A HABITAT-BASED APPROACH FOR IDENTIFYING OPEN-SPACE CONSERVATION NEEDS IN SOUTHERN MAINE TOWNS

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A Report to the
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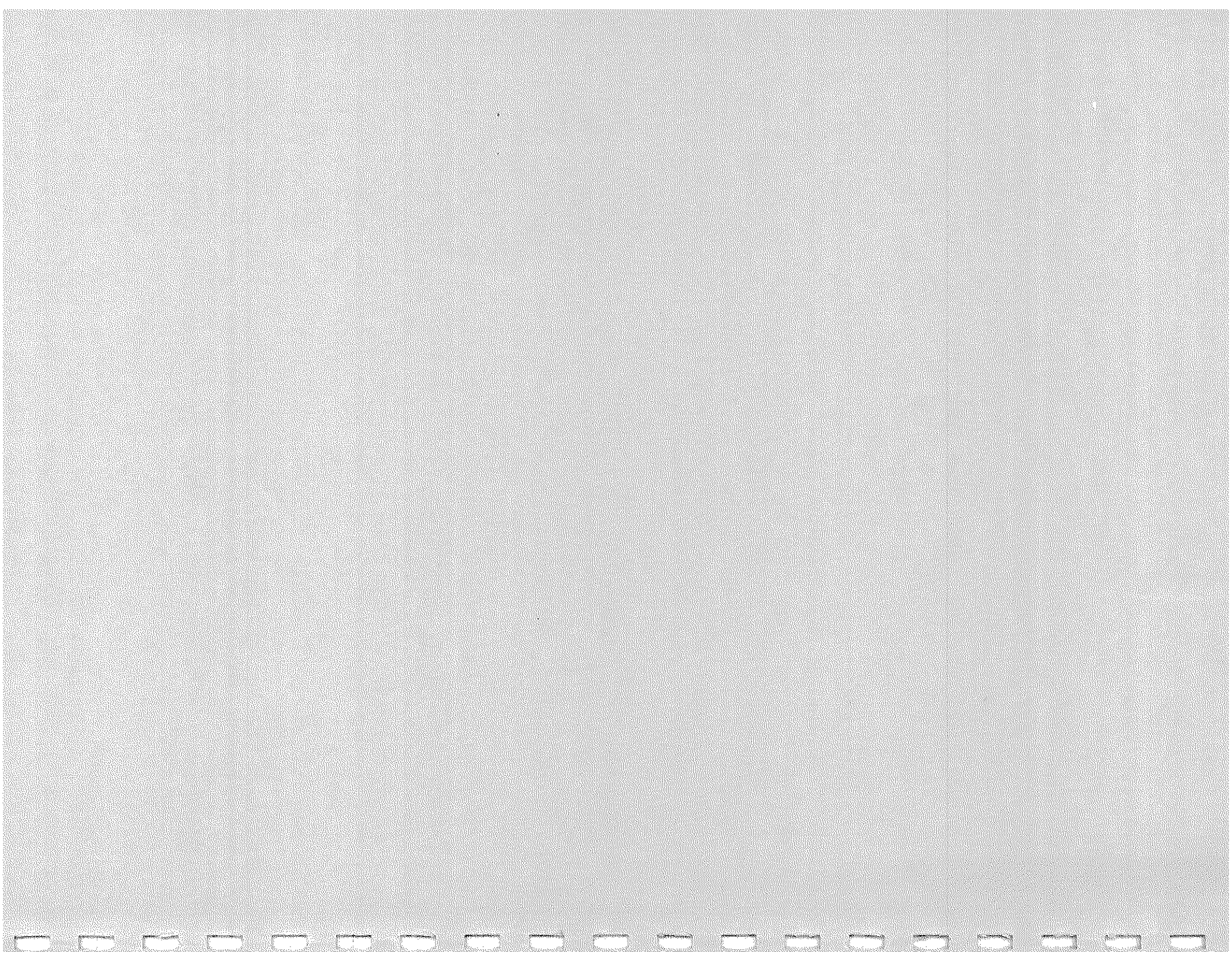

Table of Contents

List of Tables

List of Figures

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Abstract: A method to identify habitats that, if conserved, could be expected to maintain terrestrial vertebrates (= wildlife) currently breeding in southern Maine (i.e., lower half of state) into the future was developed with the Maine Department of Inland Fisheries and Wildlife (MDIFW). This method is based on digital maps and thus can be analyzed with a Geographic Information System (GIS). Southern Maine was selected for study because this region contains the greatest diversity of plants and animals in the state, has relatively few conservation lands, is experiencing sprawl into rural areas, and is projected to lose 569 mi^2 (1,473 km^2) of agricultural and forest lands by 2050. The backbone of the method is the presumed conservation of habitats immediately adjacent to all waterways and water-bodies, termed Shoreland Zones. Added to this backbone are other habitats recognized by the Maine Legislature as worthy of conservation; these we termed Important Habitats. Although some upland vegetation occurs in the Shoreland Zones and Important Habitats, these areas are comprised mostly of lowland vegetation. Currently, 270 wildlife species (amphibians = 17, reptiles =16, birds = 183, mammals = 54) are estimated to inhabit southern Maine, with 80% to 95% (median = 85%) having adequate habitat (defined as the types of habitats needed to support >10 individuals of that species in the town) in Shoreland Zones and Important Habitats. Wildlife not captured by Shoreland Zones and Important Habitats are those medium-to-large-bodied birds and mammals requiring large areas of uplands. To identify habitats for these species, blocks of agricultural and forest lands not intersected by roads, pipelines, powerlines, or railroads were mapped in the GIS. The conservation value of these relatively intact upland blocks, if maintained in current cover conditions, should be assessed in terms of size (i.e., the bigger the better) and location (i.e., the more connected to other habitats the better). Advantages of the method include that it deals with issues and habitats familiar to towns, and is computerized and hence cost efficient and practical to apply across southern Maine. Although the approach does have limitations (e.g., assumes complete data), these are addressed within this analysis method. The habitats identified by this method, if conserved, can reasonably be expected to maintain a town's wildlife well into the future.

Introduction and Background

The southern half of Maine is a conservation priority because it supports the highest diversity of plants and animals in the state, the highest number of endangered and threatened terrestrial vertebrates in Maine, and only scattered and small conservation lands (Krohn *et al.* 1998). In addition, this part of Maine supports the majority of the state's human population and is experiencing a repopulation of rural areas as people move out of the towns and cities into the less populated areas (O'Hara 1997, Krohn *et al.* 1998:6). While there is currently no conservation crisis *per se* in southern Maine, continued expansion of the human population will eventually negatively affect the region's wildlife unless land conservation measures are implemented. It has been estimated that by the year 2050 the eight counties of southern Maine will have an additional 428 mi^2 (1,109 km^2) of urban lands while losing 569 mi^2 (1,473 km^2) of agricultural and forest lands (Plantinga *et al.* 1999). Thus, preserving viable populations of all species of terrestrial vertebrates that regularly breed in southern Maine today requires that we identify and conserve the habitats needed to maintain these wildlife species.

Over 97% of the land in the southern portion of Maine is privately owned (Krohn *et al.* 1998: A9-1). Conserving wildlife habitats when lands are privately owned requires integration of local concerns in the broad context of open-space conservation where scenic, recreational and other values are considered (O'Hara 1997, Venno 1991). Town governments play an important role in land conservation in Maine. Specifically, Maine towns implement shoreland zoning ordinances, develop growth management plans, and enforce various land development laws [for details, see Venno (1991: Appendix A)]. State laws also play an important role in wildlife

habitat conservation in Maine. Specifically, under the Maine Natural Resources Protection Act (MNRPA), the MDIFW is responsible for identifying and conserving Significant Wildlife Habitat, defined as habitats for endangered or threatened species, high and moderate value deer wintering areas, high and moderate value waterfowl and wading bird habitats, along with some other specified habitats (Venno 1991:34). MDIFW is also responsible, under the Maine Endangered Species Act (MESA), for identifying and conserving Essential Habitats for endangered species (Venno 1991: Appendix A). Obviously, those habitats identified by the Maine Legislature are of special concern to the citizens of Maine, and thus should receive special attention in open-space conservation.

Assuming that the above habitats (hereafter called Important Habitats) along with shoreland and wetlands protected under state and Federal regulations (hereafter termed Shoreland Zones) are protected into the foreseeable future, the issues then become to (1) identify what species are, and are not, conserved by Important Habitats and Shoreland Zones; and (2) for species not conserved by these areas, identify what habitats need conserving and where.

Goal and Objectives

The goal of this project is to identify areas in southern Maine for towns to include in open-space conservation such that potential habitat is provided for all terrestrial vertebrates estimated to be regular breeding species in that town during the mid-1990s. To work toward this goal, we developed a GIS that can be used throughout the southern half of Maine to standardize the integration of wildlife habitat information into town planning, especially as related to long-

term planning for maintenance of open spaces (i.e., lands that are without human habitation). Project objectives were (1) to identify, at the scale of individual towns, what wildlife species are, and are not, potentially conserved by Shoreland Zones and Important Habitats; and (2) for those species whose habitat requirements are not met within these habitats, to identify open-spaces where conservation would provide long-term habitat for these species.

Study Area and Method Development

Study Area

The portion of Maine used in this analysis extends from southernmost Maine, north to Coburn Gore, east to Lincoln, and southwest along the eastern shore of the Penobscot River. Three hundred and ninety-seven townships are included in our analysis (Figure 1), and the total size of this area (including water) is 13,623 mi^2 (35,280 km^2). The southern part of the area has the mildest climate in Maine, with geomorphology ranging from rolling foothills in the west to the Atlantic Ocean in the east (Krohn *et al.* 1999). The coastal plain of this area, which comprises most of southern Maine (Krohn *et al.* 1998:7), consists of 64.7% forestlands, 17.3% agricultural land, 9.5% wetlands, 5.4% open water, and 3.1% developed lands (Krohn *et al.* 1998:A3-1).

Method Development

The landscape analysis method presented in this report was developed through close

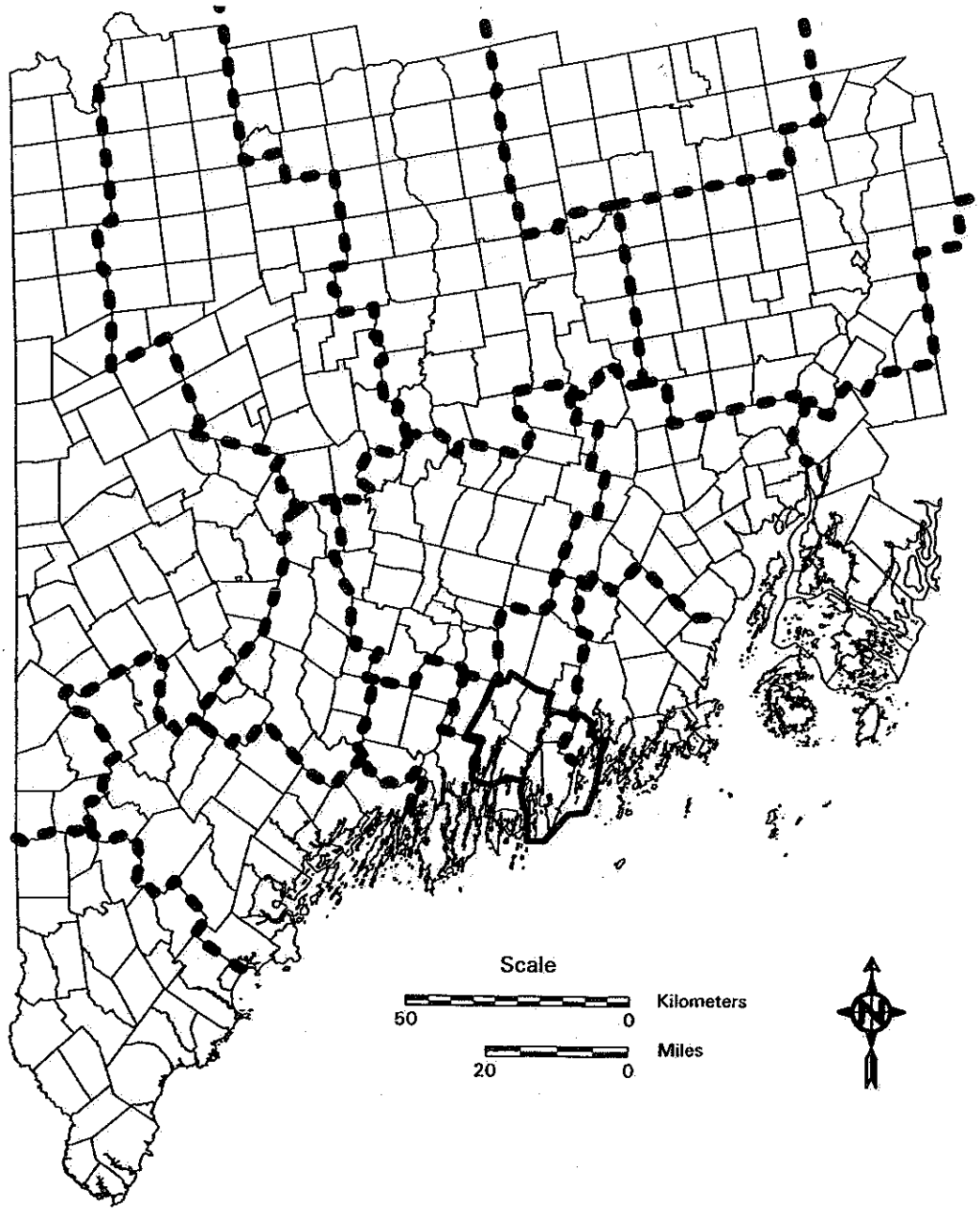

Figure 1. Location of towns (solid lines) and counties (dashed lines) in southern Maine for which the data were compiled. The heavy outline is the Damariscotta area (see Figure 2 for more detail of this area).

cooperation with the MDIFW. Specifically, the Department assigned personnel to a Wildlife Division Habitat Committee (see Acknowledgments) with whom we worked to establish objectives, define habitats of interest, and outline an analysis approach. The authors (i.e., WBK and JAH) would then assemble the appropriate data in a GIS, make preliminary tabulations and maps, and report back to the Committee for their critique and discussion. After revisions, the process would be repeated until the Committee was satisfied that the approach met their purpose. Two of the review meetings included, in addition to members of the Committee, representatives of the Maine Audubon Society (MAS), Maine Natural Areas Program (MNAP), and the U.S. Fish and Wildlife Service (USFWS).

From the outset, the Committee had a number of characteristics they considered essential in defining a useful landscape analysis method. First and foremost, the method had to be comprehensive and designed to conserve all vertebrates native to southern Maine. The method should conserve plant as well as animal communities, and not only account for the different types of habitats used by each wildlife species, but should also meet their spatial needs. That is, not only should the appropriate habitat for each wildlife species be conserved, but this habitat must be in large enough blocks that it's functionally intact (i.e., likely to support a breeding unit). The method must allow for incremental analyses in that as habitats are identified and protected, users can determine what species are, and are not, likely to be conserved. Thus, as an increment of habitat covering the needs of one group of species is done, users can move on to identifying and protecting habitats for species groups previously under- or un-protected. The Committee recognized that over the long-term habitat fragmentation is a serious threat to many wildlife species (e.g., Robbins *et al.* 1989, Robinson *et al.* 1995), and that large-bodied and predatory

animals require large areas (e.g., bears and raptors). Thus, the method must include analyses of habitat block sizes and assess habitat patterns over multiple towns if habitats are to be conserved for the full range of wildlife species. In summary, the method must sequentially identify and conserve habitats, of the appropriate type and size, until the goal of providing habitats for the entire vertebrate wildlife community currently living in southern Maine is realized.

Data Sources and Methods

Following are descriptions of the data used in the development of the method reported on here, giving special attention to describing the data used and where it came from. See Hepinstall (2000) for additional technical details related to these data.

Predicted Wildlife Occurrences

Predictions of the presence of terrestrial (i.e., non-fish, non-marine) vertebrate species that regularly breed in Maine (hereafter referred to simply as wildlife) were derived from predictions made by Krohn *et al.* (1998) for the Maine Gap Analysis Project (ME-GAP). Species predictions were based on combining a vegetation and land cover map of Maine (Hepinstall *et al.* 1999) with species-habitat associations and species range maps to make spatially explicit predictions of where species are likely to occur on the landscape (Boone and Krohn 1998a,b). The species predictions were modeled at 295.3 ft (90 m) pixel resolution for ME-GAP, but we did all analyses at 98.4 ft (30 m) resolution to more precisely represent the edge of the Shoreland Zone. Expected species lists for each town based on ME-GAP predictions were calculated using

The Shoreland Zone GIS layers were merged into one file and converted into a raster format with 98.4 ft (30 m) pixel size. The state shoreland zoning regulations are more complex than the above list would indicate, not protecting first order streams, wetlands under 10 ac (4 ha) unless attached to other wetlands or water, or forested wetlands. We chose to include all water and wetlands in our database on the basis that we were attempting to ascertain the possible species list for each town. Wetland data at a 1:24,000 scale, in digital form, came from the USFWS National Wetlands Inventory (NWI). NWI data, in turn, come from interpreted color-infrared aerial photographs (for more details on the NWI data for Maine see Krohn *et al.* 1998: 12, Appendices, 1 and 2).

