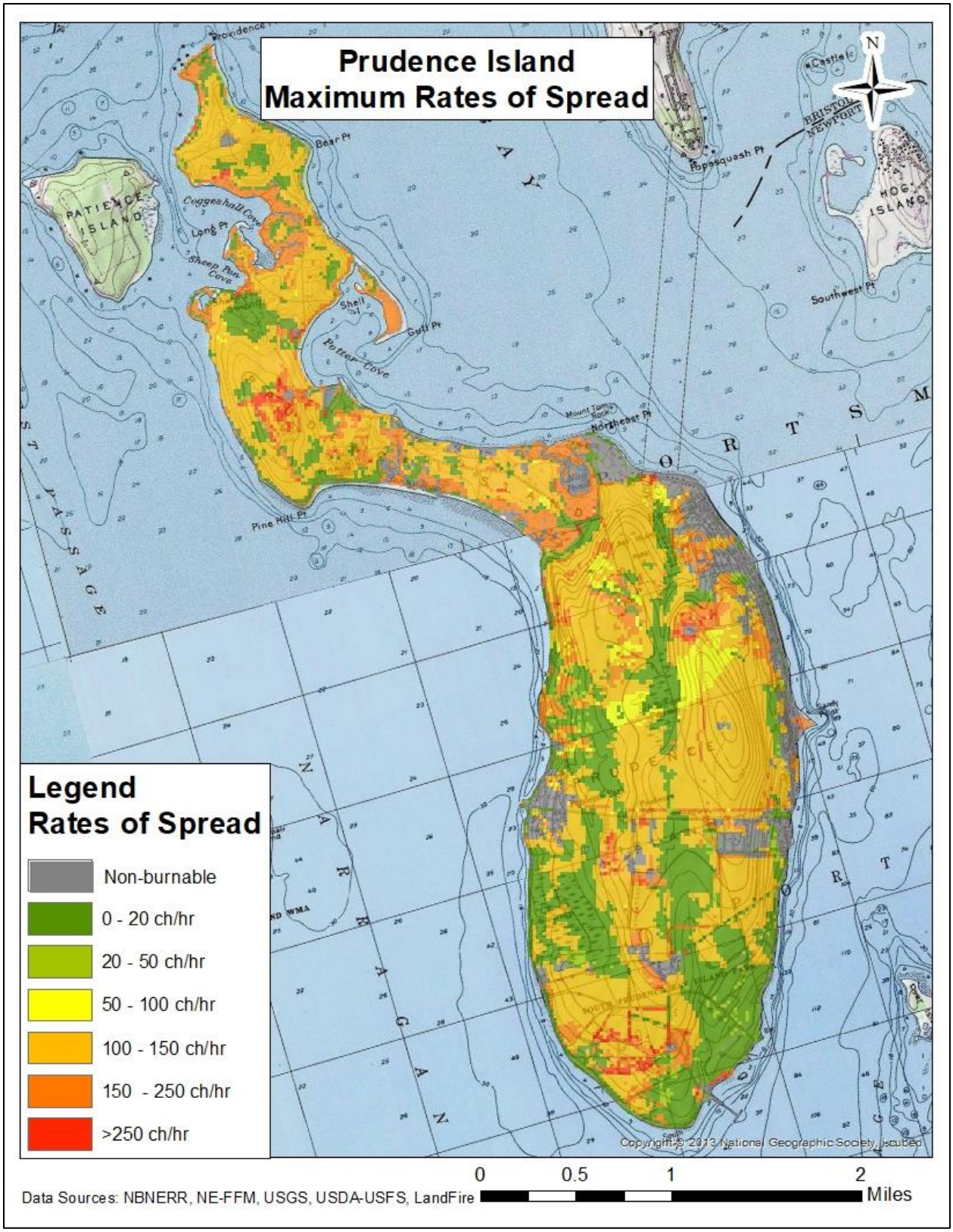

Figure 8: Rates of spread in chains (66 feet) per hour

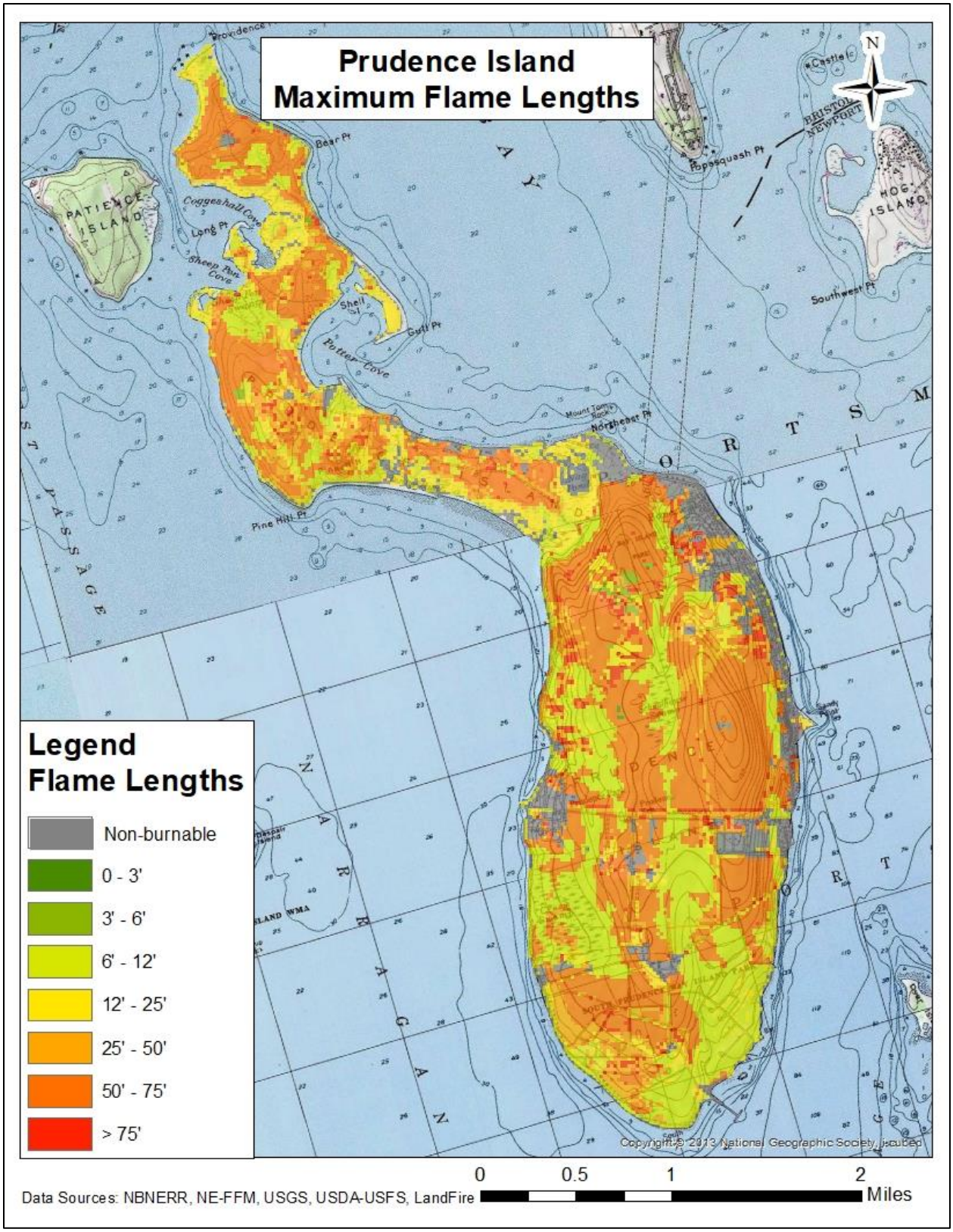

Figure 9: Maximum flame lengths in feet

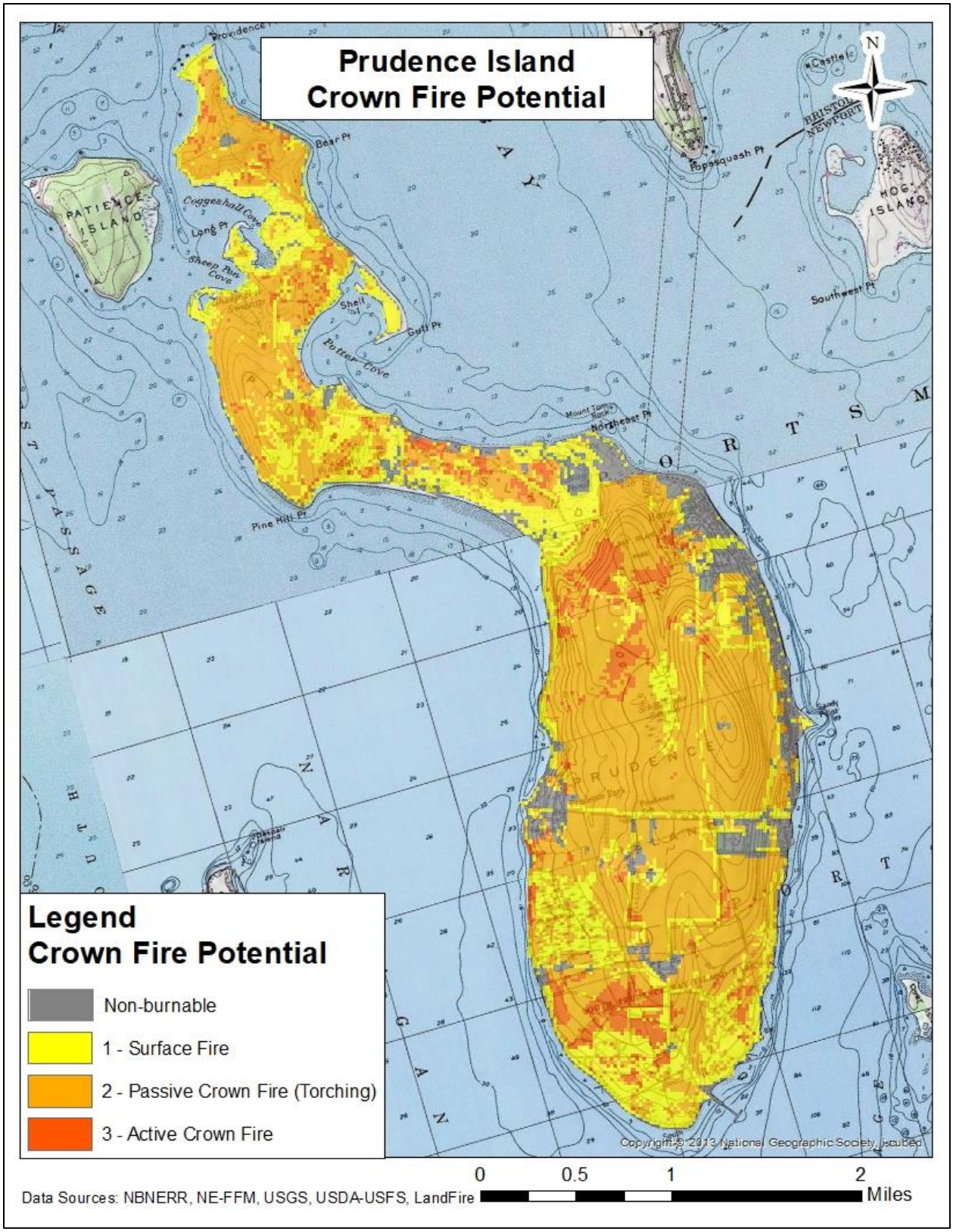

Figure 10: Crown fire potential by crown fire class

ANALYSIS

For planning purposes and to aid in further discussion of fuels, fire behavior, and specific treatments, Prudence Island has been divided into seven zones (Figure 11). Zones 2, 3 and 5 contain the majority of the WUI. Zones 1, 4, 6 and 7 are sparsely inhabited or uninhabited. Zone 1 (South End) is comprised of the former Navy property at the south end of the island. It contains the NBNERR headquarters and visitor center. Zone 2 (Prudence Park) contains the Prudence Park settlement and the majority of the structures on the western side of the island. It includes the residences along Mt. Pleasant Ave. and at Stevens Landing. Zone 3 (Eastern Shore) contains the largest number of structures. It includes Bristol Colony, Sandy Point and Homestead neighborhoods. Zone 4 (Central Forest) is made up primarily of the forested areas in the middle of the island. A few structures are located along Bay Ave. along the western shore. Zone 5 (Warnerville) is a small neighborhood north of Narragansett Ave. and west of Mill Creek. Zone 6 (The Neck) is located between Nag Pond and the northern gate on Neck Farm Rd. It contains residences along Neck Farm Rd., the North End Airstrip, Rossi Farm and a number of unoccupied buildings. Zone 7 (North End) is unoccupied shrublands and forests beyond the north gate.

