Research Brief: Loss of forest in large unfragmented blocks of forest in Rhode Island

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1 Introduction

This research brief was prepared by the University of Rhode Island (URI) in response to a request from the RI Woodland Partnership[1] to provide data on recent loss of forest in RI. Specifically we were asked to estimate the extent of recent loss of forest in large unfragmented blocks of forest with an area of at least 250ac. These large unfragmented blocks are important for many wildlife species, and were mapped by the Rhode Island Department of Environmental Management (RIDEM) during the preparation of the 2015 Rhode Island Wildlife Action Plan.[2] We were also asked to (a) estimate how much of the recent loss of forest in these unfragmented blocks was in areas that were not classified as wetlands, conservation land, or within the Urban Services Boundary; and (b) to describe the 2018 landuses to which these forested areas had been converted. The report was updated in January 2020 to include an estimate the loss of forest in these blocks by town.

2 Methodology

The Wildlife Action Plan includes two size classes of large unfragmented forests: those with an area of 250 – 500 areas, and those with an area of over 500 acres (Figure 1). The Wildlife Action Plan includes a link to download this spatial data as ArcGIS shapefiles.[3] When RIDEM prepared these layers, they utilized the 2011 Ecological Communities Classification Dataset to identify areas classified as forest.[4]

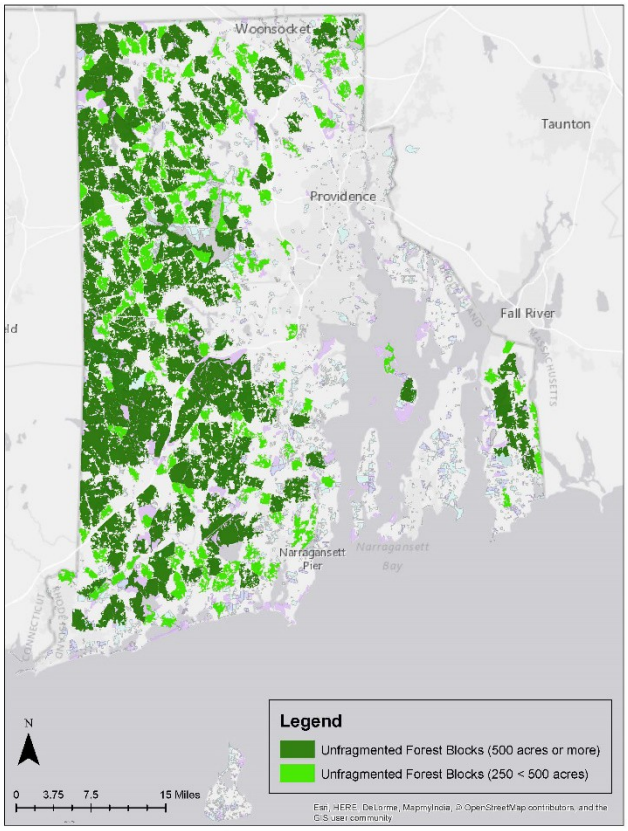

Figure 11 Large Unfragmented Forest Blocks in Rhode Island

URI is in the process of mapping the extent of young forest habitat in Rhode Island based on 2018 imagery. In the process of preparing a statewide map of this habitat type, we delineated areas that were classified as forest in 2011 but converted to other land uses by 2018. We are still refining this map, but the current version is publicly available on Arc GIS Online.[5]

We are not able to estimate the total change in forested area between 2011 and 2018 because the 2011 methodology for identifying forested

[1] RI Woodland Partnership: https://rhodeislandwoods.uri.edu/ri-woodland-partnership/
[2] Wildlife Action Plan: http://www.dem.ri.gov/programs/fish-wildlife/wildlifehuntered/swap15.php
[3] Link to GIS layers: http://ridemgis.maps.arcgis.com/home/item.html?id=cc578468dd4a42ae8f81baab3a4c2b1c
[4] Ecological Communities Classification 2011: http://www.rigis.org/datasets?q=ecological%20communities%20classification%202011
[5] Young forests of RI 2018: https://arcg.is/1X4PX8

land was quite different from the methodology we used in 2018. For example, the Ecological Communities Classification classified land within approx. 50 meters of houses as "developed land". In our 2018 mapping, we excluded lawns, houses and driveways, but included forested land that was close to houses. Therefore rather than trying to estimate the total change in forested area, we conducted a more limited analysis – we quantified the extent of land in the large blocks of unfragmented forests that had been converted to non-forest by 2018.