Important Habitats

The MDIFW provided a digital coverage of Important Habitats from habitats defined by the MNRPA. These data were added to the Shoreland Zone data and this layer was used with the species predictions from ME-GAP. Important Habitats included Biological and Conservation Data system (BCD) points and polygons (i.e., occurrences of rare invertebrates and vertebrates), wintering areas of White-tailed Deer (*Odecoileus virginianus*), seabird nesting islands, shorebird nesting, feeding, and staging areas and tidal waterfowl and wading bird habitats. Essential Habitat for the Bald Eagle (*Haliaeetus leucocephalus*) (MDIFW 1998), Roseate Tern (*Sterna dougallii*) and Least Tern (*S. antillarum*) was included in this data layer.

The percentage of species that inhabited Shoreland Zones (SZ) and Important Habitats (IH) were calculated by (1) the total habitat available for ≥ 1 individual of a species, and (2) > 10 individuals of a species. Specifically:

$$(1)\ \%\ \text{of total potential species missed} = \frac{\text{No. of species in SZ + IH within a town}}{\text{Total no. of species predicted by ME-GAP}} \times 100;\ \text{and}$$

(2) % of total potential species with > 10 individuals per species missed = $\frac{\text{No. of species with > 10 individuals in SZ + IH within a town}}{\text{Total no. of species predicted by ME-GAP with area for > 10 individuals}}$ X 100.

Blocks of Upland Habitat

To locate potential habitat for the species missed by the Shoreland Zones and Important Habitats, we developed a map of blocks of relatively unbroken, mostly upland habitats. Upland habitats were defined by the superclasses in Hepinstall *et al.* (1999) as Agricultural Lands and Forestlands (including forested wetlands). Blocks of agricultural and forest lands unbroken by roads (i.e., interstate, primary, secondary, and improved), pipelines, powerlines, and railroads were classified by sizes and color coded (i.e., larger the block, the darker the color). Road data came from MOGIS and were developed by the Maine Department of Transportation, and were mapped at a scale of 1:24,000. By visually inspecting the blocks of undeveloped habitats, and relating these blocks to the size and types of habitats needed to conserve upland species requiring large areas, habitat for species not adequately protected in Shoreland Zones and Important Habitats could be identified. To select upland blocks for conservation, we recommend that larger blocks be selected over small ones, and that blocks containing or connecting a variety of habitats (e.g., Shoreland Zones, Important Habitats, and conservation lands) be given special consideration. Additional factors, such as size of ownerships, land owner interest in conservation, and threat of development can also be considered.

Note that blocks of upland habitats are especially important to large animals with large spatial requirements, and to some smaller animals with population area requirements exceeding individual needs. For example, a minimum of 1,215 ac (3,000 ha) has been suggested to retain

breeding songbirds who do poorly along forest edges (Robbins *et al.* 1989); for some grassland breeders, fields should be at least 40.5 to 81 ac (100 to 200 ha) in size (Vickery *et al.* 1994).

Results - Damariscotta Area

To give the reader a sense of how to apply this landscape analysis method, we present data for the eight towns in the Damariscotta area of southcentral Maine (Figure 2). When not too unwieldy, data for the eight study towns are shown along with the data from all of the study area. When southern Maine data are too extensive, however, only data for the Damariscotta area are cited in the text; southern Maine results are given in the appendices.

Town Context and Characteristics

Most towns within the southern Maine study area are between 21 and 50 mi^2 (54.4 - 129.5 km^2) in size. Compared to all of southern Maine, the towns in the Damariscotta study area are smaller, ranging from 11 to 40 mi^2 (28.5 - 103.6 km^2) (Figure 3). Within these areas, the Damariscotta towns are covered mostly by forests, ranging from 61.2 to 77.3% of each town (Table 1) (see Appendix B for southern Maine data by town). The percentage of each town in agriculture generally ranges from 10 to 15%, with two towns (Bremen and Edgecomb) below 7% (Table 1). Wetlands occur over 11-15% of four towns, and the remaining four towns have only 7-10% of their total areas in wetlands (Table 1).

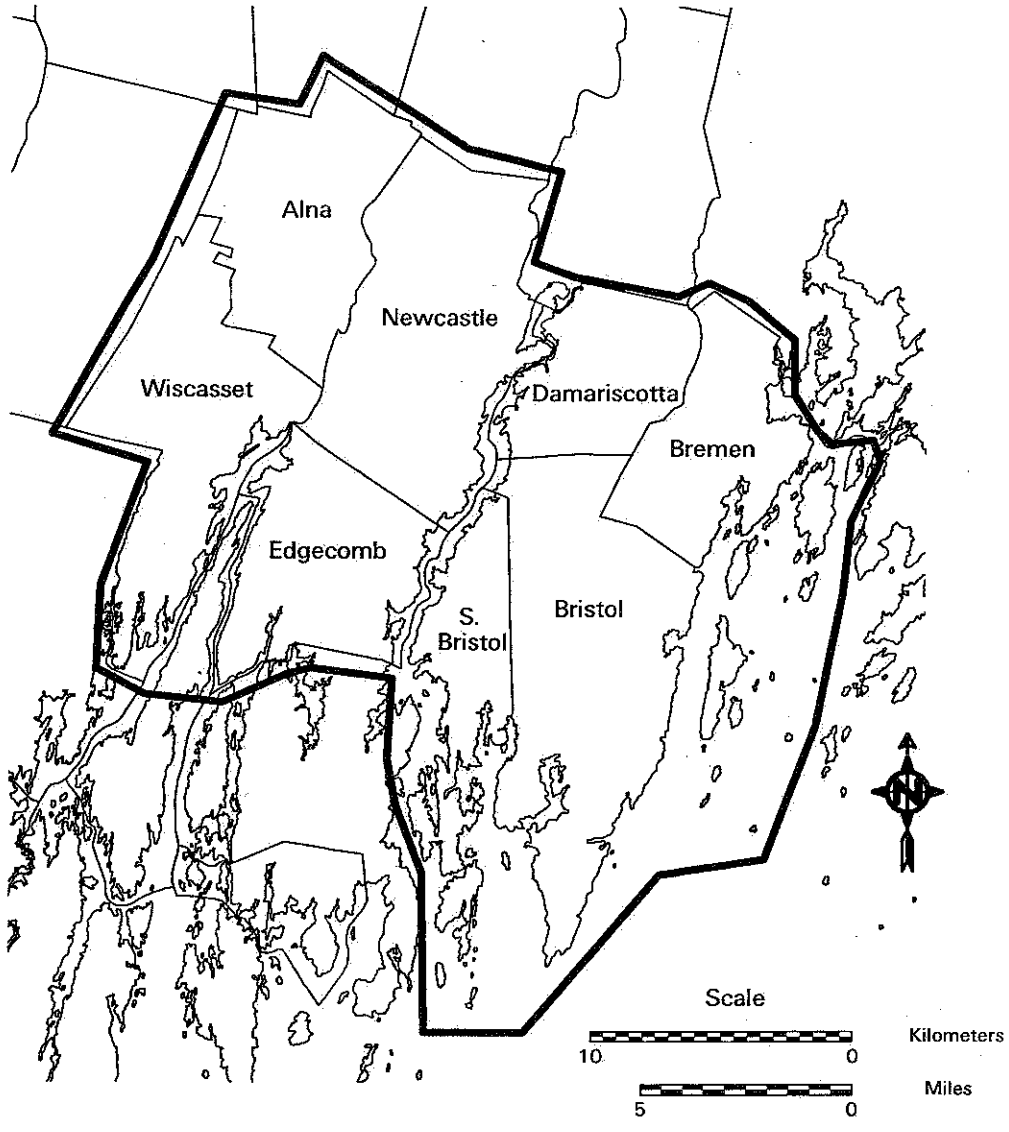

Figure 2. Location of eight towns in the Damariscotta area of southcentral Maine. Relation of this area to southern Maine is shown in Figure 1.

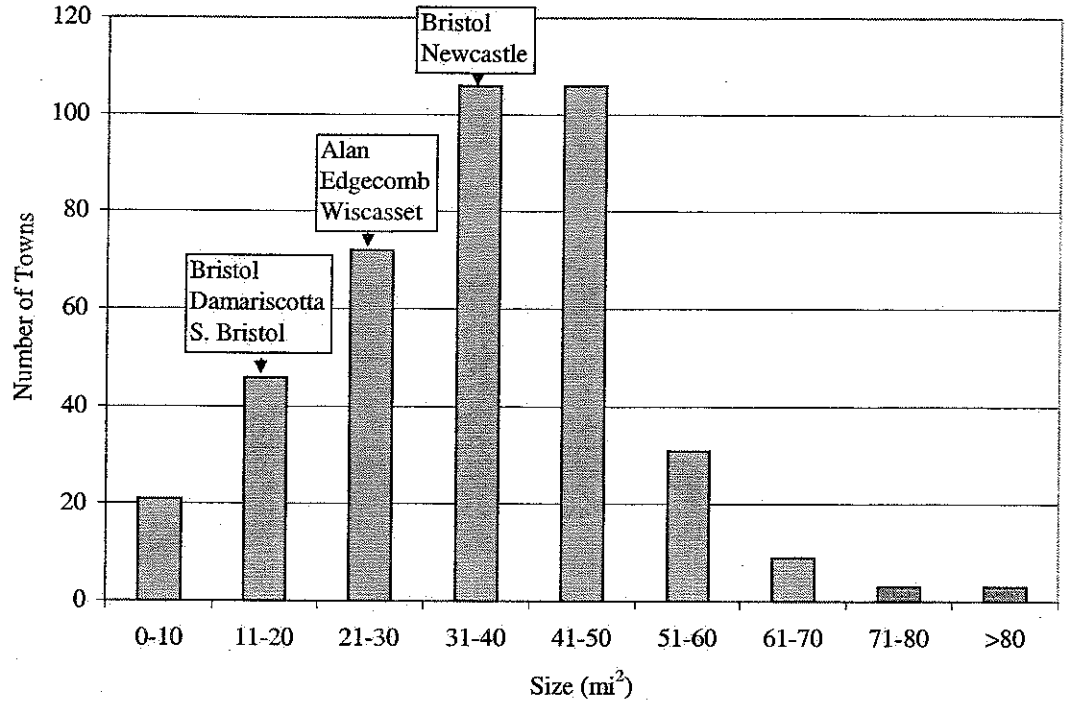

Figure 3. Frequency distribution of sizes (mi^2) of towns in southern Maine (n = 397). Towns within the Damariscotta areas of southcentral Maine are skewed towards smaller towns than the regional average.

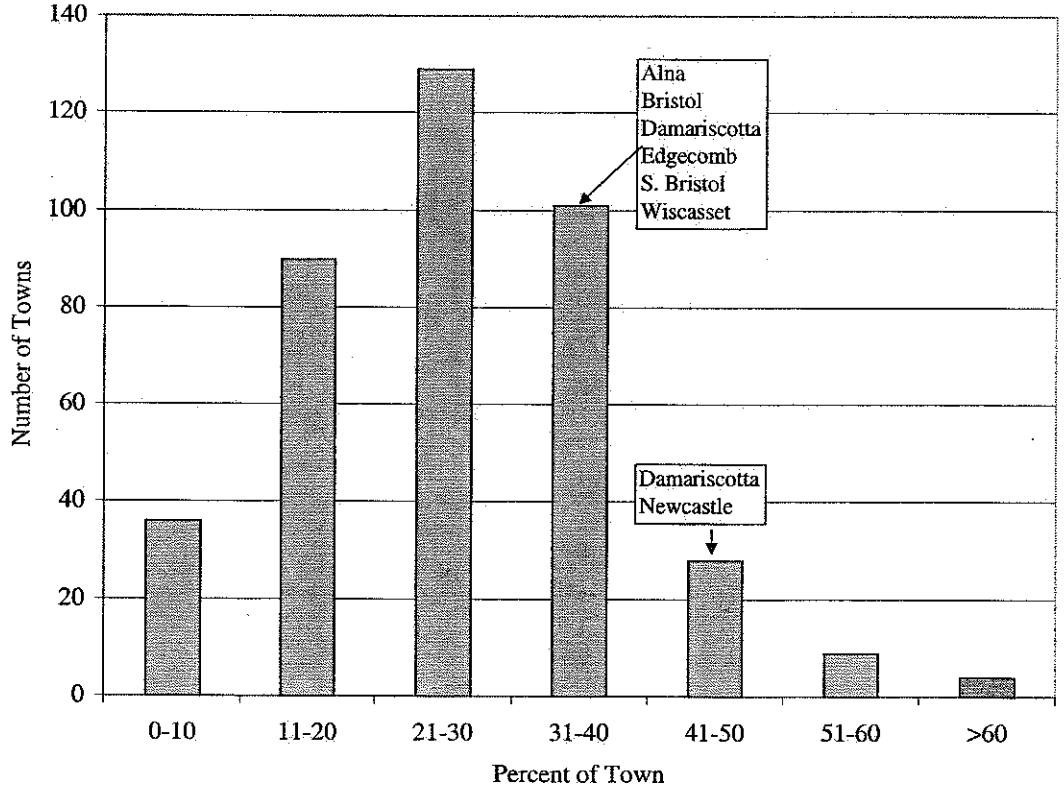

Figure 4. Frequency distribution of the percentages of towns in southern Maine (n = 397) in Shoreland Zones and Important Habitats combined. Towns within the Damariscotta study area tend to fall within the high end of this graph.

Table 1. Cover and land use characteristics of towns in the Damariscotta area of southcentral Maine[a].

Town	Developed		Agriculture		Forested		Water		Wetlands		Total	
	%	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2
Alna	0.6	(0.1)	14.5	(3.1)	75.5	(16.1)	2.6	(0.5)	6.9	(1.5)	100	(21.4)
Newcastle	1.0	(0.3)	11.0	(3.5)	68.6	(21.8)	5.3	(1.7)	14.1	(4.5)	100	(31.8)
Wiscasset	3.3	(0.9)	15.1	(4.1)	63.9	(17.3)	6.1	(1.6)	11.7	(3.1)	100	(27.0)
Damariscotta	2.8	(0.4)	10.4	(1.5)	61.2	(8.8)	11.0	(1.6)	14.6	(2.1)	100	(14.3)
Bremen	0.5	(0.1)	6.8	(1.2)	72.8	(13.2)	10.3	(1.9)	9.7	(1.7)	100	(18.1)
Edgecomb	1.0	(0.2)	9.7	(1.9)	73.4	(14.5)	7.2	(1.4)	8.7	(1.7)	100	(19.7)
Bristol	2.1	(0.8)	11.2	(4.0)	72.5	(26.1)	2.3	(0.8)	11.8	(4.3)	100	(36.0)
South Bristol	2.1	(0.3)	11.6	(1.5)	77.3	(10.1)	1.8	(0.2)	7.1	(0.9)	100	(13.0)

[a] - Data from Hepinstall *et al.* (1999), which includes definitions of the above types of vegetation and land cover.

The land cover and land use characteristics of the eight towns in the Damariscotta area result in combined Shoreland Zones and Important Habitats (i.e., non-overlapping) covering 30.2 to 42.8% of each town (Table 2). These figures are high compared to the study area as a whole (Figure 4), primarily because of the relatively high amounts of water (salt- as well as fresh-water) and wetlands (Table 1).

Conserving Lowland Habitats

The total number of wildlife species potentially present in the Damariscotta area, by town, ranges from 146 to 151 (Table 3) (Appendix C for southern Maine data). Because we presumed that towns would fully conserve Shoreland Zones and Important Habitats, those wildlife species requiring open water, wetlands, riparian, or a combination of these areas, were now considered conserved and not given any additional analysis. However, if towns are interested in enhancing existing wetlands, or in creating new ones, detailed technical information is available (e.g., Whitman *et al.* 1995).

The majority of wildlife species in southern Maine have home ranges of < 1.0 mi^2 (2.59 km^2) (Figure 5). All amphibians have home ranges < 0.1 mi^2 (0.26 km^2) and no reptiles have home ranges ≥ 1.0 mi^2 (2.59 km^2) and only birds and mammals have home ranges ≥ 10 mi^2 (2.59 km^2) (Figure 5). The percentages of species potentially present but missed is similar for Shoreland Zones and Shoreland Zones plus Important Habitats (Figure 6), showing that shorelands are the most critical of the two in meeting conservation goals. Across the study area, 128 of 201 upland species of wildlife predicted as potentially occurring in a town were

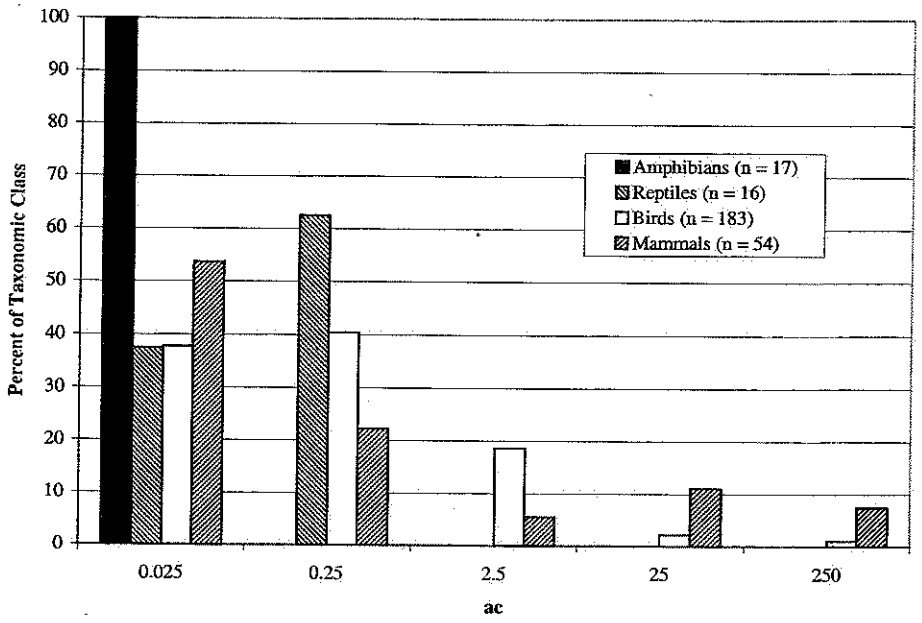

Figure 5. Frequency distribution of home ranges for terrestrial vertebrates that regularly breed in Maine.