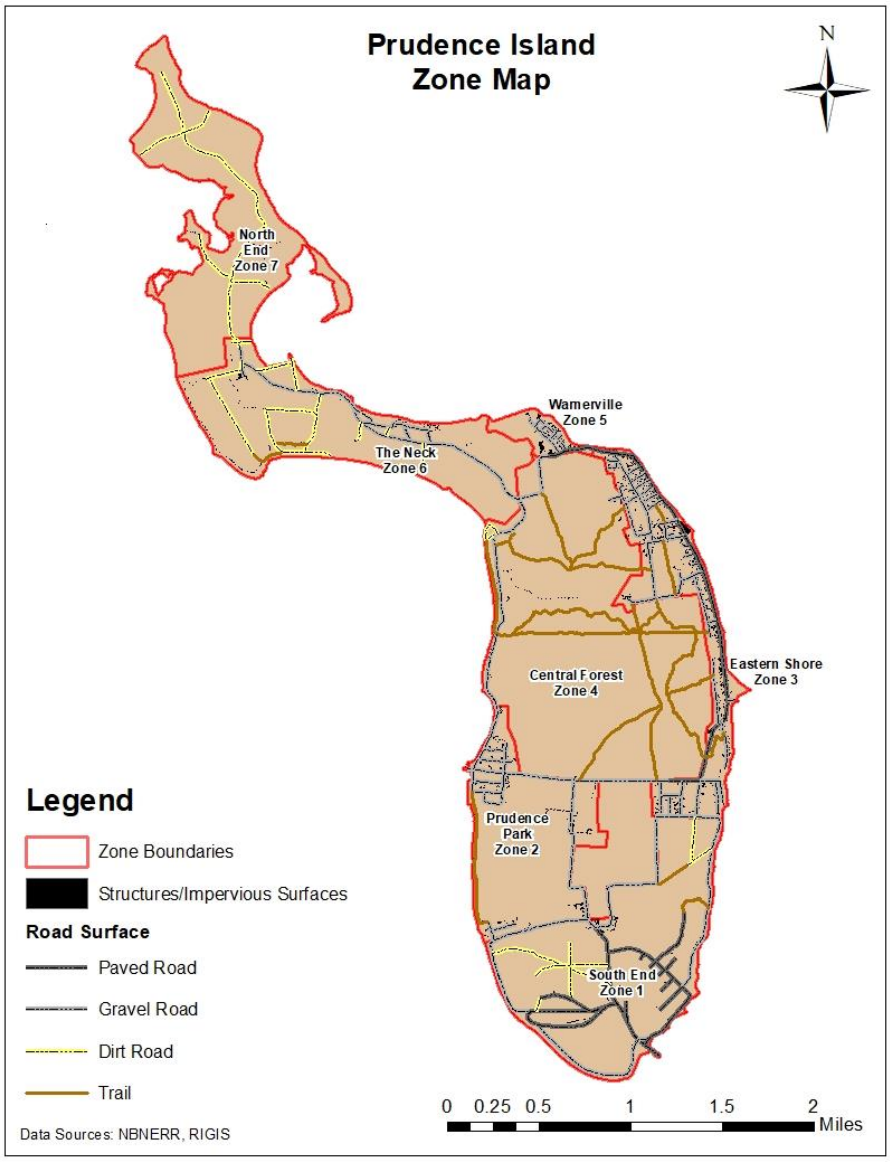

Figure 11: Prudence Island CWPP Zone Map

ZONE DESCRIPTIONS

Zone 1 – South End

Zone 1 is approximately 615 acres located in the southern end of the island. It contains the former U.S. Navy ammunition dump. The land was dramatically altered by construction and land use practices during the period of Naval use, and the traces of this past land use remains today. The property is now owned by the State of Rhode Island Department of Environmental Management and is managed by NBNERR. The zone contains a cluster of buildings that house the NBNERR headquarters and visitors center located in the northern-central portion of the zone near the intersection of Mt. Pleasant Ave., Albro Farm Rd, and South Reserve Dr.

The zone is crisscrossed with abandoned roads that now serve as trails and access to the preserved land. The trails and roads could be utilized by a brush fire engine. A number of abandoned ammunition storage bunkers are dotted across the zone. The southeast corner contains a wooden pier. Zone 1 currently contains no water supply, but a site near NBNERR offices has been proposed as a site for future cistern construction. The structures within the zone are within 10 minutes response time of the fire station. The nearest water source at this time is the cistern at the fire station. Refilling could take up to 45 minutes. Installation of a proposed cistern at the NBNERR offices would cut down refill time considerably.

Vegetation types within Zone 1 are highly varied. The western portion is primarily upland and the eastern portion is mostly wetland. Early successional habitat dominates the southwestern area. Later successional forests occupy most of the eastern wetlands. Closer to the northeast corner, upland forests abut the residences in the Bristol Colony neighborhood. Because of the diverse vegetation, Zone 1 contains numerous fuel models. The wetland forests and shrublands are modeled as SH6, low load humid climate shrub. The upland forests, containing a heavy greenbrier component, are modeled as SH8, high load humid climate shrub. Both shrub models support high flame lengths and high rates of spread. Juvenile pitch pine stands are modeled as SH9, very high load humid climate shrub which supports high rates of spread and very high flame lengths. Former larch plantations, now an open grass-shrub mix are GS3, moderate load humid climate grass-shrub. GS3 supports high rates of spread and moderate flame lengths. The grasslands near NBNERR offices, along roadsides and scattered throughout the zone are modeled as GR3, low load very coarse humid climate grass. GR3 supports high rates of spread and moderate flame lengths. A few patches of marsh grass containing Phragmites grow along the southeastern shore and are modeled as GR9, very high load humid climate grass. Flame lengths and rates of spread can be very high in Phragmites. The areas of highest potential fire behavior are in the interior of this preserved land, relatively far from residences. The areas of highest fire danger are in the northwest and northeast corners where upland forest with greenbrier understory abuts residential areas.

Vegetation within the zone is among the most heavily managed of the wildland areas. Mechanical treatments and prescribed fire have reduced crown fire potential and increased the prevalence of shrub and grass fuels. If management were to stop or be greatly diminished, reductions in fuel loading and potential fire behavior would likely be reversed. Pitch pine barrens would become densely packed pine forest with high crown fire potential. Shrublands and forests would undergo a transition to higher fuel loading with an increase in ladder fuels. If left untreated, the potential for crown fire would likely increase across the zone.

Zone 2 – Prudence Park

Zone 2 is 374 acres located in the western portion of the island. The zone contains an estimated 58 structures concentrated within three populated areas surrounded by large tracts of preserved lands. The largest number of residences is the Prudence Park settlement around the western end of Broadway. More structures are located along Mt. Pleasant Ave. in the middle of the island. A small neighborhood of eight structures is located on Stevens Landing Ln. and Chippoquasett Rd. near the western shore of the island. The zone contains a roughly 220-acre forested area. The majority of the forested area is wetland, known as Crow's Swamp. The zone currently does not have any water resources for firefighting. In the event of a fire in the area, water would be shuttled from the fire station.

Residences within the zone are accessible by engine. Broadway, Bay Ave., Mt. Pleasant Ave. and Albro Farm Rd. are all easily travelable by engine. Many side roads dead end at residences and are dirt or gravel. Bay Ave. south of Prudence Park is a dirt trail and would not readily allow vehicle passage with the exception of perhaps a brush engine or off-highway vehicle (OHV). Residences at the end of Broadway are generally within 10 minutes response from the fire station, and those by Stevens Landing Ln. and Albro Farm Rd. may be up to 15 minutes. Refill time in the zone is currently 35-45 minutes under optimal conditions because the nearest cistern is at the fire station. The area is not within the Prudence Island Water District, but the Prudence Park neighborhood is serviced by its own community well and distribution system. In other areas of this zone, water is available only through private wells. As a result, water to all areas of this zone would currently need to be shuttled. Proposed cistern installations at Prudence Park, the NBNERR offices and Broadway would allow for direct supply to engines fighting fire in Prudence Park and would cut refill time considerably for all other areas within the zone.

The zone contains a mix of upland and wetland soils. The largest tract of wetlands is primarily red maple swamp, which is modeled as SH6, low load humid climate shrub because of the prevalence of greenbrier and other vines in the midstory. Coastal shrublands, present along the coast, are modeled as SH6 as well. The uplands are mostly a mix of Oak-Maple Forest and Pine-Oak Forest, modeled as SH8, high load humid climate shrub. Both SH6 and SH8 can support high flame lengths and high rates of spread. Roughly ten acres of grassland are located west of Mt. Pleasant Ave. The grassland is primarily switchgrass with sapling pine, cedar and hardwoods intermixed. The grasslands are modeled as GS3, moderate load, humid climate grass-shrub. Spread in the grasslands can be high and flame lengths moderate.

Zone 3 – Eastern Shore

Zone 3 is 291 acres located in the eastern portion of the island. It is the most thickly settled of the zones. The zone contains roughly 330 structures. It includes Bristol Colony, Sandy Point and Homestead neighborhoods. The zone contains the site of the ferry dock, the fire station and all three of the cisterns currently operational on the island. The zone contains the Bacon Farm, an open grassland on the site formerly occupied by a vineyard.

Narragansett Ave. is the primary roadway in the zone. It is a two-lane paved road that provides access to all the neighborhoods along the eastern shore. Side roads are generally accessible by engine, although many roads dead-end at residences. Properties west of Homestead Ave. and Governor Paine Rd. are built in the WUI with maintained lawn and other vegetation as a break between the residences and wildland fuels. Because the fire station is located within the zone, response times are shortest, at 5-10 minutes, as long as roads are passable. Refill times are also relatively short because the zone contains all three currently operational cisterns. The addition of a proposed cistern on Broadway would increase capacity and shorten refill time for the southern section of Zone 3 as well as Zones 1 and 2.

The zone is primarily developed and within the WUI. The forested areas west of the zone are upland and wetland hardwood forest with thick greenbrier dominating the understory. Coastal shrublands line the eastern coast between the beach and Narragansett Ave. Fuels are modeled as SH6 in the wetlands and coastal shrublands, and SH8 is modeled in the uplands. Wooded areas are intermixed with the maintained yards in the residential areas, generally containing thick greenbrier as well. The open areas of the Bacon Farm are dominated by mixed perennial grasses and are modeled as GR3, low load, very coarse, humid climate grass.