We conducted the analysis using ArcGIS version 10.7.1 (Environmental Systems Research Institute, Redlands, CA) through the following steps:

a) We used the ArcGIS "erase" tool to delete the 2018 forested area (from our recent analysis) from the large unfragmented forest blocks in the Wildlife Action Plan. This identified areas that had been converted to non-forest land uses.
b) We used the ArcGIS "multipart to singlepart" tool to create a set of individual polygons, and selected polygons with an area of at least 1 acre.
c) We visually checked these polygons with the 2011 imagery to ensure that they had been property classified as forest, and with the 2018 imagery to ensure that they had been converted to another land use by 2018. We deleted any polygons that had been improperly classified in either time.
d) We used the ArcGIS"erase" tool to assess how much of the converted area was not in wetlands, state conservation areas, local conservation areas, or the Urban Services Boundary.[6]
e) We classified the 2018 landuse of each forest parcel from the previous step into nine classes, and calculated the acres in each class.
    - Agriculture,
    - Barren/Unknown
    - Grassland/Pasture
    - Industrial Development
    - Gravel Mines
    - Residential - house/yard/driveway
    - Solar Array
    - Water
    - Wind turbines

3 Results

We estimated the total extent of land in the large unfragmented forest blocks that was classified as forest in 2011 but had been converted to other landuses by 2018 (Table 1) with a breakdown by town (Table 2). Please note that this is not the total change in forested areas during the period - there was undoubtedly some new forest created during the period as fields were abandoned. Furthermore, this analysis only includes polygons with an area of at least 1 acre. The extent would be larger if we included smaller polygons.

[6] These four GIS layers are available at: http://www.rigis.org/datasets?q=conservation

Table 1. Extent of forest (acres) in large unfragmented forest blocks identified in the RI Wildlife Action Plan that were converted to non-forest land use between 2011 and 2018

	Unfragmented forest blocks: 250–500 ac	Unfragmented forest blocks: greater than 500 ac	Total (unfragmented forest blocks of at least 250 ac)
a) Total extent of polygons (>= 1 ac) classified as forest in 2011 and converted to non-forest by 2018	647 ac	1,267 ac	1,914 ac
b) Same as (a) after excluding wetlands and conservation lands	594 ac	1,168 ac	1,762 ac
c) Same as (b) after excluding land within the Urban Services Boundary	269 ac	875 ac	1,144 ac

Table 2. Extent of forest (acres) in large unfragmented forest blocks identified in the RI Wildlife Action Plan that were converted to non-forest land use between 2011 and 2018 by town, after excluding wetlands, conservation lands, and land within the Urban Services Boundary.

NAME	500 or more ac blocks	250 - 500ac Blocks	TOTAL
BURRILLVILLE	50	34	84
CHARLESTOWN	46	19	65
COVENTRY	196	15	211
CRANSTON	12	0	12
CUMBERLAND	5	6	11
EAST GREENWICH	13	0	13
EXETER	41	1	42
FOSTER	48	128	176
GLOCESTER	60	9	69
HOPKINTON	12	5	16
NORTH KINGSTOWN	4	0	4
NORTH SMITHFIELD	27	17	44
RICHMOND	26	0	26
SCITUATE	62	23	85
SMITHFIELD	2	0	2
SOUTH KINGSTOWN	108	9	117
TIVERTON	8	0	8
WEST GREENWICH	110	2	112
WESTERLY	47	2	49
TOTAL	875	269	1,144

In Table 3, we present our analysis of the current land use of the previously-forested parcels included listed in Table 1, Line c, which did not include wetlands, conservation land or areas within the Urban Services Boundary. We classified the current land use of these parcels into nine categories. For some recently-converted parcels, we could not detect the purpose for the conversion, so we classified these parcels as "Barren/Unknown". The most common new land use was residential development (houses, yards, driveways), which represented 28% of the converted land.

Table 3. Current land use (2018) of parcels that had previously been part of large unfragmented forest blocks identified in the RI Wildlife Action Plan, but were converted to non-forest between 2011 and 2018. This analysis excludes wetlands, conservation lands and areas within the Urban Services Boundary.

2018 Landuse	Unfragmented forest blocks: 250–500 ac		Unfragmented forest blocks: greater than 500 ac		Total: unfragmented forest blocks of at least 250 ac	
	acres	percent	acres	percent	acres	percent
Agriculture	18	7%	68	8%	86	8%
Barren/Unknown	132	49%	176	20%	308	27%
Grassland/Pasture	25	9%	165	19%	190	17%
Industrial Development	35	13%	16	2%	51	4%
Gravel Mines	14	5%	78	9%	92	8%
Residential - house/yard/driveway	30	11%	292	33%	322	28%
Solar Array	11	4%	34	4%	45	4%
Water	4	1%	0	0%	4	0%
Wind turbines	0	0%	46	5%	46	4%
Total	269	100%	875	100%	1,144	100%