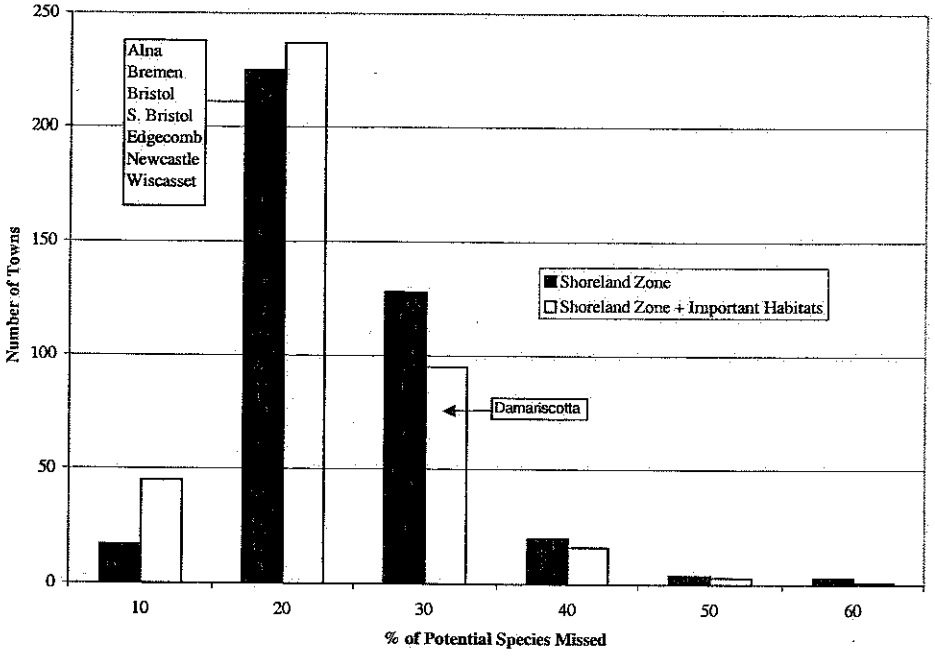

Figure 6. Frequency distribution of southern Maine towns showing percentages of species potentially present in a town but missed by Shoreland Zones or Shoreland and Important Habitats combined. The Damariscotta study towns are similar to southern Maine as a whole.

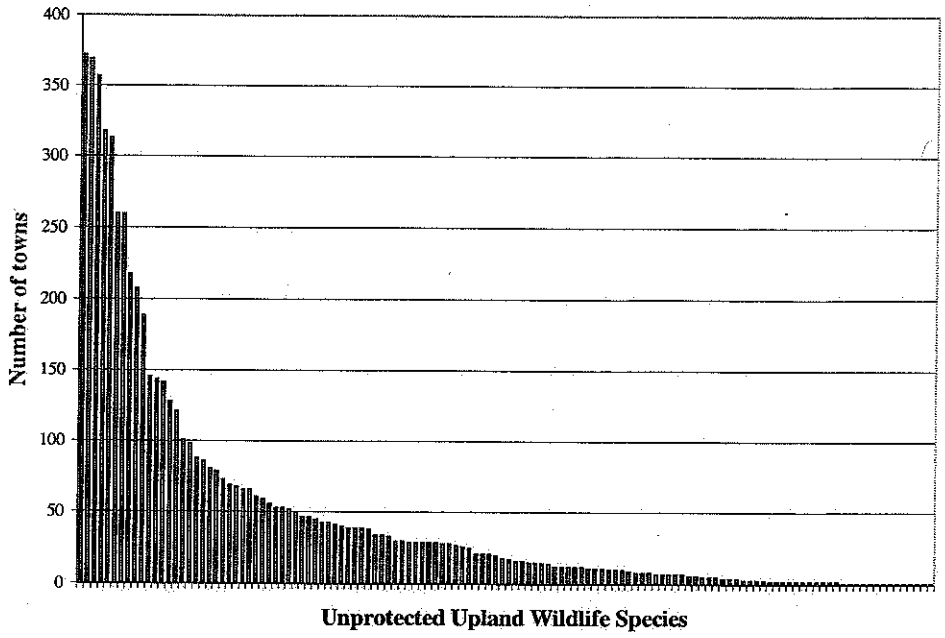

Figure 7. Number of towns where each upland species was predicted to occur but was unprotected by Shoreland Zones and Important Habitats (128 of 201 upland species were unprotected in ≥ 1 town).

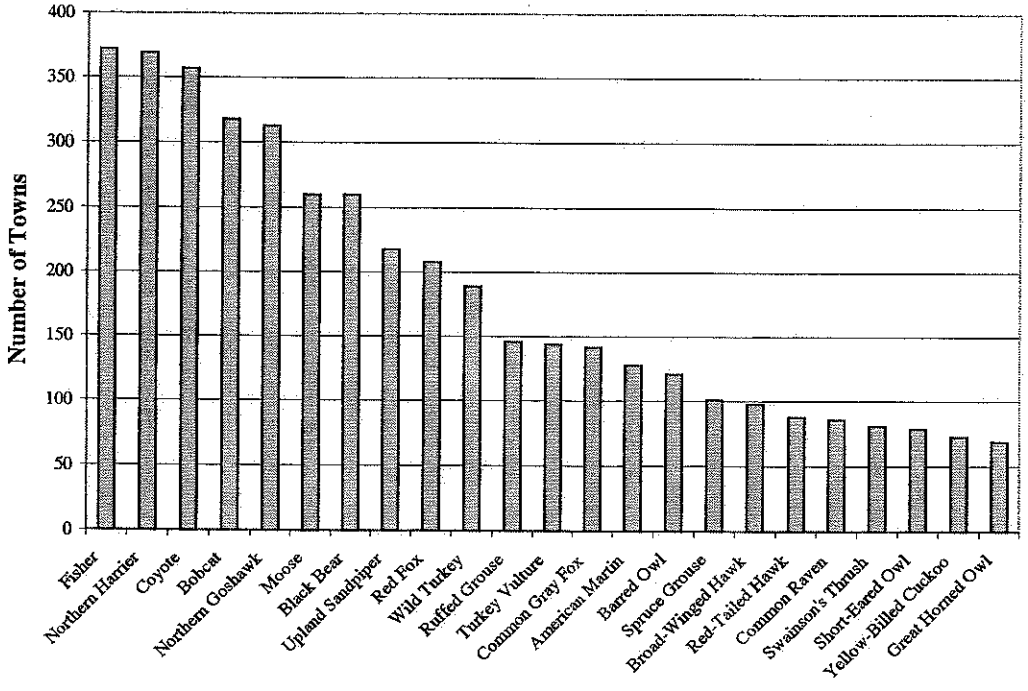

Figure 8. Upland species predicted to occur but most frequently (> 70 towns) unprotected by Shoreland Zones and Important Habitats.

Table 2. Amounts of water, Shoreland Zones, and Important Habitats by town, in the Damariscotta area of southcentral Maine.

Town	Square Miles					Total Area SZ & IH[b]	
	Lakes (mi^2)	Rivers (mi^2)	Streams (mi)[a]	Shoreland Zones (SZ)	Important Habitats (IH)	mi^2	% of Town
Alna	0.19	0.04	0.75	3.17	5.02	6.95	32.5
Newcastle	0.80	0.00	0.52	7.52	9.49	13.93	42.8
Wiscasset	0.17	0.01	0.75	5.69	4.86	8.74	31.7
Darmariscotta	1.26	0.00	0.16	3.31	2.39	5.95	40.8
Bremen	1.75	0.00	0.09	3.69	2.53	7.01	38.4
Edgecomb	0.16	0.00	0.33	3.00	5.30	7.37	35.7
Bristol	0.50	0.24	0.69	7.68	5.99	11.00	30.2
South Bristol	0.07	0.00	0.10	3.36	1.04	4.02	30.5

[a] - Converted to mi^2 from 30 m pixel raster version of 1:100,000 streams vector file.

[b] - SZ and IH overlap and thus total area in SZ and IH not simply additive.

Table 3. Number of wildlife species potentially occurring by towns in the Damariscotta area of southcentral Maine.

Town	Total Number of Species Potentially Present[a]	Species Occurring In: Shoreland Zones	Species Occurring In: SZ & IH[b] Combined	% of Total Potential in SZ & IH[b]
Alna	151	124	134	88.7%
Newcastle	151	128	138	91.4%
Wiscasset	150	127	134	89.3%
Darmariscotta	146	126	128	87.7%
Bremen	148	122	127	85.8%
Edgecomb	150	119	134	89.3%
Bristol	151	130	136	90.1%
South Bristol	148	115	118	79.9%
Mean and Range	149.4 146-151	123.9 115-130	131.1 118-138	87.8% 79.9-91.4%

[a] - From Boone and Krohn (1998 a,b)

[b] - SZ & IH = Shoreland Zones and Important Habitats

unprotected in ≥ one town if only Shoreland Zones and Important Habitats were protected (Figure 7). When only those species unprotected by Shoreland Zones and Important Habitats in ≥ 70 of the 397 towns are considered, the list drops to 22 upland species (Figure 8). Examining the spatial needs of these 22 species shows that medium to large-size birds and mammals (e.g., hawks, owls, and mammalian carnivores) with large home ranges are of special concern (Table 4). General types of upland habitats needing conservation are a mixture of forest and agricultural lands (Table 4).

Shoreland Zones and Important Habitats do an excellent job of providing habitats for amphibians and reptiles, both in terms of number of species (Table 5) and for species where enough habitat was provided for 10 or more individuals (Table 6). Shoreland Zones and Important Habitats in the Damariscotta area were estimated to not provide habitat for only 3.6-8.8% and 8.1-13.5% of the bird and mammal species, respectively (Table 5). When considering only those species for which enough habitat was provided for 10 or more individuals, more birds than mammals were missed with the town-specific data ranging from 10.1-25.2% and 5.9-9.1%, respectively (Table 6).

Neither the percentage of total species protected (Figure 9), nor species with > 10 individuals each protected (Figure 10), were correlated with the amount of land occupied by humans (= urban lands). This suggests that conserving Important Habitats and Shoreland Zones will work equally well in both urban and rural towns, with few exceptions (see outliers on left side of Figure 9). However, the percentage of total species that could be protected by the conservation of Important Habitats and Shoreland Zones rises sharply as the amount of Important Habitats and Shoreland Zones increases beyond 5 mi^2 (13.0 km^2) (Figure 10).

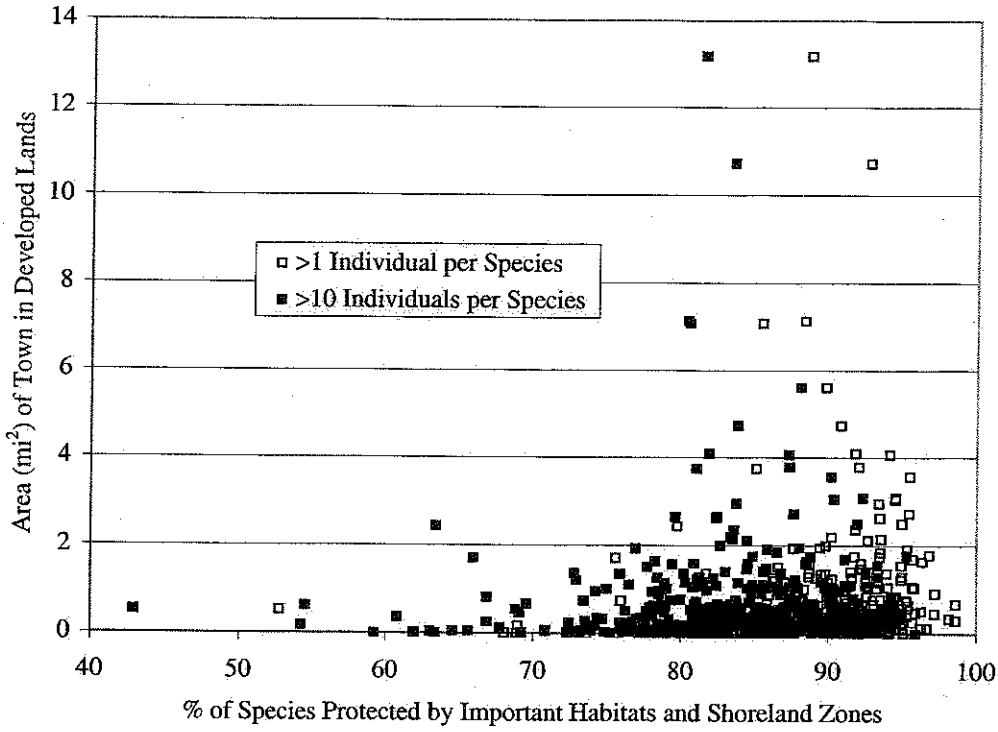

Figure 9. The percentage of species protected by Important Habitats and Shoreland Zones potentially present in a town against the amount of developed land (mi^2) in the town for southern Maine towns.

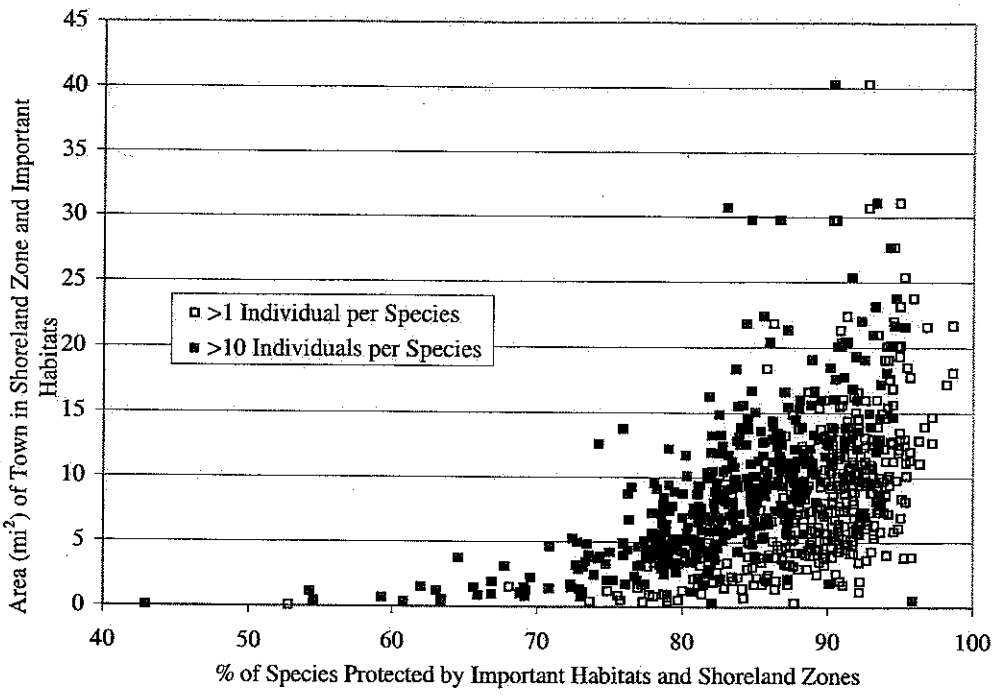

Figure 10. Relationship between the percentages of total species present that are protected and the area (mi^2) in Shoreland Zones and Important Habitats. for each southern Maine town.

Table 4. Species with >70 towns with inadequate habitat within the Shoreland Zones and Important Habitats and spatial and habitat needs of those upland species.

Common Name	No. of towns where species unprotected	Home Range Size (mi^2)[a]	General Habitat(s) Used[b]
Fisher *Martes pennanti*	372	11.58	Forestland
Northern Harrier *Circus cyaneus*	369	0.77	Agricultural/Wetlands
Coyote *Canis latrans*	357	28.57	Forestland and Agricultural
Bobcat *Lynx rufus*	318	4.75	Forestland
Northern Goshawk *Accipiter gentilis*	313	1.16	Forestland
Moose *Alces alces*	260	2.70	Forestland
Black Bear *Ursus americanus*	260	7.72	Forestland
Upland Sandpiper *Bartramia longicauda*	218	0.19	Agricultural
Red Fox *Vulpes vulpes*	208	3.86	Forestland and Agricultural
Wild Turkey *Meleagris gallopavo*	189	2.70	Forestland and Agricultural
Ruffed Grouse *Bonasa umbellus*	146	0.19	Forestland
Turkey Vulture *Cathartes aura*	144	0.77	Forestland
Common Gray Fox *Urocyon cinereoargenteus*	142	3.86	Forestland
American Marten *Martes americana*	128	1.74	Forestland
Barred Owl *Strix varia*	121	1.16	Forestland
Spruce Grouse *Falcipennis canadensis*	101	0.29	Forestland
Broad-Wing Hawk *Buteo platypterus*	98	0.19	Forestland
Red-Tailed Hawk *Buteo jamaicensis*	88	0.77	Forestland and Agricultural
Common Raven *Corvus corax*	86	3.86	Forestland and Agricultural
Swainson's Thrush *Catharus ustulatus*	81	0.04	Forestland
Short-Eared Owl *Asio flammeus*	79	0.19	Forestland
Yellow-Billed Cuckoo *Coccyzus americanus*	73	0.04	Forestland

[a] - from Appendix A.