Zone 4 – Central Forest

Zone 4 is the largest zone, at approximately 1,188 acres of primarily preserved lands. The central forest is generally unpopulated, with two residences along the western shore. Bay Ave. runs along the western coast, mostly between 50 and 250 feet from the shore. Broadway divides the island east and west. A 145-acre portion of the zone is south of Broadway. The rest of the zone is one large forested block. Numerous trails run through the zone. The two most prominent trails are the east-west Division Wall Trail and the north-south Heritage – Army Camp Trail. Currently, none of the trails are wide enough to be safely used by engines for suppression. The plan recommends widening the Heritage – Army Camp Trail in order to create a reliable fuel break and provide a north-south travel corridor under high water

conditions in which Narragansett Ave. may be impassable. A widened trail, passable by a type 6 engine, would allow for direct or indirect attack in the forest interior. Other trails in the zone may be used as fire breaks if attacking with hand tools and bladder bags. Many of the trails are accessible by off-road utility vehicle (UTV). The fire department does not currently have a UTV engine, but the addition of a UTV fire engine would increase the capacity and range of wildland fire suppression on the island.

Linear wetlands occupy a swath of the middle and western portion of the zone. The largest wetland, known as Schoolhouse Swamp is located between the two ridges, draining north into Mill Creek. South of Broadway, the wetlands drain to the south through the former Navy property. A small 13-acre wetland sits west of the residences near Sandy Point. The large hill in the northwestern portion of the zone is dominated by pitch pine. The area was formerly cleared to bare ground and grew up in thick pitch pine. The resulting forest is dense canopy of adult pitch pine with little understory vegetation. Edges of the pitch pine forest are a mix of juvenile pitch pine, tree oak, small shrubs and greenbrier. The fuel model in the pitch pine forest is modeled as TL5, high load conifer litter. Spread rate and flame length in the conifer litter is low. Thick juvenile pitch pine stands, however, can support high flame lengths and rates of spread. The upland hardwood forests are modeled as SH8 and the wetland forests are modeled as SH6. Flame lengths and rates of spread and flame lengths in the hardwoods forests are high because of the heavy greenbrier component.

Forests have been heavily impacted by gypsy moth defoliation over the last number of years. An estimated 15-25% of oaks were killed by the combined stressors of defoliation and periods of moderate to severe drought. The long-term impacts of the overstory mortality is not yet understood. It is possible that it could lead to an increase in shrubs and waxy vines, thus increasing fire behavior, but it is also possible for red maple to fill in where oaks have died, limiting increases in potential fire behavior. The oak mortality has caused a dramatic increase in the amount of coarse woody material on the ground and standing dead throughout the forest. The increased fuel loads associated with deadfall will likely increase fire behavior and smoke production. Downed trees limit the ability of wildland fire engines from driving off-road and create difficulties for deploying hose. Standing dead trees, when ignited, produce embers that may travel long distances and present hazards for firefighters working under them. A number of mitigation measures are possible, including salvage harvest of dead trees, understory mowing and prescribed fire implementation.

Zone 5 – Warnerville

Zone 5 is the smallest zone at 54 acres. It is located between Narragansett Ave., Mill Creek, Nag Pond and Narragansett Bay. The zone contains roughly 35 structures. Narragansett Ave. separates Warnerville from Zone 3 to the south. Under extremely high tides and storm conditions, tidal and storm waters at Mill Creek and Nag Pond can rise over Narragansett Ave. blocking access from the south. Ongoing road improvements are being planned to prevent high water from blocking the roadway at Mill Creek, however under extreme conditions, access remains a concern. The zone is mostly residential, with a three-acre coastal shrubland between Nag Pond and the mowed areas west of Raphael Ave. The edges of Nag Pond are dominated by marsh grasses, with small areas of Phragmites. Between the houses vegetation is mostly mowed lawns, however some areas are wooded with a heavy greenbrier component.

Response time to Warnerville is roughly 15 minutes but could vary more or less depending on road and traffic conditions. A cistern is currently under construction at the Town Barn on Narragansett Ave. Once completed, it will allow for direct water supply to engines in Warnerville and will reduce refill times and increase capacity for firefighting in the Neck and beyond.

Fuels within the zone are mostly considered non-burnable. The coastal shrublands are modeled as SH6, the marshes are modeled as GR3, low load, very coarse, humid climate grass, except for Phragmites, which is modeled as GR9, very high load humid climate grass. Phragmites can support high flame lengths and rates of spread.

Zone 6 – The Neck

Zone 6 is located between the intersection of Bay Ave. and Narragansett Ave. to the northern extent of developed land near the North End Airstrip. The zone is approximately 498 acres. The majority of structures, roughly 17, are along the

northern shore of the Neck. One residence is located near Jenny Pond, south of Neck Farm Rd. The North End Farm is located on the uplands north of Pine Hill Point in the western portion of the zone. The North End Farm area contains a number of structures, some in use and some abandoned. The North End Airstrip is west of the farm. The northern boundary of the zone is the north fire break, a mowed break which follows a stone wall dividing the uninhabited North End from the rest of the island. The non-residential areas of this zone, including the Rossi Farm, are generally comprised of preserved lands.

Neck Farm Rd. is the primary roadway in the zone and is travelable by engine. Beach Rd. and Harbor Rd., north of Neck Farm Rd., provide access to most of the residences in the Neck. Roads off of Neck Farm Rd. are mostly dirt or gravel, and while generally accessible by engine, could be muddy if ground conditions are wet. Response time to residences in the Neck could be up to 20 minutes or longer with poor road conditions. Once the cistern is completed at the town barn, refill time will be roughly 40-60 minutes. A cistern is proposed to be constructed at the intersection of Neck Farm Rd. and Beach Rd. It would allow for direct supply for most residences and would reduce refill time for areas beyond direct fill radius.

Soils in the zone are constituted of both till and outwash soils. The central and eastern portion of the Neck are low elevation and contain marshes and tidal streams. Vegetation in the marshes is primarily marsh grass, such as smooth cordgrass (*Spartina alterniflora*), modeled as GR3, low load, very coarse, humid climate grass. Patches of Phragmites are modeled as GR9, very high load humid climate grass, and would support higher fire behavior than other marsh grasses. Forests in the Neck have different composition than the central forest. The Neck forests contain a significant component of cherry and Eastern red cedar. Many lower elevation areas are dominated by coastal shrublands. Greenbrier is an important carrier of fire in most of the shrublands and forests. The western portion of the Neck, west of Jenny Pond, has a number of managed grasslands intermixed with shrublands and forests. The grasslands are modeled as GS3, moderate load, humid climate, grass-shrub. The airstrip roughly follows a small upland ridge. The farm fields and airstrip are modeled as GR3.

Zone 7 – The North End

Zone 7 is the northernmost zone. It is roughly 496 acres in size and is a mix of upland, wetland and tidally influenced areas. The North End contains no structures and few roads. The primary road is Providence Point Trail, which is a two-track dirt road north of the northern break. Two smaller east-west roads cut across the Neck providing access to Potter Cove, Long Point and the east and west shores near Providence Point. A small, mowed, 3-acre clearing is located in the northern portion of the zone around a historic site containing foundations of buildings. Roads within the zone could be travelled by a Type 6 engine, off-road tanker or OHV.

Vegetation in the North End is a mix of coastal shrubland, maple swamp, cherry-Eastern red cedar forest and marshland. Vines including oriental bittersweet (*Celestrus orbiculatus*), greenbrier and invasive plants such as multiflora rose (*Rosa multiflora*) are a significant component of the plant community. Fuels are modeled as SH6 in wetlands and shrubland. Upland forests are modeled as SH8. Marshes and salt meadows are modeled as GR3, with Phragmites marshes as GR9. Upland grasslands are modeled as GS3.

LOCAL PREPAREDNESS ASSESSMENT

One goal of the Prudence Island Community Wildfire Protection Plan is to assess current wildland fire suppression capacities and identify areas to increase effectiveness. The Prudence Island Volunteer Fire Department (PIVFD) has primary fire suppression responsibilities on the island. Fire protection is supported by Rhode Island Department of Environmental Management (RIDEM) Forest Fire Control and mutual aid with numerous nearby fire departments including Portsmouth, Bristol and Warwick. In the event of a major wildfire or multiple structural fires, Narragansett Bay Marine Task Force (fire boats) and support personnel would be called in through mutual aid. Once activated, fire boats can be on scene in 30-40 minutes providing salt water for suppression. Transportation of engines onto Prudence Island from the mainland or Aquidneck Island would require ferry utilization and would take considerable time. Any fire response

requiring the activation of multiple mutual aid agreements would involve a high degree of complexity because of the remoteness, logistics and communication challenges involved.

TRAINING/PERSONEL

PIVFD currently has 25 NFPA Certified firefighters. Because only a portion of firefighters live year-round on the island, and many work off-island, firefighter availability can vary greatly by day, time and season. Generally, 2-6 firefighters are available at any given time. All firefighters have been through the firefighter training at the Rhode Island Fire Academy or other accredited institution. A small number of the firefighters have been trained in wildland firefighting through the National Wildfire Coordinating Group (NWCG) S-130/S-190 Introduction to Wildland Fire Behavior and Firefighter Training. Some members of the department have attended specialized trainings such as FEMA sponsored All-Hazards Training and water delivery trainings.

Training Recommendations

A large fire event on the island would require a high degree of coordination between numerous fire departments and agencies. A mutual aid joint training exercise is recommended in order to test plans under the most realistic possible conditions. Scenario-based or simulation training involving all mutual aid departments is recommended to prepare for a large event. Ideally hosted by RIDEM Forest Fire Control, a simulation of a large fire would allow for the testing of dispatch, response and communication plans. It would help identify potential problems and areas for improvement. Such a training may require professional facilitation. Funding may be pursued through a grant if available.

Future success in wildfire protection will depend on well-coordinated attack and well-trained firefighters. Wildland fire training and experience are recommended for PIVFD members. Participation in prescribed fires on the island is recommended in order to provide the opportunity to engage in live wildland fire activities. Prescribed fires provide the opportunity to practice use of wildland engines and utilize wildland fire suppression tactics, including the use of hand tools, bladder bags, drip torches etc. Prescribed fires also allow firefighters to familiarize themselves with fire behavior in the wildland setting, increasing situational awareness and safety when engaging a wildfire. Continuing to train firefighters in NWCG wildland fire classes is recommended to build knowledge and wildland firefighting skill sets. In some areas, indirect attack may be the best firefighting option. Any indirect attack would require that firefighters are experienced in wildland fire tactics.

Specialized trainings focused on tactics required on Prudence Island would improve effectiveness of PIVFD. Water conservation is of particular concern. A large fire or numerous structure fires could quickly tax the available water supply on the island. Refill times can be quite long and the efficient use of water may be a critical factor in ensuring success. Additionally, community well pump capacity and recharge rates will limit the rate at which cisterns refill following use. A large fire event could stress the water supply on the island as a whole. It is recommended that water use and water conservation trainings are conducted periodically in order to build and maintain skills. Water shuttling is a critical component of fighting fire on the island. A number of courses are available to train firefighters in water supply methods. Several members of PIVFD have attended “Got Big Water” training, a rural water supply operations seminar and live training event. Similar trainings are recommended to maintain skills and train new firefighters.

EQUIPMENT

PIVFD is a wholly volunteer fire department. The department has one fire station located at 0292 Narragansett Ave. The fire station houses all suppression apparatus on the island. The fire department has two Type 1 engines primarily for use on structure fires, three large tankers of 1,000 gallons or larger, one pump truck (capable of pumping salt water), and two Type 6 wildland fire engines (figures 12-19). All vehicles are beyond the expected replacement date. National standards, NFPA 1906: Standard for Wildland Fire Apparatus (2016), do not set a required replacement period but do recommend wildland firefighting apparatus over 20 years old be evaluated for replacement. NFPA 1912: Standard for Fire Apparatus Refurbishing (2016) states: “Because the changes, upgrades, and fine tuning to NFPA 1901 since 1991 have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to firefighters by

keeping fire apparatus more than 15 years old in first-line service." PIVFD apparatus range in age from 33 to 44 years old, placing them well beyond typical replacement age.