[b] - from Boone and Krohn (1998a,b).

Table 5. Percentage (number) of upland wildlife species not captured in Shoreland Zones and Important Habitats relative to total number of species potentially present in the Damariscotta area of southcentral Maine.

Town	Amphibians (2)[a] % (n)	Reptiles (5-6)[a] % (n)	Birds (112-114)[a] % (n)	Mammals (37-38)[a] % (n)
Alna	0	0	3.6 (4)	10.5 (4)
Newcastle	0	0	4.5 (5)	10.5 (4)
Wiscasset	0	0	4.4 (5)	10.5 (4)
Damariscotta	0	0	8.0 (9)	13.5 (5)
Bremen	0	0	8.8 (10)	10.8 (4)
Edgecomb	0	16.7 (1)	5.3 (6)	8.1 (3)
Bristol	0	0	7.1 (8)	10.8 (4)
South Bristol	0	16.7 (1)	8.8 (10)	10.8 (4)

[a] - Total species potentially present per town. Because this total varies by town, a range is shown where appropriate.

Table 6. Percentage (number) of upland wildlife species < 10 home ranges per species not captured in Shoreland Zones and Important Habitats relative to total number of species potentially present in the Damariscotta area of southcentral Maine.

Town	Amphibians (2)[a] % (n)	Reptiles (5)[a] % (n)	Birds (107-110)[a] % (n)	Mammals (33-34)[a] % (n)
Alna	0	0	12.8 (14)	5.9 (2)
Newcastle	0	0	10.1 (11)	5.9 (2)
Wiscasset	0	0	12.8 (14)	6.1 (2)
Damariscotta	0	0	15.2 (16)	6.1 (2)
Bremen	0	0	17.8 (19)	6.1 (2)
Edgecomb	0	0	12.8 (14)	6.1 (2)
Bristol	0	0	11.8 (13)	6.1 (2)
South Bristol	0	0	25.2 (27)	9.1 (3)

[a] - Total species potentially present per town. Because this total varies by town, a range is shown where appropriate.

Thus, towns with ≤ 5 mi^2 (13.0 km^2) of Important Habitats and Shoreland Zones (i.e., mostly lowland habitats), should consider conserving more upland habitat than in towns with > 5 mi^2 (13.0 km^2) of lowland habitats (Figure 10).

Conserving Upland Species

Wildlife not captured by Shoreland Zones and Important Habitats are those medium-to-large-bodied upland species requiring large areas of agricultural and forest lands (Table 4). To identify habitat for these species, blocks of agricultural and forest lands not intersected by roads, pipelines, powerlines, or railroads were mapped in the GIS. Relatively unbroken blocks of habitat are presumed to have higher value for some species by limiting negative edge effects such as dry conditions (e.g., DeMaynadier and Hunter 1998, 1999) or nest parasitism/predation (e.g., Robbins *et al.* 1989, Robinson *et al.* 1995), and the potential disturbance and mortality (e.g., Krohn *et al.* 1994) related to ease of access by humans or their pets.

Thus, we next identified upland habitats, of adequate size, to provide habitat for those species missed if only Shoreland Zones and Important Habitats were conserved. Most blocks of agricultural lands in the Damariscotta area are in the 0.25 to 25 ac (0.10-10.1 ha) range compared to 25-2,500 ac (10.1-1,012 ha) for forestlands (Table 7). The locations of blocks of relatively intact uplands as well as Shoreland Zones, Important Habitats, and conservation lands for the town of Alna are shown in Figure 11.

To develop a landscape that conserves a full compliment of species, carefully review the available conservation lands data to ensure that all new acquisitions, conservation easements, land trust parcels, and water district lands are included. Next, look for opportunities where, if conserved, the blocks of undeveloped land would link conservation lands, Important Habitats, and Shoreland Zones.

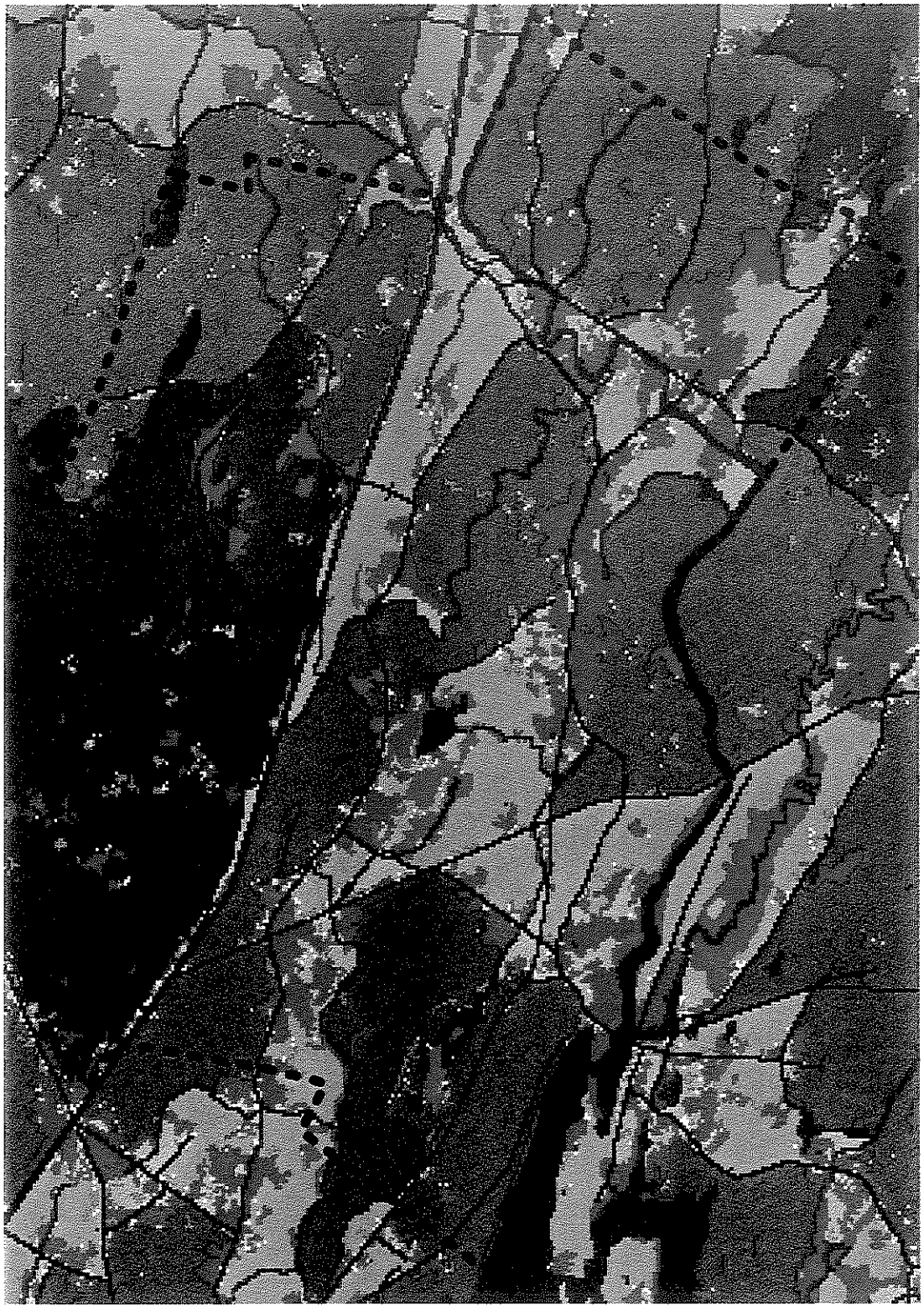

Figure 11. Blocks of relatively intact upland habitats (i.e., agricultural and forested lands on paper) as related to the locations of Shoreland Zones and Important Habitats and conservation lands (on mylar) in Alna, Maine.

Table 7. Percentage of towns in the Damariscotta area by the size of blocks of relatively intact agricultural and forest lands. Blocks were defined as a parcel of either agricultural or forest land untraversed by a road, pipeline, powerline, or railroad.

Town	Agricultural Lands in Acres				
	0.025	0.25	2.5	25	Total
Alna	3.7	14.4	35.9	46.0	100
Newcastle	4.3	14.4	55.7	25.6	100
Wiscasset	6.5	20.6	55.8	17.0	100
Damariscotta	4.2	18.9	59.6	17.3	100
Bremen	4.3	18.6	43.6	33.5	100
Edgecomb	4.8	18.9	66.7	9.6	100
Bristol	4.2	18.4	61.1	16.4	100
South Bristol	3.5	19.1	50.5	26.9	100

Town	Forestlands in Acres[a]						
	0.025	0.25	2.5	25	250	2500	Total
Alna	0.5	1.1	3.8	17.2	54.5	22.9	100
Newcastle	0.4	1.3	3.1	18.4	54.3	22.5	100
Wiscasset	0.8	2.0	4.6	33.3	40.0	19.3	100
Damariscotta	0.5	1.7	3.9	13.5	36.3	44.0	100
Bremen	0.3	0.5	2.5	14.6	64.2	18.0	100
Edgecomb	0.4	0.9	1.0	16.7	50.2	30.9	100
Bristol	0.4	1.0	2.4	18.0	55.4	22.7	100
South Bristol	0.4	1.2	6.8	37.0	54.7	0.0	100

[a] - Includes Forested Wetlands.

Because larger blocks provide habitat for more species, the larger the block the higher the conservation value of the parcel. Once blocks are selected, numerous options are available to conserve open-space (Milne 1985). Thus, the vision is to create a landscape with a series of large, open-space blocks, connected by corridors linking Shoreland Zones and Important Habitats, that then function as a continuous landscape for wildlife. By considering linkages to adjacent towns, a regional landscape can be created to provide habitat for species with the largest spatial requirements.

The methodology reported here emphasizes the values of wildlife habitats. Other values that must be considered when selecting parcels include exemplary and rare plant communities, scenic views and sites (e.g., waterfalls), recreational values, and others (i.e., number of parcel owners, interest of landowners in conservation).

Discussion

Cautions

This method is spatially explicit and thus presumes that all data elements are completely mapped (i.e., census data, not samples). We know this is not the case and thus users must be careful. Streams, a key element in Shoreland Zones, were represented at a scale of 1:100,000, and if one examines the 1:24,000 scale coverage, more small streams and brooks will be found. Unfortunately, the completeness (i.e., uniformity) of the 1:24,000 stream coverage varied greatly among quadrangles and thus could not be used. Similarly, deer wintering areas, an element in the Important Habitats, were not uniformly mapped across southern Maine (see Figure 17, Krohn *et al.* 1998:89). We also suspect that occurrence records for many rare animal species, mapped as part of the Important Habitats, are incomplete. Finally, we note that not only is the existing

GIS coverage of conservation and public lands dated (Krohn and Kelly 1997), it is incomplete in terms of lands such as conservation easements, local land trusts holdings, water district lands, and the many small parcels of public lands scattered across southern Maine towns (Krohn *et al.* 1998:66-67). To counter the above deficiencies, users must supplement the regional data provided with up-to-date local knowledge.

The preceding method is habitat-based and if someone wants to conserve a representative sample, say 10-15%, of the major landform types that occur in southern Maine, an entirely different analysis would be used (e.g., Orndorff, In Preparation). Similarly, if interest was focused on rare or exemplary plant communities instead of wildlife habitat, different areas could be selected for conservation. However, when we overlaid plant data from the MNAP onto the Shoreland Zones and Important Habitats for some areas of southern Maine, we found a high spatial coincidence suggesting that multiple conservation targets (i.e, plants and animals) would be conserved, with some exceptions (i.e., dry sandy areas, or mountain tops). Users of this wildlife habitat-based system should not be surprised if landscape analyses using different methods yield different results, but instead should view alternative analyses as opportunities to identify and obtain multiple conservation goals.

To ensure that the analysis method outlined above encompasses landscapes at the level necessary for conserving vertebrates requiring large areas, users must regularly apply the method on a multi-town basis. For example, consider the fisher (*Martes pennanti*), a medium-sized forest carnivore that is territorial with adult females living apart from adult males (Arthur *et al.* 1989a). Radio-telemetry work in southcentral Maine suggests that it takes approximately 12 mi^2 (31.1 km^2) and 6 mi^2 (15.5 km^2) per adult male and adult female, respectively (Arthur *et al.* 1989a). Because fishers do not use urban/industrial lands, open water, or forested wetlands

(Arthur *et al.* 1989b), we can assume that only 30 mi^2 (77.7 km^2) of an average town of 40 mi^2 (103.6 km^2) (Figure 3) is suitable. Furthermore, if like American marten (*M. americanus*) (Bissonette *et al.* 1997), fishers can tolerate $\leq$ 30% of non-forested habitats within their territories, then the average amount of suitable habitat per town is less than 30 mi^2 (77.7 km^2). However, staying with the optimistic estimate of a mean of 30 mi^2 per town of suitable fisher habitat, this is enough space for only 7-8 adults (2-3 males, 5 females). Such small populations over such large areas are vulnerable to random mortalities (let alone high road-kills in the towns with dense human populations and roads). Thus to maintain viable fisher populations in southern Maine, fisher habitat must be analyzed and managed over multiple town areas (i.e., in blocks of $\geq$9 towns).

Advantages

The landscape analysis method presented here is based on information that MDIFW has collected, and these data relate to issues towns deal with (i.e., including shoreland zoning, wetland protection, and endangered species protection), and can be applied in a framework familiar to towns (i.e., comprehensive planning). Specifically, Maine's Comprehensive Planning and Land Use Regulation Act has ten goals that include such topics as protecting the state's rural character, safeguarding agricultural and forest resources, protecting water resources and wetlands, protecting wildlife and fisheries habitats, and promoting and protecting opportunities for outdoor recreation and the many benefits of open space (Venno 1991:30-31). Thus, this method reinforces existing mandates to give water, wetlands, and certain habitats special consideration in town planning, and acknowledges multiple solutions to conserving habitats in the context of open-space planning.

Inputs to the method such as home range sizes and habitat associations can be updated as new information about wildlife ecology is developed. The method is not based on a fixed set of rules and thus can be adapted as new developments occur in the rapidly expanding fields of conservation biology and landscape ecology. Because an area's hydrology forms the skeleton of methods conservation strategy, implementation of this method conserves the full range of aquatic and semi-aquatic vertebrates as well as terrestrial wildlife. This method provides biologists and planners with flexibility to account for factors not in a GIS, such as patterns in land ownership and land owner attitudes. Finally, this method has many of the attributes amenable for working with local governments as suggested by Hobbs (1999).

Major Steps

The methodology, summarized by its major steps, works as follows:

(1) Obtain an overview of the cover and land characteristics of the study town and adjoining towns. Examine the locations of water (running and standing), wetlands and habitats of concern to the MDIFW. Water and wetlands should be examined for completeness, and modified as needed. Note also the locations of Important Habitats; these are species-specific (e.g., white-tailed deer), or group-specific (e.g., wading birds) habitats.

(2) Examine the buffers that were created along shorelands. They should be 250 feet on each side of rivers, lakes, ponds, and wetlands; 75 feet on each side of streams. Collectively, these are termed Shoreland Zones and roughly correspond to Maine Shoreland Zoning Ordinances. (Note: If waters and wetlands were added in Step 1, those areas will have to be buffered in this step).

(3) The potential number of terrestrial vertebrates regularly breeding in each town during the mid-1990s was estimated from Maine Gap Analysis. Based on the habitat and home range (i.e., spatial) needs of these species, data are provided on the number of species potentially inhabiting Shoreland Zones and Important Habitats. Review Important Habitats and add on needed new data or rare plants and exemplary plant communities. Assuming that the town fully conserves the Important Habitats and Shoreland Zones, the town next needs to consider conserving habitats for upland species requiring large blocks

of undeveloped lands.

(4) Examine the maps of (a) conservation lands, and (b) blocks of agricultural and forest lands. Give special attention to completeness of the conservation lands map, especially with regard to parcels in land trusts, conservation easements and water district land (the statewide data are known to be incomplete, so add areas as appropriate).

(5) Identify blocks of agricultural and forest lands to provide habitat for upland species not adequately addressed by conservation of Shoreland Zones and Important Habitats (e.g., wild turkeys, fishers). When identifying blocks for potential conservation as part of open space plan, special attention should be given to the larger blocks, and blocks that connect conservation lands, Important Habitats, and Shoreland Habitats.

(6) Once open-space needs for conserving upland wildlife with large spatial needs are identified, conserve these areas through voluntary purchase, easements, or cooperative agreements. **In each step consider how habitats are distributed in all adjacent towns, as well as distribution patterns within the town of primary interest.**

When applied, it must be emphasized that Shoreland Zones are the skeleton of habitat conservation. This method fails if large blocks of agricultural and forest lands are not conserved, and thus to maintain large, upland blocks in current cover conditions, willing land owners must be identified. Land owner cooperation will also be critical to maintain connectivity among watersheds, conservation lands, Shoreland Zones, Important Habitats, and open spaces. Because this process is not anti-development, lands suitable for development should also be identified within the framework presented.

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APPENDICES

Appendix A. Estimates of sizes of home ranges during the breeding season used in this study. Note that these estimates do not account for social grouping nor the needs of species who's spatial requirements exceed individual home range needs. (e.g., forest interior songbirds).

Species	Home Range Estimates (ac) Source: 1	Home Range Value Used (ac)
Amphibians (n = 17)		
Blue-spotted Salamander		0.25
Spotted Salamander		0.25
Eastern Newt		0.25
Northern Dusky Salamander	0.25	0.25
Two-lined Salamander		0.25
Spring Salamander		0.25
Four-toed Salamander		0.25
Northern Red-backed Salamander		0.25
American Toad		0.25
Gray Treefrog		0.25
Spring Peeper		0.25
Bullfrog	0.40	2.47
Green Frog	0.25	0.25
Pickerel Frog		0.25
Northern Leopard Frog	0.75	0.25
Mink Frog		0.25
Wood Frog	0.25	0.25
Reptiles (n = 16)		
Common Snapping Turtle		12.4
Common Musk Turtle		2.5
Painted Turtle		2.5
Spotted Turtle	1.24	2.5
Wood Turtle		2.5
Blanding's Turtle		2.5
Eastern Box Turtle		2.5
Racer		12.4
Ring-necked Snake		12.4
Milk Snake		12.4
Northern Water Snake		12.4
Smooth Green Snake		12.4
Brown Snake		12.4
Redbellied Snake		12.4
Eastern Ribbon Snake		12.4
Common Garter Snake		12.4

Birds (n = 172) Source:	1	2	3	
Pied-Billed Grebe	1			2
Common Loon		1426		49
Great Black-Backed Gull				25
Herring Gull		327		25
Franklin's Gull		80		25
Common Tern		32		25
Black Tern	988	17		25
Double-Crest. Cormorant		496		494
Common Merganser		391		494
Mallard			59	62
American Black Duck			57	62
American Wigeon		220		124
Common Goldeneye				124
Am. Green-winged Teal		92		124
Green-winged Teal				124
Blue-winged Teal		106		124
Wood Duck		204		124
Ring-necked Duck		215		124
Canada Goose		1328		124
Glossy Ibis				25
American Bittern	1	215		25
Least Bittern	4	23		25
Great Blue Heron	74	728		247

Green Heron				99
Snowy Egret	59	108		124
Little Blue Heron				124
Cattle Egret		98		124
Black-crowned Night Heron	59	274		247
Virginia Rail	5	20		25
Sora		20		25
American Coot	1	168		124
American Woodcock			13	12
Common Snipe	13	31		25
Upland Sandpiper	116	53		124
Spotted Sandpiper		10		12
Killdeer				2
Mourning Dove	1063		2	2
Yellow-Billed Cuckoo		17		25
Black-Billed Cuckoo		13		25
Belted Kingfisher	1075	41		25
Hairy Woodpecker		16		25
Downy Woodpecker		7		12
Black-Backed Woodpecker				25
Yellow-Bell. Sapsucker		13		12
Pileated Woodpecker			263	247
Yellow-Shafted Flicker	184	35		25
Whip-Poor-Will			17	25
Common Nighthawk		17		25
Chimney Swift				25
Ruby-Thr. Hummingbird			0.25	2
Eastern Kingbird	21	10		12
Grt. Crested Flycatcher			5	5
Eastern Phoebe	7	5		5
House Wren	2	2		2
Winter Wren	2	2		2
Marsh Wren	0.25	2		2
Carolina Wren	0.25	2		2
Northern Mockingbird	1	12		12
Cedar Waxwing	0.49	7		7
Solitary Vireo	130	4		5
Warbling Vireo		3		2
Red-Eyed Vireo	2	4		5
Nashville Warbler	6	2		2
Yellow Warbler	0.49	2		2
Yellow-Rumped Warbler		3		2
American Redstart	0.49	2		2
Northern Waterthrush		4		5
Common Yellowthroat	2	2		2
Wilson's Warbler		1		2
Rose-Breasted Grosbeak		12		12
Chipping Sparrow	6	3		5
Vesper Sparrow		6		7
Savannah Sparrow		5		5
Grasshopper Sparrow	3	4		5
Fox Sparrow		8		7
Song Sparrow		5		5
Lincoln's Sparrow		4		5
White-Throated Sparrow		6		7
Dark-Eyed Junco		5		5
Bobolink		9		10
Red-Winged Blackbird		10		10
Common Grackle		27		25
Brown-Headed Cowbird		10		10
Pine Grosbeak		14		15
Red Crossbill		9		10
White-Winged Crossbill		6		7
Pine Siskin		3		2
American Goldfinch		3		2
Evening Grosbeak		15		15
Turkey Vulture		471		494
Northern Harrier	623			494
Sharp-Shinned Hawk	245	48		124
Cooper's Hawk	1638	130		124
Red-Tailed Hawk	759	388		494
Red-Shouldered Hawk	158			247
Broad-Winged Hawk	13	130		124

American Kestrel	350	32		37
Osprey		506		494
Short-Eared Owl		110		124
Barred Owl			721	741
Great Horned Owl		432		494
Golden Eagle	67173			37065
Bald Eagle			30888	24710
Merlin	4979			247
Peregrine Falcon	7331			494
Long-Eared Owl			124	124
Northern Saw-Whet Owl	339			247
Common Nighthawk			32	25
Northern Goshawk	519			741
	Source: Min.[3]	Max.[3]	Mean[3]	
Olive-Sided Flycatcher	247.10	9.88	128.49	61.78
Golden-Crowned Kinglet	1.48	3.21	2.22	2.47
Ruby-Crowned Kinglet	1.48	2.72	2.22	2.47
Blue-Grey Gnatcatcher			4.94	4.94
Eastern Bluebird	9.64	21.00	15.32	12.36
Veery	2.47	4.94	3.71	2.47
Bicknell's Thrush	4.94	9.88	7.41	7.41
Swainson's Thrush	3.21	49.42	26.44	27.18
Hermit Thrush	1.98	66.72	34.35	34.59
Wood Thrush	4.69	11.12	7.91	12.36
American Robin	0.74	3.21	1.98	2.47
Gray Catbird	0.74	7.17	3.95	2.47
Brown Thrasher			1.58	2.47
American Pipet	9.64	24.96	17.30	17.30
Yellow-Throated Vireo	5.19	35.34	20.26	19.77
Philadelphia Vireo	4.45	12.36	8.40	7.41
Blue-Winged Warbler	0.99	4.45	2.72	2.47
Tennessee Warbler	0.25	0.74	0.49	2.47
Northern Parula	0.49	0.99	0.74	2.47
Chestnut-Sided Warbler	4.69	5.93	5.44	4.94
Magnolia Warbler		4.20	2.22	2.47
Cap May Warbler	2.47	3.46	2.97	2.47
Black-Throated Blue Warbler	2.22	9.88	6.18	7.41
Black-Throated Green Warbler	1.24	3.21	2.22	2.47
Blackburnian Warbler	0.99	1.24	1.24	2.47
Pine Warbler	2.97	4.45	3.71	4.94
Prairie Warbler	1.24	49.42	25.20	24.71
Palm Warbler	2.47	5.19	3.95	4.94
Bay-Breasted Warbler	1.24	7.66	4.45	4.94
Blackpoll Warbler	1.24	3.71	2.47	2.47
Black-And-White Warbler	0.99	1.48	1.24	2.47
Ovenbird	0.49	4.45	2.47	2.47
Louisiana Waterthrush	2.22	12.36	7.17	7.41
Mourning Warbler	1.48	2.47	1.98	2.47
Canada Warbler	2.47	8.15	5.44	4.94
Scarlet Tanager	1.98	8.40	5.19	4.94
Alder Flycatcher			4.94	4.94
Blue Jay			12.36	12.36
Boreal Chickadee			7.41	7.41
Brown Creeper			2.47	2.47
Common Raven			2471	741.30
Black-capped Chickadee				2.47
Eastern Wood-Pewee			2.47	2.47
Purple Martin				24.71
Tree Swallow				12.36
Northern Rough-winged				12.36
Bank Swallow				12.36
Cliff Swallow				12.36
Barn Swallow				12.36
Horned Lark			7.41	7.41
House Wren			1.24	1.24
Least Flycatcher			1.24	1.24
Red-Breasted Nuthatch			1.24	1.24
Ruffed Grouse			123.55	123.55
Sedge Wren			0.49	0.49
Spruce Grouse			185.33	185.33
Three-Toed Woodpecker			24.71	24.71
Tufted Titmouse			2.47	2.47
White-Breasted Nuthatch			37.07	37.07
Willow Flycatcher			2.47	2.47
Yellow Rail			19.77	19.77

Common Moorhen					24.71
Yellow-Bellied Flycatcher				2.47	2.47
Northern Cardinal	2.97		10.13	6.67	7.41
Indigo Bunting	6.18		17.54	11.86	12.36
Eastern Towhee	2.22		6.18	4.20	4.94
Field Sparrow	1.98		5.93	3.95	4.94
Saltmarsh Sharp-Tailed Sparrow				3.71	4.94
Nelson's Sharp-Tailed Sparrow				3.71	4.94
Swamp Sparrow	0.99		1.24	1.24	2.47
Eastern Meadowlark	3.95		15.07	9.64	9.88
Rusty Blackbird	12.36		35.34	23.72	24.71
Baltimore Oriole			4.69	4.69	4.94
Purple Finch	7.91		3.46	5.68	4.94

Mammals (n = 53)	Source: 1	5	6	7	8	
Virginia Opossum		25.90				24.71
Masked Shrew	1.28	0.22				1.24
Water Shrew	1.33	0.94				1.24
Smoky Shrew		0.44				0.25
Long-tailed Shrew		0.25				0.25
Pygmy Shrew		0.12				0.25
Northern Short-tailed Shrew		1.38				2.47
Star-nosed Mole		0.62				2.47
Hairy-tailed Mole		5.91				2.47
Little brown Myotis	0.44	0.49				0.25
Northern Myotis		0.44				0.25
Eastern Small-footed		0.35				0.25
Eastern Pipistrelle		0.27				0.25
Silver-haired Bat		0.49				2.47
Big Brown Bat	0.94	0.99				2.47
Eastern Red Bat	0.59	0.69				2.47
Hoary Bat	1.21	4.99				2.47
New England Cottontail	7.04	7.39				12.36
Snowshoe Hare	18.53	11.51				12.36
Eastern Chipmunk	2.25	0.57				2.47
Woodchuck	23.35	45.89				24.71
Gray Squirrel	12.03	3.43				12.36
Red Squirrel	8.28	13.79				12.36
Southern Flying Squirrel	4.00	7.17				2.47
Northern Flying Squirrel	10.23	12.70				12.36
American Beaver		14.55				12.36
Deer Mouse	1.73	0.15				2.47
White-footed Mouse	1.70	0.15				2.47
Southern Red-backed Vole	0.25	0.15				0.25
Meadow Vole	0.54	0.27				0.25
Rock Vole		0.22				0.25
Woodland Vole		0.17				0.25
Muskrat		8.75				12.36
Southern Bog Lemming	0.32	0.20				0.25
Meadow Jumping Mouse		0.12				0.25
Woodland Jumping Mouse		0.12				0.25
Common Porcupine		34.59				24.71
Coyote	18,285[9]	11,369	13,371	3,954	16,803	18,285
Red Fox	3,632[10]	3,071	4,764	976	4,860	2,471
Gray Fox	969	2,659	4,253	252	339	2,471
Black Bear	6,437	511				4,942
Common Raccoon	1,045	57		121		247
Fisher	7,635[11]	1,957	3,341	1,290	4,942	7,413
American Martin	1,112[12]			761	1,685	1,112
Ermine	35	227	613	29	40	37
Long-tailed Weasel	153	30	124			25
Mink	35	361	882			37
Striped Skunk	593	1,060	2,058			618
Northern River Otter		6,249	8,342			6,178
Bobcat	24,092[10,13]	9,382	11,493	1,221	4,769	22,239
Lynx	25,575[14]					24,710
White-tailed Deer	200	754				494
Moose	2,360	2,634	1,730[15]			1,730

[1] = measured home range cited in Bassett (1998).

[2] = home range estimated by Bassett (1998).
[3] = Gauthier and Aubry (1996).
[4] = DeGraaf and Rudis (1992).
[5] = estimated w/ Harestad and Bunnell (1979) equations as modified by Lindstedt *et al.* (1986).
[6] = estimated with Lidstedt's > 45 degree latitude.
[7] = maximum reported measured home range cited in Lindstedt *et al.* (1986).
[8] = minimum reported measured home range cited in Lindstedt *et al.* (1986).
[9] = Aurthor and Krohn (1988).
[10] = Harrison (1986).
[11] = Arthur *et al.* (1989): Male home range size (Female: 403 ac).
[12] = Chapin (1995): Male home range size (Female: 642 ac).
[13] = Litvaitis *et al.* (1986): Male home range size (Female: 7,710 ac).
[14] = Aubry *et al.* (1999).
[15] = Thompson (1987).

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Appendix B. General vegetation and land cover composition (% and mi^2) of southern Maine towns (composition data modified from Hepinstall *et al.* [1999][a] to include all National Wetlands Inventory wetlands).

	Developed		Agriculture		Forested		Water		Wetlands		Other		Total
	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2	%	mi^2
Abbot	0.37	1	2.89	8.1	28.09	79	1.44	4.1	2.75	7.7	0	0	29.31
Acton	0.08	0.2	7.45	18.1	27.16	66	3.48	8.5	2.95	7.2	0.02	0	13.02
Adamstown Twp	0.2	0.5	0	0	29.05	75	7.75	20	1.75	4.5	0	0	47.9
Albany Twp	0.14	0.3	2.35	4.6	44.6	87.6	0.91	1.8	2.93	5.7	0	0	18.09
Albion	3.79	27	3.94	28	5.01	35.7	0.7	5	0.6	4.3	0	0	42.77
Alder Stream Twp	0.08	0.2	0	0	35.88	93.4	0.2	0.5	2.27	5.9	0	0	36.03
Alfred	0.28	1	4.77	17.1	17.75	63.6	0.74	2.7	4.34	15.6	0.02	0.1	22.14
Alna	0.12	0.6	3.09	14.5	16.14	75.5	0.55	2.6	1.48	6.9	0	0	41
Alton	0.48	1.1	1.85	4.4	24.45	57.7	0.59	1.4	15.04	35.5	0	0	28.15
Andover	0.29	0.5	3.46	6	50.09	87.2	0.45	0.8	3.15	5.5	0.01	0	58.64
Andover N. Surplus	0	0	0.12	0.5	25.22	97.8	0.03	0.1	0.43	1.7	0	0	38.13
Andover W. Surplus T.	2.44	3.1	2.75	3.4	54.04	67.7	13.77	17.2	6.87	8.6	0	0	41.98
Anson	0.98	2	6.37	13.1	37.23	76.7	1.14	2.3	2.82	5.8	0	0	28.83
Appleton	0.27	0.8	4.3	12.9	21.91	65.7	0.8	2.4	6.07	18.2	0	0	39.16
Argyle Twp	0.49	1.7	0.45	1.5	16.65	57.7	1.89	6.5	9.41	32.6	0	0	15.71
Arrowsic	0.07	0.7	0.48	4.5	5.51	52.3	1.82	17.3	2.66	25.3	0	0	14.46
Arundel	0.34	1.4	6.26	26.1	14.9	62.3	0.15	0.6	2.28	9.5	0.01	0	27.38
Athens	0.38	0.9	6.45	14.8	34.13	78.5	0.19	0.4	2.33	5.4	0	0	0.5
Atkinson	0.34	0.9	3.59	9.3	22.39	57.9	0.26	0.7	12.09	31.3	0	0	34.36
Auburn	4.73	7.2	16.31	24.8	34.75	52.9	6.8	10.4	3.03	4.6	0.07	0.1	37.86
Augusta	5.61	9.6	10.47	18	33.23	57.1	3.39	5.8	5.54	9.5	0	0	28.17
Avon	0.07	0.2	1.99	4.8	37.22	89.6	0.63	1.5	1.64	3.9	0	0	38.77
Bald Mnt Twp T2 R3	0.23	0.5	0.23	0.5	35.47	80.8	4.11	9.4	3.86	8.8	0	0	11.63
Baldwin	0.18	0.5	5.01	13.8	27.75	76.4	1.09	3	2.23	6.1	0.07	0.2	53.11
Bangor	10.73	30.9	7.7	22.2	12.74	36.7	0.84	2.4	2.7	7.8	0	0	38.66
Barnard Twp	0.02	0.1	0.15	0.6	21.4	85	0.05	0.2	3.56	14.1	0	0	43.36
Batchelders Grant Twp	0.01	0.1	0.05	0.2	22.81	97.5	0.1	0.4	0.43	1.8	0	0	12.85
Bath	1.27	9.6	2.52	19	4.46	33.6	3.34	25.2	1.69	12.7	0	0	19.53
Belfast	0.62	3.1	4.92	24.1	10.94	53.6	0.88	4.3	3.05	14.9	0	0	19.4
Belgrade	0.56	1.4	9.96	25.3	23.95	60.9	0.69	1.8	4.18	10.6	0	0	44.68
Belmont	0.19	0.4	2.54	5.9	36.95	85.8	1.72	4	1.66	3.9	0	0	65.7
Benton	0.32	1.2	4.03	15.6	18.51	71.5	0.94	3.6	2.09	8.1	0	0	29.14
Berwick	0.85	2.2	10.4	27.6	19.6	52.1	0.5	1.3	6.22	16.5	0.05	0.1	30
Bethel	0.97	2.1	9.22	20.3	28.22	62	3.53	7.7	3.61	7.9	0	0	54.78
Biddeford	3.05	10.1	9.01	29.8	13.18	43.6	0.46	1.5	4.46	14.7	0.09	0.3	49.22
Bigelow Twp	0.01	0.1	0	0	13.1	72.6	2.65	14.7	2.28	12.6	0	0	28.22
Bingham	0.5	1.4	1.6	4.6	31	89.2	0.56	1.6	1.11	3.2	0	0	56.29
Blanchard Twp	0.07	0.2	0.61	1.3	40.63	90.6	1.1	2.5	2.44	5.4	0	0	35.62
Blue Hill	0.03	0.2	0.54	3.6	13.85	92.8	0	0	0.5	3.3	0	0	51.82
Boothbay	0.58	2.4	3.32	13.7	16.05	66	1.38	5.7	2.99	12.3	0.01	0	47.37
Boothbay Harbor	0.54	8.8	0.71	11.6	3.75	61.2	0.56	9.1	0.57	9.2	0	0	43.16
Bowdoin	0.39	0.9	6.67	15.3	32.77	75.2	0.14	0.3	3.64	8.3	0	0	31.55
Bowdoinham	0.68	1.7	7.65	19.6	22.92	58.7	2.98	7.6	4.84	12.4	0	0	24.74
Bowerbank	0.02	0	0.01	0	35.78	76	6	12.7	5.25	11.2	0	0	41.02
Bowmantown Twp	0.03	0.1	0.01	0	31.88	92.1	0.22	0.6	2.48	7.2	0	0	21.23