Current Equipment

Figure 12: Engine #82 1976 Maxim F 500-gallon capacity photo credit: John Galla firenews.org

Figure 13: Engine #83 1974 Maxim 500-gallon capacity photo credit: John Galla firenews.org

Figure 14: Tanker #1 1975 Fore/Farrar 4,000-gallon capacity photo credit: John Galla firenews.org

Figure 15: Tanker #2 1985 GMC Brigadier/Farrar 2,500-gallon capacity photo credit: John Galla firenews.org

Figure 16: Tanker #3 1975 AM General 6x6 (off-road capable) 1,000-gallon capacity photo credit: John Galla firenews.org

Figure 17: Brush #84 1995 Ford F-450 200-gallon capacity photo credit: firenews.org

Figure 18: Brush #85 1977 Dodge 4x4 (off-road capable) 250-gallon capacity photo credit: John Galla firenews.org

Figure 19: Pump #1 1985 Chevrolet 4x4 750 GPM Pump Truck photo credit: firenews.org

Current Firefighting Tactics
The current firefighting capabilities are highly dependent on distance from the nearest cistern. Direct pumping from a pumper engine to the tactical engine is the most efficient means. Typically, when engaging a fire, an engine will draw water from the nearest cistern and deploy supply hose to reach the tactical engine or to relay to a tanker. One pumper relaying to an engine can supply water up to 1,800 feet from the cistern. Once fire operations have begun, tankers will begin shuttling water from other cisterns to the cistern tapped for the operations to prevent the cistern from running dry.

As distance from a cistern increases, a second pumper must be put in series to allow for water to be pumped greater distance from the water source. If the fire is greater than 1,800 feet from a cistern, a tanker is put in relay to deliver water another 1,800 feet for a total of 3,600 feet distance from the cistern to the tactical engine. Beyond roughly 3,600 feet, direct or series pumping is no longer possible and water shuttling must be used to supply the tactical engine.

Shuttling is much less efficient than direct pumping and involves considerable time and coordination for supplying water. If firefighting operations are beyond 3,600 feet from a cistern, a large portable tank is set up near the fire and is filled from tankers. The three tankers fill at cisterns and dump water into the portable tank from which the water is pumped to the tactical engine(s). Hooking up, detaching, filling, and travelling to and from the scene all take considerable time.

Wildland fire is typically engaged using Brush #84 and Brush #85. The brush engines are usually refilled from Tanker #3, the only off-road capable tanker, at 100 gallons per minute. Tanker #3 holds 1,000 gallons of water. The wildland engines are generally not capable of driving through the woods, and must remain on roads, trails or in open areas. As a result, lengthy hose lays are needed to attack remote fires. Fires with low flame lengths may be attacked using hand tools, but under high fire danger conditions flame lengths will likely be too high to be engaged using hand tools alone.

Equipment Recommendations
The firefighting apparatus for Prudence Island should be suited to fire environment. Large portions of the island, including many residences, are accessible only by rough paved, gravel or dirt roads which are difficult to access with traditional structural fire engines. During winter months, roadways are impacted by snow and ice making travel more difficult. Periods of heavy precipitation regularly cause wash-outs, and when coupled with high tides, roads may become impassable. The island has the potential for a large wildland fire and current capabilities leave Brush #84 and Brush #85 as the only engines capable of responding to a typical wildland fire. Engine #83 is the primary structural firefighting engine but has a limited ability to navigate the island under difficult road conditions. The fleet of fire apparatus should be constructed with access and agility as priorities. A combination of wildland and WUI engines is better suited for responding under difficult conditions while still meeting the needs for traditional structural firefighting.

Current equipment is in need of upgrading in order to maintain and improve firefighting capabilities on the island. The brush engines #84 and #85 are 23 and 41 years old respectively, and are in need of being replaced. Pump #1 is mounted on a truck that is over 30 years old. The pump is still suitable for use, however, the truck on which it is mounted should be replaced. A replacement truck for Pumper #1 should be a heavy duty off-road capable truck.

It is recommended that Brush #85 is retired and is replaced by two new wildland/WUI fire engines. The new engines should have capability for off-road wildland suppression and structure protection. Figure 20 shows a Nantucket engine designed for WUI fire suppression. A similar configuration is recommended for Prudence Island. It has 1,000-gallon capacity. It may be best to acquire two 1,000-gallon capable WUI engines similar to the engine shown in Figure 20. Alternatively, the replacement for Brush #85 could be one WUI engine and one Type 6 engine. With lower height and smaller turning radius, a Type 6 may have greater access to remote areas, however, it has less water capacity and less pumping capability (Figure 21, example Type 6 engine).

The areas that require water shuttling are generally difficult to access. Tankers #1 and #2 do not have off-road capabilities and can only be used in areas with paved roads. A wildland capable tanker is needed to augment wildfire firefighting capabilities. The new tanker should be off-road capable with a capacity of 1,000 gallons or greater. The

tanker should be built on a Mercedes Unimog or similar truck body that provides adequate clearance and off-road accessibility.

It is recommended that one or two side-by-side off-road utility vehicles (UTVs) be purchased and outfitted with slip-on pump systems. UTVs serve as Type 7 wildland fire engines that can attack wildland fires in more remote areas than larger engines. The maneuverability allows for patrol of fire breaks, and for direct attack along trails and other areas inaccessible to other engines. The large number of trails on the island potentially could provide access to a UTV engine, allowing for initial attack in areas previously inaccessible by engine. A UTV engine can deliver significantly more capability than firefighters with backpack pumps. UTVs can serve other functions in the fire department, assisting in search and rescue or other operations needing access to the forests. Some UTVs, such as Bobcat's Toolcat, can utilize a number of attachments including mowers, buckets, graders and others that may be utilized in fire line prep and fuel reduction projects.

Figure 20: Nantucket WUI engine photo credit: Josh Nigro firenews.org

Figure 21: Type 6 engine Dartmouth Fire Department Photo credit: MEB firenews.org

WATER SUPPLY

Prudence Island has no standing fire hydrants for use in firefighting. The island relies on a system of cisterns to hold water to be accessed by the fire department. The Prudence Island Water District was established in 2004 to provide clean water to the residents of Prudence Island. The district serves the eastern portion of the island, including all Zone 3, the eastern shore, and Zone 5, Warnerville. The Neck and western portions of the island are not on district water supply and rely instead on wells. The water district relies on ground water which is pumped into large tanks and cisterns for fire suppression. Locations of water supply points and proposed additions are displayed in Figure 22.

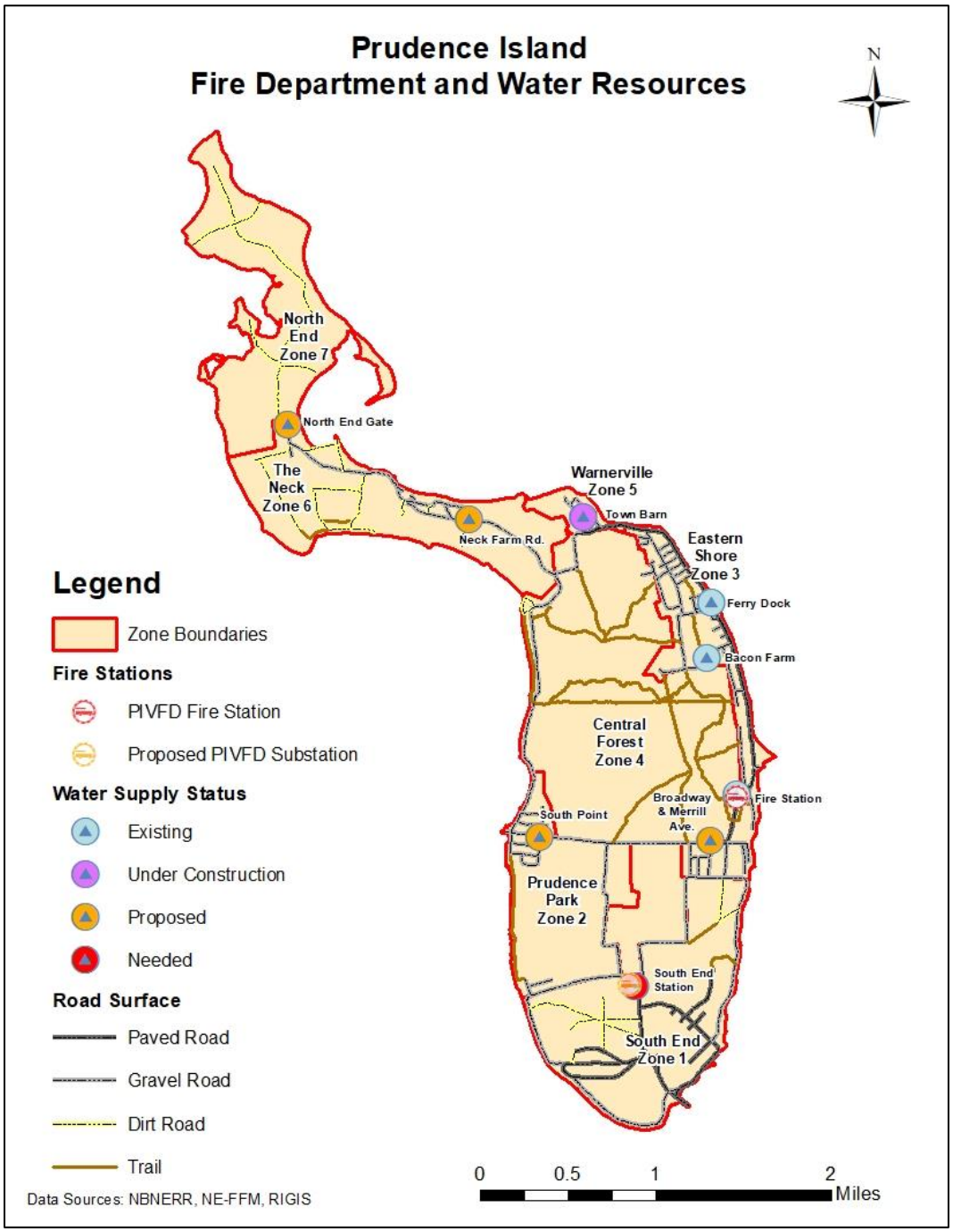

Figure 22: Map of current and proposed fire stations and water supply

Water Supply Goals

- Water supply located within one pumper direct supply distance (~1,500 feet) of 75% of residences
- Water supply located within two pumper direct supply distance (~3,000 feet) of 85% of residences
- Tanker refill time under 15 minutes (using 3 tankers) for all residences outside of direct supply area (requires 45-minute turn-around time per tanker)

  Note: 1,500 and 3,000 feet instead of 1,800 and 3,600 feet from water supply were used to account for curves in hose deployment

Current Water Supply

Fire Station: The fire station has a 10,000-gallon steel cistern used to for refilling during fire operations. The cistern was installed during the 1980s. It is the primary refilling option for fire suppression. The cistern is nearing replacement age. Steel cisterns are typically warrantied for 30 years, so a replacement cistern will be needed in the near future.

Ferry Dock: A 15,000-gallon buried reinforced concrete cistern is located at the ferry dock. It is accessed by the fire department through a stand pipe. The cistern was installed in 2015.

Greer Tank: The fire department has a 12,000-gallon cistern located adjacent to the water district storage cistern, known as "big blue". The water district cistern is accessed by a dry hydrant and is the third filling option.

Under-Construction Water Supply

Warnerville Town Barn: A 15,000-gallon cistern is planned (anticipated 2018-2019 completion date) to be located behind the town barn in Warnerville. The cistern will provide the primary refill location for fires in Warnerville and the Neck. It should allow for direct pumping throughout Warnerville.

Proposed Water Supply

PIVFD has proposed the addition of four cisterns. The new cisterns will provide increased water supply capacity in the most densely populated areas and decreased refill time in other distant areas. The additional water supply would allow for faster refilling of cisterns being used during active fire suppression and would reduce the danger of running out of water during a large fire.