Bowtown Twp	0.01	0	0.01	0	25.88	91.9	1	3.5	1.28	4.5	0	0	18.4
Bradford	0.39	1	7.27	17.7	27.79	67.6	0.1	0.2	5.56	13.5	0	0	45.55
Bradley	0.59	1.2	1.06	2.1	30.32	59.8	1.54	3	17.19	33.9	0	0	31.65
Bremen	0.08	0.5	1.23	6.8	13.17	72.8	1.86	10.3	1.75	9.7	0	0	29.71
Brewer	2.65	16.9	3.37	21.4	7.33	46.6	0.53	3.4	1.83	11.7	0	0	14.8
Bridgton	0.54	0.8	6.62	9.9	44.73	67	10.79	16.2	4.1	6.1	0	0	44.89
Brighton Plt	0.17	0.4	0.87	2.2	35.55	88.8	0.9	2.2	2.57	6.4	0	0	11.53
Bristol	0.77	2.1	4.04	11.2	26.13	72.5	0.82	2.3	4.25	11.8	0.02	0.1	50.91
Brooklin	1.02	4.7	1.16	5.4	13.43	62.7	0.5	2.3	5.31	24.8	0	0	43.19
Brooks	0.72	1.2	5.5	9.5	29.93	51.6	15.13	26.1	6.68	11.5	0	0	25.28
Brooksville	0.42	1.3	5.44	17.5	21.41	68.8	1.98	6.4	1.86	6	0	0	53.59
Brownfield	0.68	1.5	9.4	20.3	28.91	62.4	1.36	2.9	5.99	12.9	0.01	0	35.9
Brownville	0.65	1.5	1.54	3.5	34.34	77	0.74	1.7	7.34	16.5	0	0	36.42
Brunswick	4.09	7.9	14.07	27.2	25.25	48.7	2.23	4.3	6.17	11.9	0	0	44.86
Buckfield	0.18	0.5	5.22	13.9	28.04	74.5	0.34	0.9	3.87	10.3	0	0	39.54
Bucksport	2	3.6	5.2	9.2	39.48	70.1	4.73	8.4	4.86	8.6	0	0	77.91
Burnham	0.33	0.8	3.36	8.2	23.61	57.4	2.1	5.1	11.71	28.5	0	0	28.39
Buxton	0.43	1.1	13.07	31.7	21.99	53.4	0.91	2.2	4.72	11.5	0.05	0.1	38.78
Byron	0.03	0.1	0.72	1.4	48.95	93.3	1.01	1.9	1.78	3.4	0	0	57.36
C Surplus	0.01	0.1	0.01	0	15.68	89.5	0.38	2.2	1.44	8.2	0	0	41.17
Cambridge	0.24	1.2	3.19	16.5	12.06	62.2	0.29	1.5	3.62	18.6	0	0	41.32
Camden	1.01	5.4	1.06	5.6	14.98	79.3	1.45	7.7	0.39	2.1	0	0	35.54
Canaan	0.57	1.3	6.85	16.3	26.91	64	1.11	2.6	6.6	15.7	0	0	54.55
Canton	0.7	3.6	2.62	13.4	14.84	75.7	0.15	0.8	1.3	6.6	0	0	35.3
Cape Elizabeth	1.76	11.8	4.28	28.8	5.89	39.6	0.31	2.1	2.6	17.5	0.03	0.2	15.35
Caratunk	0.07	0.1	0.02	0	49.55	89.8	3.4	6.2	2.1	3.8	0	0	82.15
Carmel	1.1	3	4.52	12.3	24.64	66.8	0.49	1.3	6.15	16.7	0	0	24.92
Carrabasset Valley	0.35	0.4	0.09	0.1	75.17	96.5	0.66	0.8	1.65	2.1	0	0	16.83
Carrying Place Town	0.16	0.4	0.01	0	36.46	85.4	3.48	8.1	2.59	6.1	0	0	66.79
Carrying Place Twp	0.01	0.1	0	0	15.36	94.3	0.68	4.2	0.23	1.4	0	0	31.29
Carthage	0.1	0.2	0.01	0	51.02	95.2	0.13	0.2	2.33	4.3	0	0	10.75
Casco	0.5	1.3	3.43	9	24.07	63.4	7.23	19	2.74	7.2	0	0	24.77
Castine	0.44	1	5.32	12.2	29.16	67	3.15	7.2	5.46	12.5	0	0	39.79
Chain of Ponds Twp	0.22	0.5	0	0	39.52	91.6	1.48	3.4	1.91	4.4	0	0	27.03
Charleston	0.39	1	7.57	18.6	27.43	67.5	0.06	0.1	5.21	12.8	0	0	43.13
Chelsea	0.67	3.4	3.42	17.1	13.51	67.7	0.33	1.6	2.03	10.2	0	0	35.2
Chesterville	0.5	2.1	2.1	8.9	18.3	77.4	0.7	3	2.03	8.6	0.04	0.2	41.45
China	0.77	1.6	9.04	18.9	30.48	63.8	3.7	7.8	3.76	7.9	0	0	62.9
Clifton	0.49	1.4	0.68	1.9	29.74	83.2	1.7	4.8	3.12	8.7	0	0	23.32
Clinton	1.11	2.5	14	31.3	23.96	53.6	1.07	2.4	4.55	10.2	0	0	44.05
Coburn Gore	0.02	0.2	0	0	11.8	86.2	0.68	5	1.19	8.7	0	0	21.47
Concord Twp	0.2	0.5	2.55	6.8	31.74	85	0.65	1.7	2.2	5.9	0	0	39
Coplin Plt	0.14	0.4	0.46	1.4	27.5	83.1	0.14	0.4	4.84	14.6	0	0	13.24
Corinna	0.85	2.2	11.13	28.2	21.77	55.3	1	2.5	4.65	11.8	0	0	19.41
Corinth	0.75	1.9	10.34	25.7	22.5	56	0.2	0.5	6.42	16	0	0	44.02
Cornish	0.17	0.8	5.19	23.1	15.11	67.3	0.23	1	1.74	7.8	0.02	0.1	43.06
Cornville	0.25	0.6	7.16	17.5	28.8	70.6	0.4	1	4.19	10.3	0	0	39.34
Criehaven Twp	0	0	0.12	35.4	0.15	43.6	0	0.1	0.05	14.4	0.02	6.5	19.91
Cumberland	0.97	3.7	8.48	32.5	14.62	55.9	0.15	0.6	1.85	7.1	0.07	0.3	33.08
Cushing	0.5	2.3	3.16	14.8	13.46	63.1	0.38	1.8	3.82	17.9	0	0	50.69
Dallas Plt	0.14	0.4	0.66	1.6	34.4	85.1	1.56	3.9	3.63	9	0	0	43.6
Damariscotta	0.39	2.8	1.49	10.4	8.78	61.2	1.57	11	2.1	14.6	0	0	38.44

Davis Twp	0.13	0.4	0.02	0.1	31.55	89.6	2.82	8	0.68	1.9	0	0	23.39
Dayton	0.13	0.7	6.07	33	10.22	55.5	0.49	2.6	1.37	7.5	0.12	0.7	50.93
Dead River Twp	0.02	0	0	0	29.37	68	12.11	28.1	1.69	3.9	0	0	38.77
Dedham	0.4	0.9	1.33	3	35.95	81.1	5.32	12	1.3	2.9	0	0	56.72
Deer Isle	1.42	3.6	2.56	6.6	20.27	52.1	2.11	5.4	12.51	32.2	0	0	47.13
Denmark	0.12	0.2	4	8.1	37.72	76.5	3.73	7.6	3.75	7.6	0	0	39.74
Detroit	0.2	1	2.5	12.3	11.29	55.5	0.23	1.1	6.14	30.2	0	0	19.31
Dexter	1.04	2.8	7.32	19.7	23.36	62.9	2.16	5.8	3.25	8.8	0	0	40.2
Dixfield	1.27	4.5	4.15	14.7	18.6	66.1	2.58	9.2	1.55	5.5	0	0	38.66
Dixmont	0.37	1	4.46	12.2	27.34	75.1	0.18	0.5	4.08	11.2	0	0	30.53
Dover-Foxcroft	1.69	2.4	9.7	13.7	46.36	65.2	3.43	4.8	9.88	13.9	0	0	23.2
Dresden	0.3	0.9	5.13	15.4	22	66	2.11	6.3	3.82	11.4	0	0	47.74
Durham	0.71	1.8	9.68	24.8	23.33	59.7	0.85	2.2	4.48	11.5	0	0	28.83
East Moxie Twp	0.18	0.5	0.05	0.1	33.88	85.4	1.62	4.1	3.92	9.9	0	0	23.05
Eddington	1.17	4.4	1.96	7.4	18.56	70	1.65	6.2	3.2	12	0	0	39.6
Edgecomb	0.2	1	1.92	9.7	14.46	73.4	1.41	7.2	1.71	8.7	0	0	29.37
Edinburg	0.67	1.8	0.22	0.6	25.07	69.2	1.38	3.8	8.89	24.5	0	0	42.6
Eliot	0.55	2.8	6.32	31.7	9.92	49.8	0.42	2.1	2.7	13.5	0	0	40.34
Embden	0.38	0.9	3.98	9.1	31.53	72.4	4.36	10	3.28	7.5	0	0	20.42
Enfield	0.91	2.7	1.52	4.5	21.68	63.6	6.18	18.1	3.82	11.2	0	0	44.9
Etna	0.61	2.5	2.61	10.5	16.64	67.2	0.31	1.3	4.58	18.5	0	0	35.25
Eustis	0.49	1.2	0.15	0.4	33.01	79.9	3.01	7.3	4.63	11.2	0	0	37.69
Exeter	0.52	1.4	8.88	23.1	23.52	61.2	0.2	0.5	5.33	13.9	0	0	37.03
Fairfield	1.17	3.2	6.39	17.3	21.23	57.3	1.48	4	6.76	18.2	0	0	42.41
Falmouth	2.36	7.6	8.04	25.7	16.52	52.8	0.72	2.3	3.59	11.5	0.04	0.1	36.25
Farmingdale	0.67	5.8	2.31	19.9	7.57	65.1	0.38	3.3	0.69	5.9	0	0	41.28
Farmington	1.25	2.2	11.61	20.8	38.69	69.3	1.28	2.3	2.97	5.3	0.03	0.1	54.24
Fayette	0.89	1.6	9.24	16.3	32.11	56.6	7.36	13	7.12	12.5	0	0	38.89
Flagstaff Twp	0.09	0.3	0.01	0	21.01	62.5	9.9	29.5	2.58	7.7	0	0	37.97
Frankfort	0.15	0.6	5.2	20.6	18.72	74	0.05	0.2	1.16	4.6	0	0	37.66
Freedom	0.34	1.1	3.64	11.9	22.36	73.2	1.73	5.7	2.41	7.9	0.04	0.1	25.36
Freeman Twp	0.07	0.2	1.93	5.7	28.73	84.7	0.15	0.4	3.05	9	0	0	35.52
Freeport	1.36	3.8	8.71	24.4	22.8	64	0.77	2.2	1.99	5.6	0	0	42
Friendship	0.64	4.5	1.86	13.3	9.33	66.6	0.18	1.3	1.99	14.2	0	0	44.64
Fryeburg	0.86	1.3	11.64	17.6	34.28	51.9	6.62	10	12.7	19.2	0	0	3.85
Gardiner	1.37	8.2	2.93	17.7	10.55	63.6	0.97	5.9	0.76	4.6	0	0	38.44
Garland	0.27	0.7	5.22	13.7	27.29	71.9	0.35	0.9	4.84	12.8	0	0	58.24
Georgetown	0.14	0.7	1.06	5.7	14.02	75.3	0.32	1.7	3.08	16.5	0	0	23.39
Gilead	0.17	0.4	3.4	7.6	37.33	83.2	0.73	1.6	3.25	7.2	0	0	66.09
Glenburn	1.06	3.6	3.48	11.9	17.95	61.5	2.38	8.2	4.29	14.7	0	0	41.11
Gorham	1.6	3.1	20.28	39.5	26.3	51.2	0.83	1.6	2.04	4	0.26	0.5	37.12
Grafton Twp	1.94	3.5	11.52	21.1	34.05	62.4	1.27	2.3	5.77	10.6	0	0	28.88
Gray	1.48	3.2	8.61	18.8	29.55	64.5	2.99	6.5	3.18	6.9	0.03	0.1	37.96
Greenbush	0.81	1.7	0.92	2	32.49	68.9	1.64	3.5	11.26	23.9	0	0	31.02
Greene	0.4	1.1	6.38	18.1	22.45	63.7	2.9	8.2	3.1	8.8	0	0	20.02
Greenwood	0.95	2.6	2.86	8	23.61	66.1	2.74	7.7	5.56	15.6	0	0	39.4
Guilford	0.64	1.8	2.55	7.2	28.59	80.3	1.08	3	2.75	7.7	0	0	41.55
Hallowell	0.54	8.9	1.95	32	3.13	51.3	0.23	3.7	0.25	4.1	0	0	37.67
Hampden	2.63	6.8	7.02	18	23.6	60.7	1.21	3.1	4.44	11.4	0	0	32.03
Hanover	0.26	0.5	3.67	7.7	41.13	86.4	1.06	2.2	1.47	3.1	0	0	23.8
Harmony	0.39	1	4.07	10.1	30.82	76.4	1.57	3.9	3.49	8.6	0	0	7.49
Harpswell	0.52	2.2	3.65	15.6	16.83	71.9	0.6	2.6	1.82	7.8	0	0	40.79