Broadway & Merrill Ave.: Town land located on the northwest corner of Broadway and Merrill Ave. has been identified as priority location for additional water supply. The addition of a cistern at the site would increase water supply availability, particularly in the more densely populated areas south of the fire station. The cistern would be capable of direct supply to engines fighting fire in the neighborhoods south of Broadway between Alden Ave. and Beach St. The cistern reduces the distance to refill for fires along the western shore by more than 2,000 feet.

Prudence Park: The Prudence Park neighborhood, located along the western shore, currently has no water supply for fighting fire in the developed area. The proposed cistern on Broadway is roughly one mile from the neighborhoods between Atlantic Ave. and Bay Ave. It is recommended that a site be identified for the construction of an additional cistern somewhere central in the neighborhood. Currently, the only way to resupply water to Prudence Park is by shuttling water with tankers from the fire station. A cistern located within the neighborhood would allow for a direct supply line during firefighting operations, limiting or eliminating the need for extensive water shuttling operations. The proposed new cistern in Prudence Park would also decrease the shuttle distance for residences on the west shore and would increase the amount of water available for firefighting.

Neck Farm Rd.: The northeast intersection of Neck Farm Rd. and Bay Rd. has been identified as the preferred location for a cistern supplying the residences in the Neck. Most structures in the Neck are within 1,500 feet of the proposed

location. The cistern would allow for increased protection of structures within the Neck and would dramatically decrease refill time for any fires in the Neck or areas to the north.

North End Gate: A 15,000-gallon cistern is proposed to be installed at the entrance gate to the North End. The cistern would provide a water source to stop a wildland fire approaching from the north and would provide a large water source for the structures north of the entrance to Potters Cove. It would be the only water source north of Jenny's Creek.

Other Needed Water Supply:
NBNERR HQ: Former Navy land, now occupied by NBNERR offices, has been identified as a potential location for cistern installation. Sturdy, concrete foundations, remaining from removed Navy buildings, are already in place. The location has also been identified as the preferred site for a fire department substation. The addition of a cistern at the site would decrease the distance required for refill from Stevens Landing Ln. by over 1.5 miles. The cistern would be between 2,500 and 3,500 feet from the Stevens Landing residences, allowing for two-pumper direct supply to most residences in the neighborhood.

Water Supply Improvements:
Cisterns which are not located in proximity to available water district distribution line connections, need to be filled by shuttling water. The addition of rain collection would reduce the need for refilling by shuttling water. The town barn roof could be used for rain collection and directed to the new cistern. A cistern constructed at the NBNERR offices may be able to use rainwater collection to assist in refilling after use. If possible, a cistern at NBNERR should be elevated to allow for top-filling of engines. Elevated tanks are of particular use in fighting wildland fire because wildland engines can be quickly top-filled and then return to the fire. Any elevated tank would need to be heated in order to prevent freezing. Other tanks should be heated as needed to prevent freezing during cold weather.

FIRE STATION(S)
Current Fire Station:
The Prudence Island Volunteer Fire Department Station is located at 0292 Narragansett Ave., roughly 1,300 feet north of the intersection of Narragansett Ave. and Broadway. The station is ~4,000 square feet, with three equipment bays occupying ~2,500 square feet and ~1,500 square feet of equipment storage and meeting space. Currently, Engine #81, Tanker #1 and Tanker #2 are stored in the bays and Brush #85, Tanker #3, and Brush #84 are stored outdoors in the open or under an open-sided metal shed. The station is centrally located to respond to fires on either shore.

The needs of the fire department have far surpassed what the current station provides. Six vehicles are currently stored in three bays. The two brush engines and one tanker are not protected from the elements, and during colder months must be winterized. All equipment should be stored in a temperature-controlled environment. The station does not have the space to accommodate the current equipment, let alone the recommended equipment additions and replacements.

Fire Station Needs:
Additional storage for apparatus is recommended. Ideally, a substation housing some of the equipment would be constructed somewhere on the island. The NBNERR headquarters, located on former Navy land, is the preferred location for a new wildland fire substation. Foundations, left over from demolished Navy buildings, are already in place, and would likely be suitable for a new substation. The proposed substation should provide temperature-controlled storage for equipment, space for personnel, and a heated water supply.

STANDARD OPERATING PROCEDURES (SOPs) FOR WILDFIRE

SOPs for wildfire response should be developed in order to improve preparedness and effectiveness in the event of a large wildfire. A communication plans should be in place, allowing for a dedicated wildfire tactical channel separate from other first responders. A risk assessment should be conducted to evaluate the feasibility of suppressing fire at designated fire breaks rather than attacking fire interior to the forests. The risk assessment should also consider the use of indirect attack, using backfire and burn out techniques to reduce risk to firefighters and equipment while providing for public safety.

RESPONSE SUMMARY

Current and under construction cisterns will provide one pumper or two pumper relay to most of the residential areas in Warnerville and along the Eastern Shore (see Figure 23). All other residential areas on the island rely on water shuttling for fire suppression. Response times and shuttling times are highly variable and dependent on weather, personnel and equipment. The dynamic operating conditions can result in bottlenecks and delays in consistently delivering sufficient water for high demand firefighting operations, such as multiple structure fires or a WUI fire involving wildland and structure fires.

The addition of recommended cisterns would allow for relay pumping at nearly all residences on the island. Water shuttling areas would be limited to a few residences on the Western Shore and a number of uninhabited areas (see Figure 24). The maps (Figures 23, 24) display areas within a 1,500-foot buffer of cisterns and within 500 feet of a road to represent areas that could be supplied from one pumper at the cistern. The 3,000-foot buffer represents areas that would need two pumpers in relay to supply water. Distances of 1,500 and 3,000 feet are used instead of the 1,800 and 3,600-feet maximum capability to account for curves and slopes in the hose deployments. Distances of 300 feet and 500 feet from roads are displayed to show which areas are easiest and most difficult to access. The maps show access with the proposed improvements to the Army – Heritage Trail.

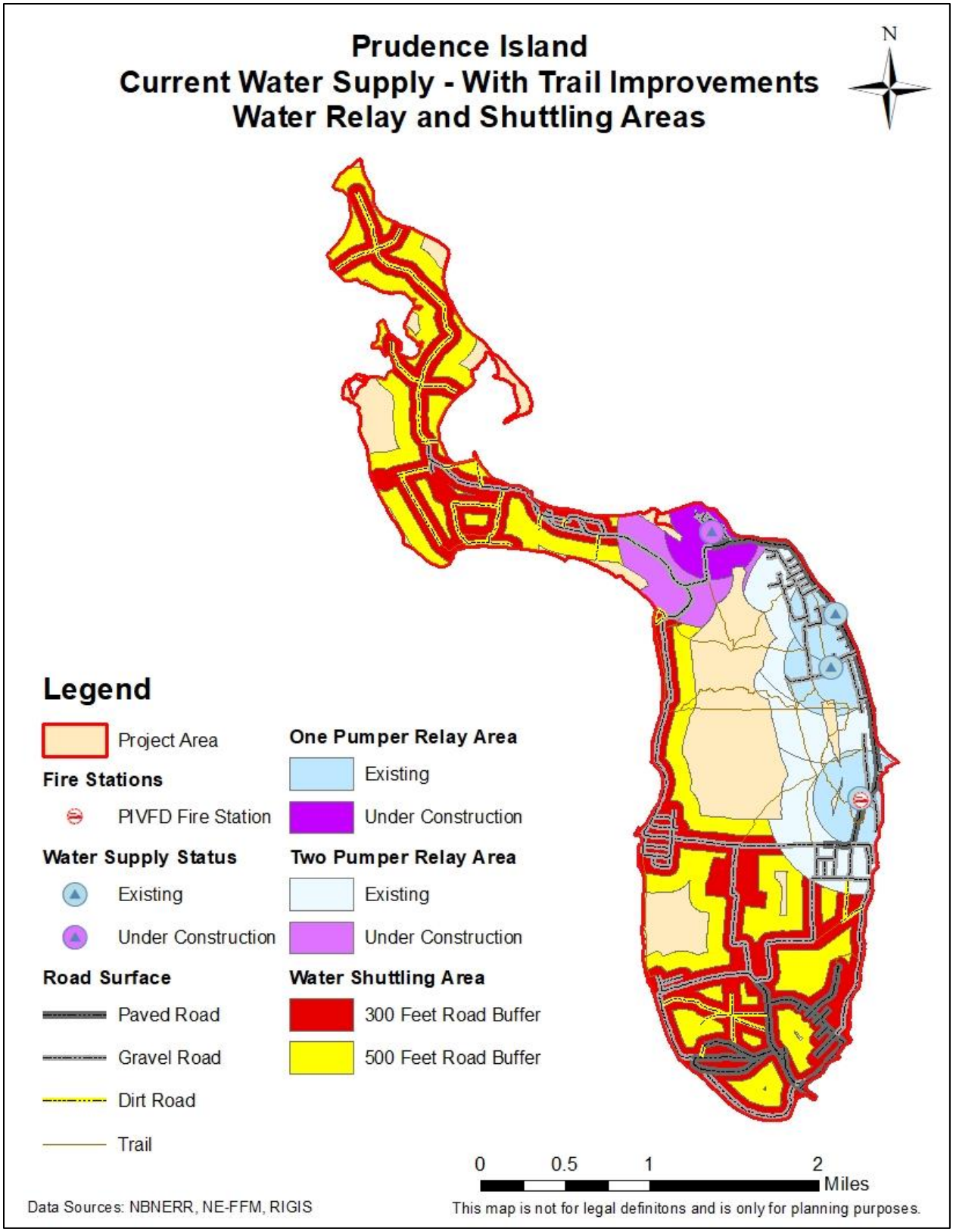

Figure 23: Map of estimated current and under construction water access type
Note: 1,500 and 3,000 feet distance were used to account for curves in hose deployment

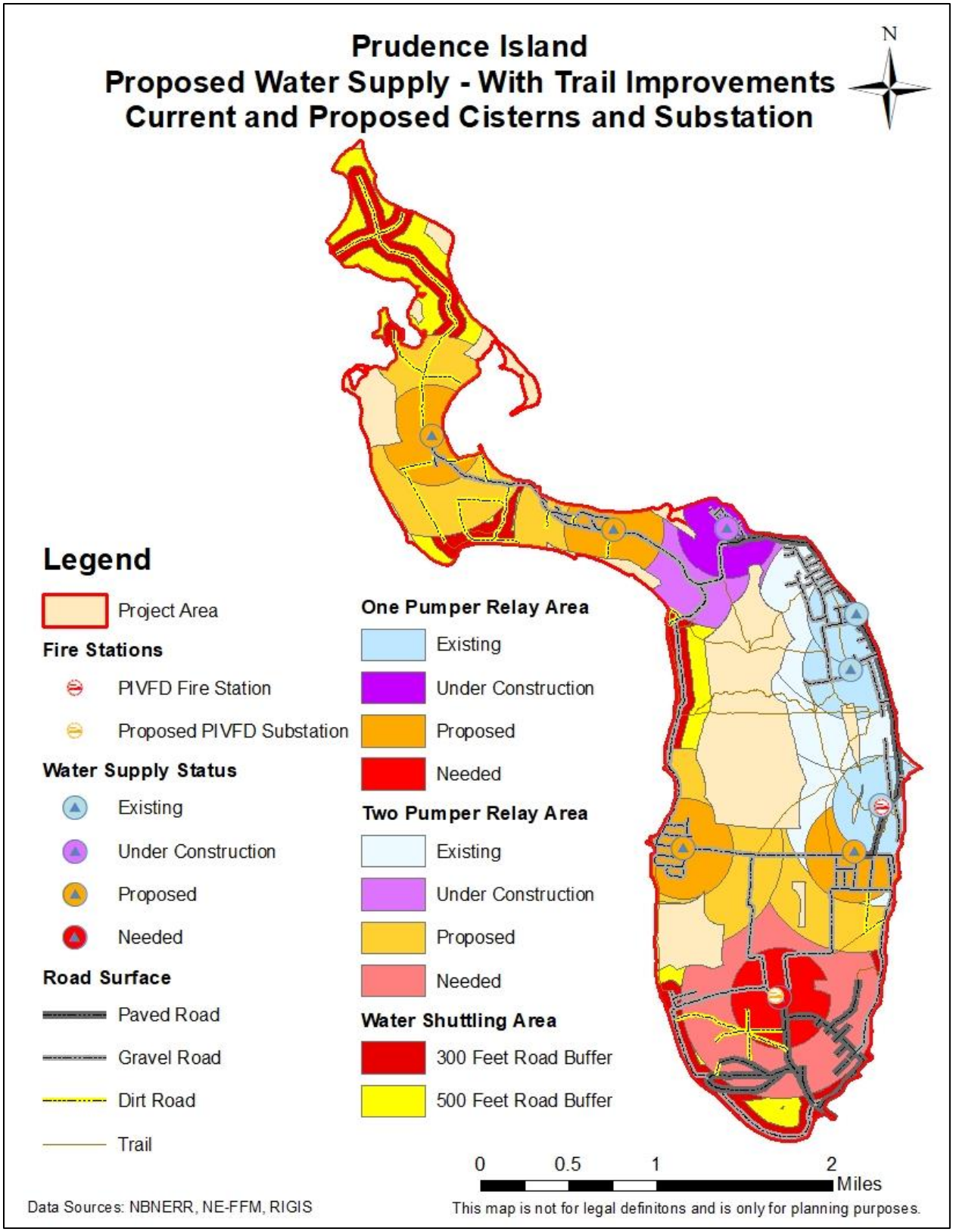

Figure 24: Map of estimated water access type with recommended improvements
Note: 1,500 and 3,000 feet distance were used to account for curves in hose deployment

Wildland Response

Most of Prudence Island is covered in hardwood forest. Suppression using hose lays is the preferred method of attack in the hardwood forest type. Interior areas of the forest may require long hose lays in order to reach a remote fire. Currently none of the trails in the interior of the forest are accessible by engine. The CWPP recommends opening up the Heritage – Army Camp Trail to be travellable by wildland fire engine. The map shown in Figure 25 shows all areas within 300 feet and 500 feet of a road or trail travellable by a Type 3 or Type 6 wildland fire engine. The map includes the Heritage – Army Camp Trail. The buffer of 300 feet was chosen as a distance easily reachable with a short hose lay, and 500 feet as a more complex hose lay. Areas farther from roads are accessible, but would require longer hose lays. Under some conditions indirect attack may be preferred. The map shows roadways from which burnouts or backfire could be lit. If the department acquires UTV engine(s), smaller trails may be utilized for suppression or indirect attack.

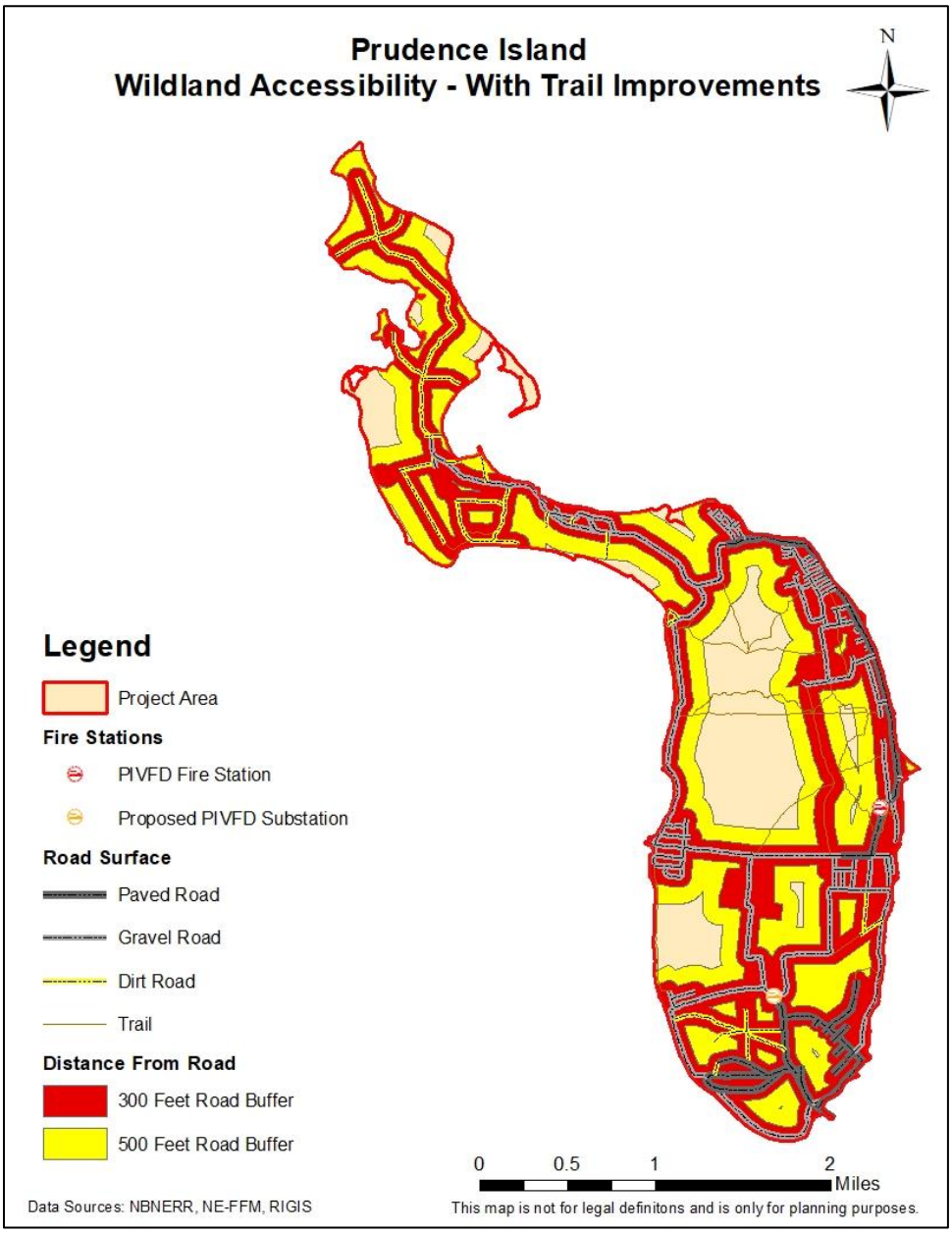

Figure 25: Map of all wildland accessible roads buffered 300 feet and 500 feet; map includes proposed improvement to Heritage – Army Trail

MANAGEMENT RECOMMENDATIONS

The Prudence Island Community Wildfire Protection Plan has identified four areas to increase wildland fire preparedness on the island. The four identified strategies are: incorporate Firewise practices, implement fuel treatments, install and maintain fuel breaks, and conduct prescribed burning designed to reduce wildland fire risk. See Figure 30 for map of fuel treatment areas.

The high proportion of protected land on the island may cause complications for the implementation of fuel treatments and Firewise recommendations. Many residences are located adjacent to or near conservation lands. Fuel mitigation activities on conservation lands may be limited by deed restrictions, conservation easements or ecological concerns. Efforts to manage fuels on protected land would require considerable coordination between residential property owners, conservation land owners, easement holders and town officials. Any fuel treatments would need to be done in a manner consistent with conservation objectives. Issues related to permissions, liability, responsibilities for treatments, funding, maintenance and documentation would all need to be addressed before any treatments could be planned on conservation land. It is recommended that a process be put in place to facilitate the treatment of high fire danger fuels on conservation lands within the WUI.

Zone 1 (South End):
Recommendations:

- Implement prescribed fire in NBNERR
- Maintain and improve firebreaks within the preserved land
- Clear flammable vegetation from under and around the powerline

Structures within Zone 1 are generally well protected. Ample defensible space surrounds the NBNERR offices. Some areas within Zone 1 are modeled to potentially carry crown fire and torching under high fire behavior conditions. Prescribed burns can reduce fuel loads, reduce ladder fuels and decrease the likelihood of extreme fire behavior. Continuing and expanding the prescribed fire program within the NBNERR South Reserve component is recommended.

The main power cable supplying electricity to the island comes ashore on the eastern shore of the island on the northern most point of the South End. This area is in constant need of brush cutting and maintenance. Most of the area is overgrown and, in the event of a fire, would sever power to the island for an extended period of time; resulting in limited access to the island's water supply and a short-term cessation of ferry service until repairs to the power supply could be implemented. Vegetation under and near the power line should be cleared and maintained as open to prevent a wildfire from compromising the island's power supply.

Zone 2 (Prudence Park):
Recommendations:

- Implement Firewise treatments on individual properties/structures
- Facilitate Firewise treatments on protected land within the "structural ignition zone"
- Implement fuel treatments between Broadway and residences near Stevens Landing Ln.
- Reduce midstory and ladder fuels in forested strip between houses and Broadway

Zone 2 contains numerous structures within the WUI. Most structure in the Prudence Park neighborhood, at the west end of Broadway have defensible space, however houses near the edges of the wooded areas should implement Firewise fuel treatments. Some areas between lots are covered in a mixture of greenbrier and grasses. Fire could move quickly through such fuels, allowing for fire to move between structures, or for falling embers to ignite structures that are isolated from the wooded edges. Mowing such patches or cutting them back from buildings would reduce the risk of structural ignition.

Zone 3 (Eastern Shore):
Recommendations:

- Implement Firewise treatments on individual properties/structures
    - Highest priority is structures west of Alden Ave., Governor Paine Rd., Narragansett Rd. (South of intersection with Gov. Paine Rd.) and Homestead Ave. because they directly interface the wildland areas
- Maintain and/or widen mowed shoulders along Broadway, South Reserve Dr., Narragansett Ave., and Governor Paine Rd. to serve as fuel breaks
- Mowing or other understory fuel treatments may be needed in the areas east and northeast of Baker Farm to mitigate modeled high flame lengths and rates of spread
- Isolated patches of grass and greenbrier may be mowed or burned to reduce the risk of fire burning to or between structures

Zone 3 contains the largest number of structures of any zone. The WUI is linear, running roughly parallel to the eastern shore with the structures concentrated along the coast with forest to the west. Most structures are east of a roadway, however, there are numerous structures that directly abut forested areas. Implementing Firewise practices is important for protecting structures in the zone, particularly those abutting the forest. Under high fire behavior conditions, shrubs and vines growing into the canopies of trees in the forest could ignite causing embers to fall in areas east of the roadways. Islands of fuels within in the zone may be mowed or burned to reduce the fire danger within settled portions of the zone.

Zone 4 (Central Forest):
Recommendations:

- Implement Firewise treatments on individual properties/structures
- The structures along the western shore should follow Firewise recommendations
- Widen trails to serve as fire breaks
- Heritage-Army Camp trail should be passable by a Type 6 engine.
    - A widened trail would serve as access and as an anchor point for attacking wildland fire
    - A widened trail would provide stability for safe passage of fire apparatus during high water or other emergencies. The trail would serve as an alternative north-south route connecting the fire station and south end to the neighborhoods around the ferry dock.
- Division Wall trail should be mowed or otherwise maintained to serve as a fuel break and access point for firefighters. If a UTV mounted engine is acquired, the break should be accessible by UTV
- Consider understory mowing as a fuel reduction technique or precursor to prescribed fire
- Consider prescribed fire as a means to reduce fuel loading and fire danger (current conditions make safe implementation difficult)
    - Remove ladder fuels through mowing or other treatment prior to implementing prescribed fire to reduce flame lengths and reduce mortality of overstory trees
    - Mowing with removal of ladder fuels alone would temporarily reduce the risk of high flame lengths and rates of spread and torching trees, if combined with prescribed fire the effect would be greater and longer lasting
- Potential target areas for prescribed fire:
    - The 200 acres between Baker Farm, Broadway, Heritage-Army Camp trail and Gov. Paine Rd.
    - Pitch pine woodlands in the northwest portion of the zone

Zone 4 is mostly forested. The fuels are dominated by thick greenbrier, with both green and dead canes forming a thick matrix of vines. The depth of the fuel bed typically ranges from two to four feet and climbs up trees into the canopy. Hardwood litter on the surface carries fire underneath the vines. Under extreme fire conditions, flames may carry up

vines, into the tree tops. Fuel treatments should focus first on reducing ladder fuels by cutting and pulling vines from trees and second, reducing the fuel bed depth by mowing.