Harrison	0.26	0.8	5.38	15.9	24.76	73	1.47	4.3	2.05	6	0	0	14.17
Hartford	0.27	1.6	2.71	15.9	10.31	60.4	0.49	2.8	3.3	19.3	0	0	17.52
Hartland	0.4	0.9	3.04	7.1	27.85	65.1	5.84	13.7	5.65	13.2	0	0	14.92
Hebron	0.07	0.3	2.95	13.1	17.49	77.8	0.16	0.7	1.81	8.1	0.01	0	1.37
Hermon	1.75	4.8	7.94	21.6	17.61	48	1.18	3.2	8.23	22.4	0	0	41.59
Hibberts Gore	0	0	0.02	2.1	0.53	70.2	0.01	1.1	0.2	26.6	0	0	37.61
Highland Plt	0.06	0.2	0.12	0.3	40.04	95.3	0.08	0.2	1.69	4	0	0	49.96
Hiram	0.12	0.3	6	15.5	28.94	74.6	1.58	4.1	2.11	5.4	0.03	0.1	27.01
Holden	1.12	3.5	2.77	8.5	23.24	71.6	1.5	4.6	3.85	11.8	0	0	40.65
Hollis	0.38	1.1	7.81	23.6	20.02	60.6	1.11	3.4	3.64	11	0.1	0.3	61.45
Hope	0.23	1	3.64	15.3	17.08	71.8	2.04	8.6	0.8	3.4	0	0	65.95
Howland	1.18	3.3	1.09	3	25.26	69.9	2.24	6.2	6.39	17.7	0	0	33.33
Hudson	0.35	0.9	2.56	6.4	23.43	58.5	2.59	6.5	11.11	27.7	0	0	46.91
Indian Island	0.08	3	0.01	0.4	1.94	68.9	0.1	3.6	0.68	24.1	0	0	37.33
Industry	0.05	0.2	1.94	6.2	26.69	86	1.34	4.3	1.01	3.2	0	0	2.47
Isle Au Haut	0.59	4.7	0.7	5.5	9.29	73.2	0.19	1.5	1.92	15.2	0	0	18.05
Isleboro	0.75	5.2	0.73	5.1	10.3	71.3	0.15	1	2.53	17.5	0	0	42.7
Jackson	0	0	0	0	10.65	98.6	0	0	0.15	1.4	0	0	57.4
Jay	0.56	1.3	3.34	8	35.13	84.5	0.74	1.8	1.83	4.4	0.01	0	33.3
Jefferson	0.41	0.7	7.01	12	38.05	64.9	6.48	11.1	6.68	11.4	0	0	24.04
Jim Pond Twp	0.11	0.3	0.11	0.3	33.24	88.2	1.26	3.4	2.96	7.8	0	0	49.31
Kenduskeag	0.33	2	3.24	19.3	9.67	57.7	0.29	1.8	3.21	19.2	0	0	36.48
Kennebunk	1.64	4.6	9.86	27.6	18.64	52.1	0.66	1.9	4.93	13.8	0.01	0	42.11
Kennebunkport	0.59	2.9	3.85	18.7	11.17	54.1	0.13	0.6	4.86	23.6	0.02	0.1	40.04
Kibby Twp	0	0	0	0	40.78	95.3	0.09	0.2	1.9	4.5	0	0	20.62
King & Bartlett Twp	0.04	0.1	0.05	0.1	34.46	88.7	1.75	4.5	2.54	6.5	0	0	0.35
Kingfield	0.34	0.8	2.72	6.3	37.47	86.4	0.71	1.6	2.12	4.9	0	0	31.1
Kingsbury Plt	0.08	0.2	0.33	0.7	41.25	92.4	0.7	1.6	2.28	5.1	0	0	45.83
Kittery	2.12	12.2	3.91	22.5	7.89	45.4	0.17	1	3.27	18.8	0	0	48.18
Knox	1.18	4	3.45	11.8	22.14	75.5	0.92	3.1	1.61	5.5	0	0	20.12
Lagrange	0.3	0.6	2.55	5.2	35.08	70.7	0.2	0.4	11.46	23.1	0	0	39.18
Lang Twp	0.14	0.4	0.21	0.6	33.03	93.6	0.14	0.4	1.78	5.1	0	0	23.31
Lebanon	0.6	1.1	9.87	17.8	36.85	66.4	0.85	1.5	7.35	13.2	0.01	0	39.35
Leeds	0.49	1.1	7.39	17	24.56	56.5	3.4	7.8	7.59	17.5	0.03	0.1	41.6
Levant	0.56	1.9	7.29	24.3	17.7	59	0.19	0.6	4.26	14.2	0	0	42.03
Lewiston	7.13	20.1	8.27	23.3	16.42	46.2	1.4	3.9	2.3	6.5	0	0	43.12
Lexington Twp	0.06	0.1	2.09	5.2	33.15	82	0.79	1.9	4.37	10.8	0	0	18.62
Liberty	0.48	1.2	3.97	10.1	27.25	69.6	1.79	4.6	5.67	14.5	0	0	23.66
Limerick	0.24	0.8	6.56	23.3	17.04	60.4	1.38	4.9	2.89	10.2	0.11	0.4	43.54
Limington	0.45	1	8.57	19.8	27.64	63.7	1.61	3.7	5.05	11.6	0.04	0.1	6.21
Lincoln Plt	0.14	0.4	0.01	0	30.42	82.2	4.9	13.2	1.54	4.2	0	0	26.86
Lincolnville	0.41	1	4.04	10.3	30.26	76.9	2.33	5.9	2.3	5.9	0	0	50.88
Lisbon	1.51	6.4	6.79	28.5	13.65	57.4	0.78	3.3	1.07	4.5	0	0	55.16
Litchfield	0.62	1.6	7.15	18.1	26.61	67.3	2.57	6.5	2.59	6.6	0	0	27.36
Livermore	2.2	6.4	6.85	19.9	22.41	65.2	0.5	1.4	2.41	7	0	0	35.93
Livermore Falls	0.13	0.4	2.91	9.2	22.81	72.3	2.32	7.4	3.38	10.7	0	0	13.13
Long Island	0.06	4.2	0.37	26	0.7	48.6	0.04	2.8	0.26	18.3	0	0	38.2
Lovell	0.31	0.6	2.59	5.4	36.9	77	5.08	10.6	3.02	6.3	0	0	62.61
Lowell	0.52	1.3	0.53	1.3	29.51	73.3	2.07	5.1	7.61	18.9	0	0	79.87
Lower Cupsuptic Twp	0.11	0.3	0.05	0.1	29.91	89.7	0.56	1.7	2.7	8.1	0	0	31.75
Lower Enchanted Twp	0	0	0	0	34.96	90.4	0.54	1.4	3.15	8.2	0	0	35.74
Lyman	0.25	0.6	6.15	15.3	26.43	65.6	1.76	4.4	5.66	14	0.06	0.1	37.93

Lynchtown Twp	0.07	0.2	0.04	0.1	37.09	86.4	3.9	9.1	1.82	4.2	0	0	24.34
Madison	1.42	2.6	10.04	18.3	35.82	65.4	3.03	5.5	4.48	8.2	0	0	40.73
Madrid	0.05	0.1	0.63	1.5	39.81	95.4	0.28	0.7	0.94	2.3	0	0	23.42
Magalloway Plt	0.09	0.2	0.01	0	44.39	81.8	6.67	12.3	3.09	5.7	0	0	10.54
Manchester	0.65	2.3	4.49	15.7	18.99	66.2	1.4	4.9	3.16	11	0	0	47.92
Mason Twp	0.46	2.1	3.76	16.9	15.36	68.9	1.25	5.6	1.45	6.5	0	0	48.55
Massachussets Gore	0	0	0	0	13.65	92.3	0.59	4	0.55	3.7	0	0	27.9
Matinicus Isle Plt	0	0	1.02	41.3	0.74	30.1	0.01	0.4	0.69	27.8	0.01	0.4	55.62
Mattamiscontis Twp	0.3	2	0.14	0.9	12.14	79.1	0.86	5.6	1.9	12.4	0	0	26.53
Maxfield	0.03	0.2	1.01	5.2	15.38	78.7	0.4	2	2.72	13.9	0	0	32.9
Mayfield Twp	0.13	0.3	0.22	0.5	37.65	86.2	1.12	2.6	4.55	10.4	0	0	14.34
Mechanic Falls	0.35	3.2	2.29	20.5	7.35	65.8	0.21	1.9	0.95	8.5	0	0	40.05
Medford	0.14	0.3	1.73	4	35.16	81.5	0.94	2.2	5.19	12	0	0	39.08
Mercer	0.15	0.5	3.03	11.1	21.11	77.1	0.58	2.1	2.5	9.1	0	0	47.31
Mexico	1.06	1.5	7.74	11.1	56.3	80.7	2.05	2.9	2.57	3.7	0.01	0	41.11
Milford	1.3	2.8	0.74	1.6	25.22	54.7	0.97	2.1	17.85	38.7	0	0	55.55
Milo	1.06	3.1	3.98	11.7	20.81	61.3	1.52	4.5	6.59	19.4	0	0	37.42
Milton Twp	0.82	1.2	7.91	12	49.44	75	1.49	2.3	6.27	9.5	0.02	0	10.44
Minot	0.12	0.4	5.82	19.6	21.25	71.5	0.29	1	2.19	7.4	0.03	0.1	44.3
Monhegan Island Plt	0	0	0.28	35.6	0.38	47.9	0.01	0.7	0.12	14.4	0.01	1.4	17.36
Monmouth	0.67	1.7	7.72	19.8	20.93	53.7	4.7	12.1	4.98	12.8	0	0	60.46
Monroe	0.01	0.2	0.1	2.7	3.72	96.7	0.01	0.1	0.01	0.4	0	0	13.43
Monson	0.25	0.5	1.82	3.7	41.43	84.2	2.5	5.1	3.23	6.6	0	0	35.24
Montville	0.27	1.4	3.36	17.4	13.35	69.1	0.12	0.6	2.21	11.5	0	0	57.44
Morrill	0.19	0.4	3.48	7.4	40.07	85.4	1.43	3	1.74	3.7	0	0	49.02
Moscow	0.47	1	0.87	1.8	42.69	88.4	2.8	5.8	1.45	3	0	0	42.95
Mount Abram Twp	0.01	0	0.61	2	29.04	96.6	0.03	0.1	0.36	1.2	0	0	47.78
Mount Vernon	0.12	0.5	2.89	13.1	16.68	75.4	0.7	3.2	1.74	7.9	0	0	6.11
Muscle Rdg Shoals T.	0	0	0.12	8.4	0.83	61	0.04	2.8	0.38	27.8	0	0	4.1
Naples	0.61	1.6	3.83	10.3	24.3	65.4	6.16	16.6	2.27	6.1	0	0	32.48
New Gloucester	1.08	2.2	9.51	19.9	30.81	64.4	0.84	1.8	5.59	11.7	0.01	0	36.61
New Portland	0.18	0.4	3.63	8.2	34.45	78.2	1.34	3	4.46	10.1	0	0	29.69
New Sharon	0.23	0.5	6.61	14.1	36.48	77.9	0.87	1.8	2.65	5.6	0	0	2.16
New Vineyard	0.07	0.2	2.26	6.2	30.07	82.4	0.64	1.8	3.44	9.4	0	0	48.85
Newburgh	0.5	1.6	3.61	11.6	22.29	71.9	0.09	0.3	4.52	14.6	0	0	52.5
Newcastle	0.32	1	3.49	11	21.77	68.6	1.69	5.3	4.48	14.1	0	0	43.42
Newfield	0.1	0.3	5.53	16.5	22.16	66.3	1.5	4.5	4.13	12.3	0.02	0.1	13.51
Newport	1.07	2.9	6.51	17.6	17.5	47.4	7.7	20.9	4.13	11.2	0	0	40.4
Newry	0.33	1.6	2.13	10.6	14.93	74.6	1.41	7	1.23	6.1	0	0	20.35
Nobleboro	0.35	1.5	2.96	12.7	13.3	57	4.12	17.7	2.58	11.1	0	0	35.8
Norridgewock	1.3	2.5	11.27	22.1	34.69	67.9	1.64	3.2	2.18	4.3	0	0	2.81
North Berwick	0.58	1.5	8.01	21	25.28	66.3	0.32	0.8	3.94	10.3	0.01	0	31.02
North Haven	0.89	7.7	1.81	15.7	6.8	59	0.31	2.7	1.72	14.9	0	0	33.96
North Yarmouth	0.34	1.6	7.42	34.6	12.33	57.4	0.19	0.9	1.14	5.3	0.06	0.3	51.08
Northport	0.36	1.5	2.02	8.4	19.18	79.8	0.59	2.5	1.88	7.8	0	0	44.31
Norway	0.58	1.2	6.32	13.4	33.65	71.1	2.81	5.9	3.94	8.3	0	0	25.89
Oakland	0.24	0.4	3.24	5.3	56.86	92.5	0.18	0.3	0.91	1.5	0.02	0	35.52
Ogunquit	0.54	13.3	0.79	19.4	2.24	54.6	0.05	1.1	0.45	11	0.03	0.7	39.65
Old Orchard Beach	1.49	19.6	1.98	26.1	2.84	37.5	0.12	1.6	1.13	14.9	0.02	0.3	40.35
Old Town	3.09	6.9	1.1	2.4	20.94	46.6	6.32	14.1	13.45	30	0	0	43.9
Orland	0.16	0.6	3.64	14.3	19.15	75.5	0.16	0.6	2.25	8.9	0	0	33.34
Orneville Twp	0.12	0.3	0.75	2	26.76	69.6	1.94	5	8.86	23.1	0	0	3.63

Orono	2.15	11.1	1.76	9.1	9.62	49.6	1.6	8.3	4.28	22	0	0	34.62
Orrington	1.27	4.6	4.31	15.8	17.61	64.4	2.11	7.7	2.06	7.5	0	0	36.22
Otis	0.18	0.6	0.45	1.6	22.42	78.1	4.16	14.5	1.48	5.2	0	0	21.42
Otisfield	0.1	0.2	3.9	8.8	32.27	72.8	4.71	10.6	3.31	7.5	0	0	44.78
Owls Head	1.21	14.4	1.42	16.9	5.04	60	0.04	0.5	0.7	8.3	0	0	47.07
Oxbow Twp	0.01	0	0.16	0.5	30.64	95.7	0.17	0.5	1.05	3.3	0	0	30.25
Oxford	1.08	2.6	5.27	12.6	27.3	65.3	3.64	8.7	4.48	10.7	0.02	0	47.19
Palermo	0.05	0.1	3.71	8.2	36.28	80.4	1.35	3	3.73	8.3	0	0	22.46
Palmyra	0.67	1.6	8.76	21.1	24.79	59.8	1.16	2.8	6.08	14.7	0	0	42.09
Paris	0.96	2.3	6.5	15.9	30.99	75.6	0.47	1.1	2.07	5	0.01	0	33.93
Parkertown Twp	0.02	0	0.01	0	31.28	83.6	5.29	14.1	0.83	2.2	0	0	14.87
Parkman	0.31	0.7	5.19	11.3	35.48	77	0.9	2	4.21	9.1	0	0	25.43
Parmachenee Twp	0.01	0	0	0	33.24	92.5	0.38	1.1	2.3	6.4	0	0	40.31
Parsonsfield	0.32	0.5	9.19	15.4	44.19	73.9	1.18	2	4.92	8.2	0.02	0	24.41
Passadumkeag	0.46	1.9	0.49	2.1	10.94	45.8	0.88	3.7	11.1	46.5	0	0	36.72
Penobscot	0.23	0.5	4.66	10.7	29.03	66.9	5.6	12.9	3.9	9	0	0	47.58
Perkins Twp	0.01	0.1	0.29	1.2	22.19	95.2	0.04	0.2	0.78	3.4	0	0	33.45
Perkins Twp.	0	0	0.49	13.5	1.7	46.8	0.86	23.7	0.58	16	0	0	32.35
Peru	0.76	1.8	4.1	9.5	31.14	72.5	1.51	3.5	5.44	12.7	0	0	36.89
Phillips	0.25	0.5	3.09	6.1	44.12	86.7	0.76	1.5	2.69	5.3	0.01	0	18.9
Phippsburg	0.39	1.4	2.64	9	20.21	69.3	0.74	2.5	5.12	17.6	0.04	0.2	8.53
Pierce Pond Twp	0.02	0	0.01	0	35.34	85.1	3.54	8.5	2.63	6.3	0	0	41.14
Pittsfield	1.86	3.8	8.77	18	29.57	60.8	0.79	1.6	7.63	15.7	0	0	24.12
Pittston	0.49	1.5	6.74	20.2	22.3	66.9	1.02	3.1	2.78	8.3	0	0	25.8
Pleasant Ridge Plt	0.02	0.1	0.05	0.2	20.39	84.5	2.45	10.2	1.21	5	0	0	33.05
Plymouth	0.59	1.9	4.72	15.2	17.26	55.4	1.45	4.6	7.13	22.9	0	0	3.15
Poland	0.4	0.9	7.21	15.3	30.21	64.1	5.34	11.3	3.99	8.5	0	0	45.12
Porter	0.16	0.5	5.64	17.2	23.46	71.3	1.52	4.6	2.1	6.4	0.01	0	16.58
Portland	13.17	62	1.79	8.4	4.18	19.7	0.27	1.3	1.45	6.8	0.37	1.8	13.7
Pownal	0.3	1.3	5.7	24.9	14.94	65.2	0.07	0.3	1.9	8.3	0	0	42.79
Prospect	0.14	0.4	1.39	4.4	22.3	70.4	6.55	20.7	1.28	4	0	0	41.79
Randolph	0.36	16.9	0.49	22.6	1.11	51.7	0.1	4.5	0.09	4.3	0	0	25.19
Rangeley	0.7	1.3	2.11	3.8	33.62	60.5	15.34	27.6	3.78	6.8	0	0	25.36
Rangeley Plt	0.32	0.7	0.08	0.2	38.25	80.8	6.95	14.7	1.77	3.7	0	0	24.45
Raymond	0.48	1.1	3.82	8.5	26.12	58.3	12.14	27.1	2.23	5	0	0	57.95
Readfield	0.21	0.7	2.59	9.1	19.93	70.2	2.66	9.4	3	10.6	0	0	22.29
Redington Twp	0.03	0.1	0	0	40.77	97.1	0.24	0.6	0.94	2.2	0	0	0.8
Richardsontown Twp	0.01	0	0.01	0	28.68	59.8	17.21	35.9	2.01	4.2	0	0	7.58
Richmond	0.77	2.4	7.72	24.4	19.93	63	1.34	4.2	1.89	6	0	0	29.17
Riley Twp	0.17	2.8	0.36	5.9	5.24	84.3	0.06	1	0.37	6	0	0	46.08
Ripley	0.08	0.3	4.13	16.6	17.37	69.7	0.47	1.9	2.87	11.5	0	0	8.41
Rockland	1.92	14.6	2.61	19.9	6.48	49.3	0.33	2.5	1.8	13.7	0	0	38.84
Rockport	1.37	5.9	3.44	14.9	15.81	68.6	1.08	4.7	1.36	5.9	0	0	16.29
Rome	0.09	0.2	2.94	7.8	26.32	69.8	1.44	3.8	6.9	18.3	0	0	46.34
Roxbury	0.11	0.2	1.23	2.8	39.39	89.3	1.53	3.5	1.84	4.2	0	0	24.98
Rumford	0.73	2.5	8.17	28.1	15.64	53.7	0.75	2.6	3.85	13.2	0	0	41.71
Sabattus	1.08	4	6.41	23.9	15.74	58.6	0.98	3.6	2.66	9.9	0	0	46.09
Saco	2.72	7	11.37	29.3	18.92	48.8	0.65	1.7	4.93	12.7	0.17	0.4	33.59
Saint Albans	0.35	0.7	8.36	17.7	31.25	66.2	2.39	5.1	4.84	10.3	0	0	28.69
Saint George	1.58	6.3	3.05	12.2	16.82	67.3	0.32	1.3	3.2	12.8	0	0	71.07
Salem Twp	0.09	0.4	1.03	4.4	19.88	85.7	0.08	0.3	2.13	9.2	0	0	33.36
Sandy River Plt	0.2	0.6	0.01	0	32.27	91.5	1.46	4.1	1.31	3.7	0	0	38.86