Zone 5 (Warnerville):
Recommendations:

- Implement Firewise treatments on individual properties/structures

Warnerville is separated from the large block of wildland fuels by Narragansett Ave. Fuel treatments around individual structures are the best treatment to prevent impacts from wildland fire. Fires within the zone would most likely originate from falling embers or from sources within the zone (e.g. pile burns, structure fires, etc.).

Zone 6 (The Neck):
Recommendations:

- Implement Firewise treatments on individual properties/structures
- Consider implementation of prescribed fire in uninhabited areas

Many residences and structures within the Neck abut wildland fuels. Clearing defensible space around structures is the highest priority fuel treatment in the zone. Prescribed fire would help reduce fuels and may have ecological benefits in the zone.

Zone 7 (The North End):
Recommendations:

- Improve and maintain the north fire break
- Implement prescribed fire

The North End is uninhabited. The north firebreak provides a defensible area in which to stop a fire approaching from the north. Prescribed fire could reduce fuel loads and provide ecological benefits. Mechanical treatments may be required to prepare for prescribed fire implementation.

Mechanical Fuel Treatment Guidelines
Mechanical fuel treatments in wildlands typically involve understory mowing and/or overstory thinning. Logging and/or mowing equipment is used to mow, chip, or remove vegetative materials. Fuel treatments may be implemented as a standalone project or as a precursor to prescribed fire. Fuel reduction treatments nearly always require regular follow-up maintenance to keep fuel loads low. Fuel treatments can often be done in a way that maintains or enhances wildlife habitat. Figures 26 and 27 show before and after photos from a fuel treatment project on Martha's Vineyard.

Figures 26, 27: Before and after fuel treatment at M.F. Correllus State. Credit: William Patterson III, funded by Joint Fire Science Exchange

A variety of equipment may be suitable to implement fuel reduction projects. In flat open areas, mowing may be done with a brush-cutter (a.k.a. "Bush Hog") type tractor implement. In heavily forested areas, heavy equipment is usually required. The figures below show two equipment arrangements used for vegetation mastication. Figure 28 shows a tracked excavator with a forestry mulcher mastication head. Figure 29 shows a wheeled front end loader with a Fecon forestry mastication head. Either would be suitable for reducing ladder fuels and shrubs that may contribute to high fire behavior. On Prudence Island, an excavator based set up may be the best option because the reach of the arm would allow for cutting of vines, shrubs and low branches that allow fire to climb into the canopy. Any fuel reduction projects that are a precursor to prescribed fire should only be done in close consultation with a prescribed fire specialist because if done incorrectly, could make prescribed fire implementation difficult or impossible.

Figure 28: Excavator with mastication head
Credit: US Forest Service

Figure 29: Front end loader with Fecon mastication head
Credit: William Patterson III, funded by Joint Fire Science Exchange

Potential sites identified for fuel treatments on Prudence Island are generally located near residential areas. The treatment areas would be intended to provide defensible space for firefighters protecting structures, and a fuel arrangement unlikely to support crown fire. Figure 30 shows a number of areas that if treated, could reduce the risk of wildland fire impacting residential areas.

Figure 30: Map of potential fuel treatment areas and estimated acreage

MEASURES TO REDUCE STRUCTURAL IGNITABILITY – FIREWISE

Many structures on Prudence Island are vulnerable to wildfires because of the close proximity of wildland fuels and the increased time required for mutual aid response. However, homeowners can take simple actions to reduce the potential ignition of their homes. A home's exterior and yard characteristics can greatly influence its ignitability and chances for survival (Cohen 2000).

In addition to homeowner education, professional assessments would help identify vulnerabilities for individual properties. Structures should be evaluated on a parcel by parcel basis, in which the land owners would be given suggestions specific to their property. Such an effort could be part of a Firewise Community Program, discussed later in this section.

Forests and other protected wildlands are often in close proximity to structures. Clearing of brush, vines and other dangerous fuels may not be allowed by conservation land use restrictions. As a result, fuels may be located within the structural ignition zone, but homeowners lack the ability to manage the fuels. It is recommended that a process be put in place to allow property owners to implement Firewise practices on neighboring wildlands, in cooperation with the landowner, without negatively impacting conservation objectives.

For a home to ignite, all three sides of the fire triangle, heat, fuel and oxygen, must be present. In the WUI, which includes much of Prudence Island, a house may be the fuel. Flames from burning material like firewood piles, vegetation, and neighboring structures supply heat. Firebrands, or floating embers, can also supply heat when they collect on a house or nearby flammable materials like shrubs or firewood piles. Fires do not need to continuously burn through vegetation to ignite homes. Home ignitions depend on the characteristics of the home and its immediate surroundings, particularly the vegetation in the home ignition zone (Figure 31, 32).

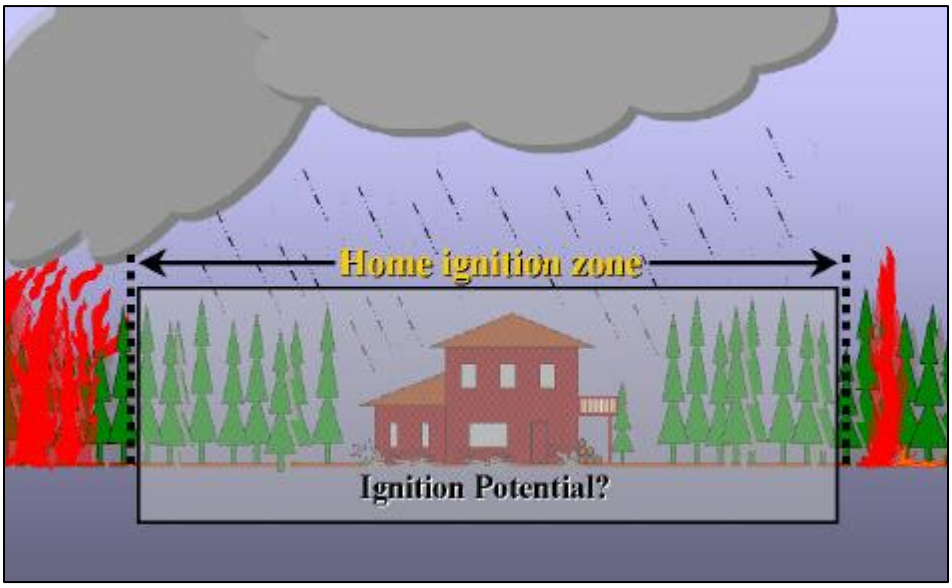

Figure 31: The home ignition zone (from Cohen 2000).

Most home ignitions in the WUI occur from lofted firebrands, measures to reduce home ignitability involve managing adjacent fuels and adjusting home design and building materials (Cohen 2000). Clearing the home ignition zone of vegetation or other flammable material and using non-flammable roofing material can greatly reduce the ignition of homes in the WUI. Howard et al. (1973) observed 95 percent survival for homes with non-flammable roofs and a vegetation clearance of 10 to 18 meters. Foote (1994) observed 86 percent survival for homes with non-flammable roofs and a clearance of 10 meters or more.

Homeowner initiatives to reduce the potential of home ignitions from wildland fire can be very successful. Many resources exist to aid homeowners in reducing structural ignitability from wildland fire. The National Fire Protection Association (NFPA) started the Firewise Communities initiative in 1997 to help communities adapt and live with wildfire while encouraging local solutions for wildfire safety and increased preparedness. The Firewise initiative has published many strategies to reduce the risk of structures burning in the WUI during a wildfire. Guides for landscaping and construction, as well as many other resources for homeowners, are available on the Firewise website, www.firewise.org.

Firewise has created guides and tools for homeowners, firefighters, and planners to aid in improving wildfire preparedness and reducing WUI fire hazards. For homeowners, they address strategies to reduce home ignition risk in two categories, landscaping and construction.

Figure 32: The Home Ignition Zone (FireWise accessed 2018)

LANDSCAPING

Firewise landscaping focuses on removing or limiting flammable vegetation in the home ignition zone. The home ignition zone can extend up to 200 feet surrounding the house in high hazard areas. A house surrounded by grass fuels has a home ignition zone of approximately 30 feet. In shrub fuels, the home ignition zone extends 50-100 feet around a structure (Figures 31,32). On Prudence Island, structural ignition from wildland fire would likely originate from falling embers resulting from burning shrubs and vines climbing into trees.

Maintaining a Firewise area in the 30 feet surrounding the home can reduce the risk of structural ignition from firebrands. This initial 30 feet should be a well-irrigated area free of dense vegetation. The Firewise Guide to Landscape and Construction makes the following recommendations for landscaping to reduce fire risk in this area:

- Space plants carefully, choose low-growing plants free of resins, oils, and waxes that burn easily.
- Keep grass short by mowing the lawn regularly.
- Prune trees up to 6-10 feet from the ground, trimming trees that overhang the house.
- Space conifer trees 30 feet between crowns.

- Within 5 feet of the home, create a 'fire-free' area using non-flammable landscaping material like pebbles and/or high-moisture content plants (Figure 33).
- Remove dead vegetation from under the deck and within 10 feet of the house.
- Store firewood away from the home.
- Water plants, trees, and mulch regularly.

Figure 33: Non-flammable materials near the home's foundation (from Firewise Guide).

If the home is in surrounded by dense shrub fuels, the next 30-100 feet should also be maintained to reduce fuel. Plants should also be low-growing, well-irrigated, and less flammable. The Firewise Guide suggests the following:

- Leave 30 feet between clusters of 2-3 trees, or 20 feet between individual trees.
- Encourage a mixture of deciduous and coniferous trees.
- Use driveways, gravel or rock walkways, and lawns to create fuel breaks (Figure 34).
- Prune trees up 6-10 feet from the ground.

Figure 34: Fuel breaks between vegetation and the house (from Firewise Guide).

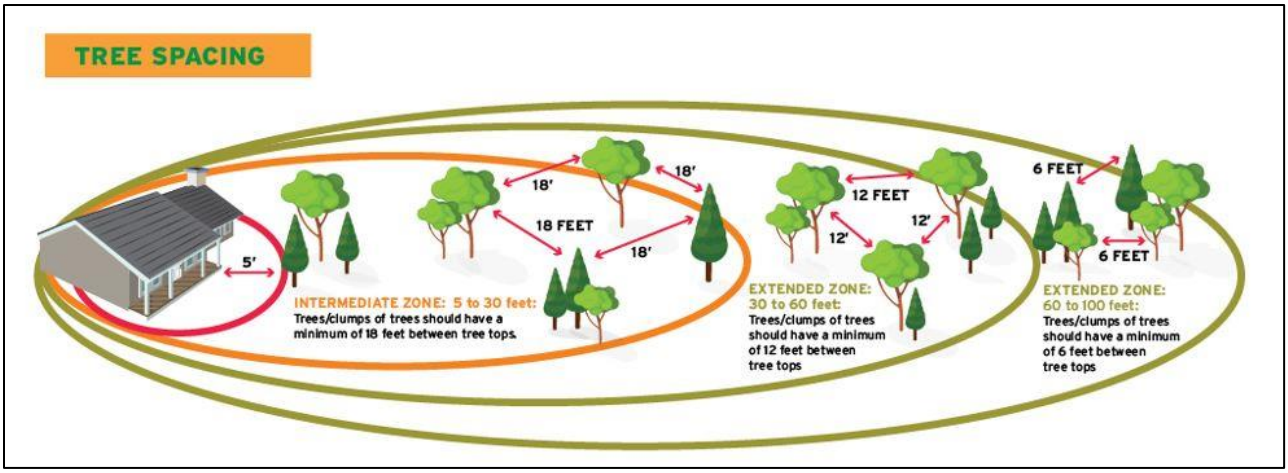

Figure 35: Intermediate and Extended Zones (FireWise accessed 2018)

CONSTRUCTION

Many homes on Prudence Island are historic and it may not be feasible to retro-fit Firewise designs. Thus, the primary focus of Firewise work on the island should be on creating defensible space around structures instead of addressing construction. New construction and home renovations, however, should incorporate the following simple recommendations in order to reduce the probability of structural ignition.

Fire resistant building materials and home design can reduce a home's ignition potential. Many lofted firebrands collect on roofs and are responsible for igniting structures (Cohen 2000). Roof ignitions commonly result in total home destruction. The Firewise Guide recommends using Class A, B, or C rated fire-resistant roofing material. Fire resistant building materials like cement, stucco, plaster, or masonry on exterior walls retard fire spread. The Firewise Guide also makes the following suggestions to building or retro-fitting a Firewise home:

- Use double-paned or tempered glass: This reduces the risk of fracture or collapse during an extreme wildfire. Glass skylights are a better choice than fiberglass or plastic, which could melt and allow embers to enter the home (Figure 36).
- Enclose eaves, fascias, soffits and vents: Enclosing eaves or vents with metal screens or boxing them in will prevent firebrands from collecting or entering the home through vents (Figure 37).
- Protect overhangs and other attachments: Remove vegetation from overhangs, room additions, bay windows, decks, or fences. Boxing in the undersides of decks or balconies with noncombustible or fire-resistant materials prevents firebrands from collecting underneath (Figure 38).
- Separate wooden fences from the house: Do not attach fences of flammable materials like wood directly to the house because they act as fuel bridges. Instead, separate the fence from the house with a masonry or metal barrier.

Figure 36, 37, 38: Home construction that reduces the ignition potential (from Firewise Guide).

FIREWISE COMMUNITIES

The Firewise program has a mechanism for certifying Firewise Communities. Communities, such as Prudence Island, can go through the process of becoming a certified Firewise Community. Benefits of the program include increased public knowledge and awareness about wildfire, a plan of action to reduce wildfire hazard, and greater access to grant funding for wildfire safety or fuel mitigation.

There are currently 13 Firewise Communities in New England; 9 in Maine, 3 in Massachusetts, and 1 in New Hampshire. There are currently no Firewise Communities in Rhode Island. Nationally, there are 1,486 participating communities across 41 states (Firewise 2018).

The five basic steps to becoming a nationally-recognized Firewise Community are as follows:

1. Obtain a wildfire risk assessment from the Rhode Island Department of Environmental Management (this plan may be able to be used as a surrogate risk assessment)
2. Create an action plan based on the assessment that includes 3 steps to improve wildfire preparedness (this plan satisfies the requirement as it outlines specific treatments)
3. Conduct a "Firewise Day" event to publicize the cause, educate residents, and do work such as clearing debris
4. Invest a minimum of $2 per capita in Firewise work each year, which could be through grants or volunteer hours (20 people volunteering 2.5 hours equates to nearly a $1,000 investment)
5. Submit an application to the state Firewise liaison

If Prudence Island residents follow the steps to become a Firewise Community, Firewise USA will present them with plaques and signs to display in the community. Becoming a Firewise Community can improve wildfire prevention education and increase wildfire preparedness. The certification also helps when applying for grants for fuel treatments. Individual parcel assessments may be included as part of Firewise Community planning.

SUMMARY OF RECOMMENDATIONS

RECOMMENDATION MATRIX	
Improve wildland suppression capabilities	
Implement wildland fire focused trainings	
Priority	Action Item
1	Host drills and simulations with mutual aid partners in order to increase cohesiveness and coordination for mutual aid responses
2	Pursue NWCG trainings and qualifications in order to increase firefighter knowledge and skills of wildland firefighting
3	Pursue specialized trainings for fire department in water delivery and water use conservation in order to increase effectiveness in fighting fire on the island
4	PIVFD and mutual aid partner participation in prescribed fires
Modernize firefighting apparatus to fit the needs of Prudence Island	
Priority	Action Item
1	Replace Brush #85 with two smaller, off-road capable brush engines
2	Construct a new substation to house equipment in a temperature-controlled environment
3	Acquire one off-road capable tanker of 1,000-gallon capacity or greater
4	Replace the truck on which Pumper #1 is mounted with a newer, off-road capable vehicle
5	Acquire two side-by-side off-road utility vehicles (UTV) engines to improve interior wildland fire fighting capabilities
Improve water supply in order to decrease refill times and increase the amount of water available for fire suppression	
Priority	Action Item
1	Complete construction of Warnerville cistern
2	Construct new cistern at Broadway & Merrill Ave.
3	Construct new cistern at Neck Farm Rd
4	Identify site and construct new cistern in the Prudence Park area.
5	Construct new cistern at NBNERR offices
6	Construct new cistern at North End State Park
7	Replace cistern at PIVFD station
Note	Preferred cistern characteristics: freeze-proof (heated where needed), rain-capturing capability where possible, raised off the ground for top-fill capability if constructed at proposed substation
Develop fire department policies and procedures specific to wildland fire	
Priority	Action Item
1	Develop wildfire SOPs and communication plan
2	Conduct hazard assessment for wildfire suppression – assessment should consider direct attack, indirect attack and the strategic use of fire breaks
Decrease fire danger to community through fuel and hazard mitigation	
Improve and maintain fire breaks	
Priority	Action Item
1	Maintain mowed roadsides to give firefighters defensible space to fight fire from roadsides
2	Maintain fire breaks in place at North End wall and within the south end
3	Improve the Heritage – Army Camp trail to serve as a fire break and remain accessible by Type 6 engine
4	Improve the Division Wall trail to be accessible by UTV fire engine

Implement fuel treatments in areas of high fire danger risk	
Priority	Action Item
1	Clear vegetation from under and around powerline
2	Evaluate the Albro Farm Rd. & Stevens Landing Ln. area for fuel reduction treatments
3	Evaluate South Reserve Dr. area for fuel reduction treatments
4	Evaluate Neck Farm Rd. area for fuel reduction treatments
5	Consider understory/ladder fuel treatments on forested areas near roadways west of Gov. Paine Rd. and Homestead Ave.
6	Evaluate Narragansett Rd. west of the fire station for fuel reduction treatments
Implement prescribed fire to reduce fuel loads	
Priority	Action Item
1	Expand prescribed fire program in the south end of the island
2	Consider implementing prescribed fire in the central forest, although ladder fuel treatments would likely be needed as a precursor to implementation
3	Consider prescribed fire operations in uninhabited areas of the Neck and North End, with fuel treatments likely necessary prior to implementation
Reduce structural ignitibility through Firewise measures	
Implement parcel-based assessments for all properties on the island, providing land-owners with site-specific recommendations	
Priority	Action Item
1	Cooperate with RI-DEM or other agency to evaluate individual properties
Conduct public outreach on Firewise mitigation measures	
Priority	Action Item
1	Host “Firewise Day”
2	Distribute printed materials
Develop a process to allow property owner to implement Firewise recommendations on forested lands within the home ignition zone	
Priority	Action Item
1	Work with public and private landowners to address liability, resource management and other concerns related to Firewise implementation

APPENDIX A: SOURCES OF FUNDING

Volunteer Fire Assistance – Rhode Island DEM Division of Forest Environment
Through the USDA Forest Service's Volunteer Fire Assistance program, the Division of Forest Environment is enabled to issue grants and materials to towns with populations less than 10,000. This program provides technical, financial and other assistance to fire departments for forest fire related purposes.
http://www.dem.ri.gov/programs/forestry/documents/vfagrant.pdf

Federal Excess Property Program – Rhode Island DEM Division of Forest Environment
Within Rhode Island, the Department of Administration oversees the USDA Forest Service's Excess Property Program. This program provides cities and towns with free firefighting materials. Any equipment acquired must be used for fire control purposes only.

State Agency for Surplus Property – Rhode Island State Agency Fire Marshal's Office
Federal surplus personal property donation programs enable certain nonfederal organizations to obtain property the federal government no longer needs.
https://www.gsa.gov/acquisition/government-property-for-sale-or-disposal/personal-property-for-reuse-sale/for-state-agencies-and-public-orgs/state-agencies-for-surplus-property-sasp-contacts#RhodeIsland

America the Beautiful Grant Program – Rhode Island DEM Division of Forest Environment
The purpose of the America the Beautiful Grant Program is to provide municipalities and non-governmental agencies to better plan and manage urban forest, and conduct public education and outreach.
http://www.dem.ri.gov/programs/forestry/

Forest Stewardship Program – Rhode Island DEM Division of Forest Environment
The FSP is implemented in cooperation with the USDA Forest Service, and supports private landowners' efforts to manage, enjoy and care for their land long-term. Enrollment in the plan provides tax incentives and requires a 10-year commitment from the landowner.
http://www.dem.ri.gov/programs/forestry/stewardship/index.php

Environmental Quality Incentives Program - Natural Resource Conservation Service
The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides technical and financial assistance to agricultural producers and forest land owners who want to improve and protect the condition of soil, water, air, plants and animals.
https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/ri/programs/financial/eqip/?cid=nrcs144p2_016499

Wildlife Habitat Incentive Program - Natural Resource Conservation Service
The Wildlife Habitat Incentive Program (WHIP) is a voluntary program that provides technical and financial assistance to private landowners who want to improve fish and wildlife habitat or restore natural ecosystems on their land.
https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/programs/farmbill/rcpp/?cid=nrcs142p2_034734

Assistance to Firefighters Grant Program - FEMA and US Fire Administration Program
The Assistance to Firefighters Grant Program awards one-year grants directly to fire departments and non-affiliated emergency medical service organizations and State Fire Training Academies to enhance their fire and fire-related hazard response abilities. The funding is intended to supply critically needed resources to equip and train emergency personnel to recognized standards, enhance operations efficiencies, foster interoperability, and support community resilience.
https://www.fema.gov/assistance-firefighters-grant

Community Facilities Loans and Grants - Rural Housing Service, U. S. Dept. of Agriculture

Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required.
https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program

Fire Management Assistance Grant Program - Readiness, Response and Recovery Directorate, FEMA
Fire Management Assistance is available to States, local and tribal governments, for the mitigation, management, and control of fires on publicly or privately-owned forests or grasslands, which threaten such destruction as would constitute a major disaster.
https://www.fema.gov/grants

Hazard Mitigation Grant Program - Federal Insurance and Mitigation Administration, FEMA
The Hazard Mitigation Grant Program provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration.
https://www.fema.gov/hazard-mitigation-assistance

Pre-Disaster Mitigation – FEMA
Grant proposals are submitted to FEMA through Rhode Island Emergency Management Agency with 75% of costs covered by Federal and 25% by local or state funds. Funding plans and projects reduces overall risks to people, property and infrastructure, while also reducing reliance on funding from actual disaster declarations. Ranking favors Firewise communities among many other factors.
https://www.fema.gov/pre-disaster-mitigation-grant-program
http://www.riema.ri.gov//grants/index.php

Wildfire Risk Reduction Program – Firewise USA, National Fire Protection Association (NFPA)
The Firewise USA program is co-sponsored by the USDA Forest Service, the U.S. Department of the Interior, and the National Association of State Foresters.

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