Sanford	4.07	8.4	10.85	22.3	23.89	49.1	1.54	3.2	8.14	16.7	0.21	0.4	34.11
Sangerville	0.43	1.1	5.68	14.4	27.83	70.3	1.34	3.4	4.32	10.9	0	0	14.04
Scarborough	3.57	7.5	12.44	26	20.03	41.9	0.67	1.4	10.86	22.7	0.21	0.4	38.44
Searsmont	0.16	0.8	0.86	4.4	17.05	86.9	0.9	4.6	0.65	3.3	0	0	19.62
Searsport	0.01	0	0.47	0.9	50.26	98.8	0.03	0.1	0.11	0.2	0	0	23.94
Sebago	0.23	0.5	4.6	9.4	24.6	50.4	16.24	33.3	3.15	6.4	0.02	0.1	33.33
Sebec	0.24	0.6	3.1	8.2	27.06	71.5	1.41	3.7	6.06	16	0	0	35.5
Sedgwick	0.25	1.8	1.37	9.7	9.98	70.4	0.65	4.6	1.92	13.5	0	0	48.61
Seven Ponds Twp	0.04	0.1	0.01	0	36.19	94.1	1.2	3.1	1	2.6	0	0	59.82
Shapleigh	0.18	0.4	5.76	14	29.13	71	2.94	7.2	2.99	7.3	0.01	0	75.1
Shirley	0.31	0.6	0.78	1.4	46.82	87	0.85	1.6	5.06	9.4	0	0	34.59
Sidney	0.17	0.4	4.48	10.4	35.31	81.9	0.63	1.5	2.54	5.9	0	0	31.65
Skowhegan	2.96	4.9	12.38	20.5	37.31	61.7	2.07	3.4	5.73	9.5	0	0	23.87
Smithfield	0.11	0.3	1.77	5.3	28.43	85.4	0.47	1.4	2.52	7.6	0.01	0	47.15
Solon	0.43	1.1	4.2	10.3	32.56	80	1.14	2.8	2.39	5.9	0	0	25.03
Somerville	0.09	0.4	2.03	8.9	16.03	70.7	0.86	3.8	3.68	16.2	0	0	11.17
South Berwick	0.64	2	5.93	18.3	21.09	65.2	0.31	0.9	4.38	13.5	0	0	35.72
South Bristol	0.28	2.1	1.51	11.6	10.07	77.3	0.23	1.8	0.92	7.1	0.01	0.1	36.92
South Portland	7.08	55.1	2.02	15.7	1.4	10.9	0.29	2.2	1.88	14.6	0.18	1.4	44.63
South Thomaston	0.6	4.4	2.72	20.1	6.69	49.5	0.16	1.1	3.35	24.8	0	0	42.92
Southport	0.27	5.1	0.28	5.4	3.71	70.6	0.14	2.6	0.86	16.3	0	0	49.58
Standish	1.03	1.3	8.74	10.6	41.96	51.1	22.23	27.1	8.08	9.8	0.11	0.1	51.16
Starks	0.17	0.5	6.48	20.3	22.85	71.5	0.63	2	1.83	5.7	0	0	34.46
Stetson	0.21	0.6	5.61	15.3	21.16	57.8	1.81	4.9	7.83	21.4	0	0	0.75
Stetsontown Twp	0.17	0.4	0.07	0.2	37	87.9	1.35	3.2	3.53	8.4	0	0	33.92
Stockton Springs	1.1	2.8	2.2	5.5	29.17	73.3	2.4	6	4.93	12.4	0	0	37.02
Stoneham	0.05	0.1	0.94	2.7	30.67	88.7	1.15	3.3	1.78	5.1	0	0	6.13
Stonington	0.96	7.3	0.63	4.7	6.01	45.4	0.99	7.5	4.66	35.2	0	0	40.24
Stow	0.04	0.2	2.59	10.6	19.35	79.3	0.15	0.6	2.28	9.4	0	0	36.34
Strong	0.19	0.7	2.78	9.6	22.71	78.8	1.14	4	2	7	0	0	43.47
Summit Twp	0.13	0.4	0.39	1	27.49	72	0.27	0.7	9.91	26	0	0	11.11
Sumner	0.63	8.1	1.1	14.1	5.01	63.9	0.08	1.1	1.01	12.9	0	0	36.16
Surry	0.3	1	6.15	20.9	21.15	72	0.21	0.7	1.56	5.3	0	0	19.61
Swanville	0.39	1.6	4.17	16.7	18.24	72.9	0.73	2.9	1.5	6	0	0	55.84
Sweden	0.04	0.1	1.33	4.5	25.02	84.3	1.05	3.6	2.25	7.6	0	0	26.14
T3 R4 BKP WKR	0.04	0.1	0.03	0.1	30.43	83.9	2.08	5.7	3.67	10.1	0	0	16.02
T3 R5 BKP WKR	0.05	0.1	0.01	0	36.24	89.8	2.11	5.2	1.94	4.8	0	0	5.26
Temple	0.02	0.1	0.9	2.5	33.47	93.5	0.42	1.2	0.98	2.7	0	0	1.44
The Forks Plt	0.01	0	0	0	38.14	92.2	1.87	4.5	1.38	3.3	0	0	48.7
Thomaston	1.04	9.4	3.64	32.8	4.95	44.5	0.27	2.4	1.21	10.9	0	0	41.54
Thorndike	0.04	0.3	0.43	4.1	7.46	71.4	0.01	0.1	2.51	24	0	0	12.69
Tim Pond Twp	0.11	0.3	0.03	0.1	39.3	94.5	0.62	1.5	1.53	3.7	0	0	14
Topsham	1.6	4.5	8.58	24.2	18.01	50.7	2.3	6.5	5.03	14.2	0	0	41.88
Township C	0.03	0.1	0	0	37.21	87.4	4.24	10	1.11	2.6	0	0	17.3
Township D	0.07	0.2	0.1	0.3	30.67	96.8	0.24	0.8	0.6	1.9	0	0	19.7
Township E	0.06	0.2	1.29	4.5	26.4	91.6	0.63	2.2	0.46	1.6	0	0	13.28
Troy	0.19	0.5	4.51	12.6	24.76	69	0.98	2.7	5.45	15.2	0	0	19.96
Turner	0.51	0.8	12.75	20.4	40.72	65	3.67	5.9	4.94	7.9	0.02	0	7.84
Twp 6 N. of Weld	0.04	0.1	0.01	0	43.6	99	0.08	0.2	0.29	0.7	0	0	51.32
Union	0.78	2.3	6.77	19.6	22.1	64.1	2.46	7.2	2.34	6.8	0	0	42.79
Unity	1.38	2.7	3.42	6.7	38.98	76.2	4.68	9.2	2.69	5.3	0	0	43.47
Unity Twp	0.44	1.1	7.1	17.2	23.3	56.4	2.3	5.6	8.19	19.8	0	0	21.62

Upper Cupsuptic Twp	0	0	0.06	0.1	40.47	96.6	0.12	0.3	1.22	2.9	0	0	55.52
Upton	0.1	0.2	0.01	0	34.21	81.3	2.65	6.3	5.12	12.2	0	0	39.05
Vassalboro	1.96	2.9	4.57	6.9	48.43	72.6	2.54	3.8	9.21	13.8	0	0	40.45
Veazie	0.62	19.8	0.66	20.9	1.5	47.7	0.19	6.1	0.17	5.5	0	0	25.57
Verona	1.72	4.4	7.24	18.7	23.86	61.5	2.06	5.3	3.9	10.1	0	0	48.28
Vienna	1.15	2.3	8.57	17.4	34.19	69.6	1.14	2.3	4.08	8.3	0.01	0	16.74
Vinalhaven	1.11	4.8	1.36	5.8	16.29	69.6	0.56	2.4	4.07	17.4	0	0	38.43
Waldo	0.05	0.6	1.04	13.9	5.67	75.8	0.66	8.8	0.07	0.9	0	0	22.68
Waldoboro	1.55	2.1	11.86	15.8	47.73	63.6	2.02	2.7	11.93	15.9	0	0	34.71
Wales	0.27	1.6	5.51	32.7	9.15	54.4	0.59	3.5	1.31	7.8	0	0	31.96
Warren	1.23	2.5	8.84	18	32.28	65.8	2.46	5	4.2	8.6	0	0	43.53
Washington	0.31	0.8	5.76	14.7	27.24	69.5	1.23	3.1	4.64	11.8	0	0	35.71
Washington Twp	0.52	1.2	7.02	16.4	31.64	73.9	1.74	4.1	1.87	4.4	0	0	69.72
Waterboro	0.56	1	7.86	13.7	37.54	65.4	2.19	3.8	9.16	16	0.05	0.1	47.59
Waterford	0.26	0.5	5.21	9.8	41.29	77.8	3.07	5.8	3.27	6.2	0	0	22.49
Waterville	0.04	0.2	1.65	6.5	20.68	81.5	1.31	5.1	1.69	6.7	0	0	22.92
Wayne	0.29	1.1	2.13	8.4	14.79	58.2	6.19	24.4	2.03	8	0	0	49.13
Weld	0.09	0.1	1.97	3.1	54.34	86.4	3.55	5.6	2.95	4.7	0	0	29.14
Wellington	0.1	0.2	2.15	5.4	35.05	87.6	0.28	0.7	2.42	6	0	0	37.16
Wells	1.79	3.1	10.15	17.7	31.82	55.4	0.3	0.5	13.26	23.1	0.09	0.2	34.77
West Bath	0.25	1.9	1.97	14.6	8.53	63.5	1.37	10.2	1.32	9.8	0	0	31.68
West Gardiner	0.77	2.8	6.03	22.3	15.68	58	2.52	9.3	2.02	7.5	0	0	43.36
West Paris	0.36	1.5	4.07	16.7	17.77	72.7	0.21	0.9	2.04	8.3	0.01	0	44.1
Westbrook	3.75	21.7	4.94	28.6	7.13	41.2	0.31	1.8	1	5.8	0.17	1	53.81
Westport	0.14	1.3	0.67	6.2	7.26	67.5	1.91	17.8	0.78	7.2	0	0	10.79
Whitefield	0.43	0.9	9.02	19	32.89	69.1	1.22	2.6	4.02	8.5	0	0	66.72
Williamsburg Twp	0.08	0.3	0.12	0.5	22.53	88.1	0.13	0.5	2.7	10.6	0	0	23.8
Willimantic	0.14	0.3	0.6	1.2	38.4	79.7	5.01	10.4	4.05	8.4	0	0	21.32
Wilton	0.21	0.9	2.95	11.9	13.61	55	4.93	19.9	3.07	12.4	0	0	17.08
Windham	1.38	2.8	15.41	30.8	26.3	52.6	3.87	7.8	2.81	5.6	0.19	0.4	38.75
Windsor	0.6	1.7	6.81	19.2	23.06	65	1.04	2.9	3.99	11.2	0	0	31.15
Winslow	0.33	1.5	2.4	11.1	14.71	68	2.04	9.4	2.14	9.9	0	0	28.69
Winterport	0.03	0.4	0.16	1.9	7.8	91.5	0.11	1.3	0.42	5	0	0	21.38
Winthrop	1.05	2.8	4.84	12.7	22.67	59.8	7.07	18.6	2.3	6.1	0	0	30.05
Wiscasset	0.89	3.3	4.07	15.1	17.26	63.9	1.64	6.1	3.15	11.7	0	0	40
Woodstock	0.03	6.3	0	0.7	0.21	42.8	0.07	13.4	0.18	36.8	0	0	35.6
Woolwich	0.56	1.4	5.05	12.7	26.23	66	3.28	8.2	4.63	11.6	0	0	46.83
Wyman Twp	0.05	0.3	0	0	18.5	91.9	0.24	1.2	1.32	6.6	0	0	47.84
Yarmouth	1.65	10.3	4.65	29	5.91	36.9	0.45	2.8	3.36	21	0	0	41.39
York	2.5	4.5	9.08	16.3	34.26	61.6	1.32	2.4	8.43	15.1	0.03	0.1	43.66

[a] - Hepinstall, J.A., S.A. Sader, W.B. Krohn, R.B. Boone, and R.I. Bartlett. 1999. Development and testing of a vegetation and land cover map of Maine. Maine Agriculture and Forest Experiment Station, Technical Bulletin 173. University of Maine. 104 pp.

Appendix C. Number of wildlife species predicted by Maine Gap Analysis (Krohn *et al.* 1998)[a], within Shoreland Zone, and within the combined Shoreland Zone and Important Habitats by towns in southern Maine.

Town	ME-GAP		Shoreland Zone			Shoreland Zone + Important Habitats			
	Species Richness	% Total	Species Richness	% Total	# Missed	Species Richness	% Total	# Added	# Missed
Abbot	204	75.6	187	69.3	17	188	69.6	1	16
Acton	218	80.7	201	74.4	17	205	75.9	4	13
Adamstown Twp	208	77.0	172	63.7	36	172	63.7	0	36
Albany Twp	221	81.9	199	73.7	22	200	74.1	1	21
Albion	213	78.9	192	71.1	21	197	73.0	5	16
Alder Stream Twp	207	76.7	185	68.5	22	187	69.3	2	20
Alfred	221	81.9	207	76.7	14	208	77.0	1	13
Alna	213	78.9	187	69.3	26	198	73.3	11	15
Alton	219	81.1	209	77.4	10	210	77.8	1	9
Andover	218	80.7	191	70.7	27	191	70.7	0	27
Andover North Surplus	210	77.8	176	65.2	34	176	65.2	0	34
Andover West Surplus Twp	213	78.9	169	62.6	44	169	62.6	0	44
Anson	212	78.5	190	70.4	22	193	71.5	3	19
Appleton	214	79.3	196	72.6	18	200	74.1	4	14
Argyle Twp	220	81.5	207	76.7	13	209	77.4	2	11
Arrowsic	217	80.4	184	68.1	33	189	70.0	5	28
Arundel	219	81.1	199	73.7	20	200	74.1	1	19
Athens	213	78.9	188	69.6	25	194	71.9	6	19
Atkinson	209	77.4	197	73.0	12	197	73.0	0	12
Auburn	217	80.4	198	73.3	19	198	73.3	0	19
Augusta	215	79.6	190	70.4	25	194	71.9	4	21
Avon	214	79.3	173	64.1	41	173	64.1	0	41
Bald Mountain Twp T2 R3	209	77.4	190	70.4	19	190	70.4	0	19
Baldwin	217	80.4	192	71.1	25	198	73.3	6	19
Bangor	219	81.1	200	74.1	19	203	75.2	3	16
Barnard Twp	206	76.3	184	68.1	22	185	68.5	1	21
Batchelders Grant Twp	219	81.1	149	55.2	70	149	55.2	0	70
Bath	218	80.7	185	68.5	33	189	70.0	4	29
Belfast	219	81.1	197	73.0	22	200	74.1	3	19
Belgrade	222	82.2	199	73.7	23	201	74.4	2	21
Belmont	217	80.4	196	72.6	21	201	74.4	5	16
Benton	212	78.5	188	69.6	24	192	71.1	4	20
Berwick	218	80.7	207	76.7	11	207	76.7	0	11
Bethel	224	83.0	198	73.3	26	201	74.4	3	23
Biddeford	219	81.1	206	76.3	13	208	77.0	2	11
Bigelow Twp	208	77.0	186	68.9	22	187	69.3	1	21
Bingham	205	75.9	173	64.1	32	184	68.1	11	21
Blanchard Twp	207	76.7	189	70.0	18	190	70.4	1	17
Blue Hill	225	83.3	208	77.0	17	211	78.1	3	14
Boothbay	215	79.6	186	68.9	29	196	72.6	10	19
Boothbay Harbor	215	79.6	163	60.4	52	168	62.2	5	47
Bowdoin	219	81.1	196	72.6	23	197	73.0	1	22
Bowdoinham	220	81.5	195	72.2	25	196	72.6	1	24
Bowerbank	210	77.8	190	70.4	20	192	71.1	2	18
Bowmantown Twp	206	76.3	183	67.8	23	184	68.1	1	22
Bowtown Twp	204	75.6	171	63.3	33	177	65.6	6	27
Bradford	214	79.3	201	74.4	13	204	75.6	3	10
Bradley	220	81.5	209	77.4	11	209	77.4	0	11
Bremen	216	80.0	189	70.0	27	194	71.9	5	22
Brewer	216	80.0	178	65.9	38	179	66.3	1	37
Bridgton	220	81.5	201	74.4	19	201	74.4	0	19
Brighton Plt	205	75.9	186	68.9	19	187	69.3	1	18
Bristol	215	79.6	193	71.5	22	200	74.1	7	15
Brooklin	224	83.0	197	73.0	27	198	73.3	1	26
Brooks	213	78.9	191	70.7	22	197	73.0	6	16
Brooksville	224	83.0	204	75.6	20	206	76.3	2	18
Brownfield	217	80.4	199	73.7	18	202	74.8	3	15
Brownville	209	77.4	192	71.1	17	193	71.5	1	16
Brunswick	220	81.5	198	73.3	22	202	74.8	4	18
Buckfield	218	80.7	196	72.6	22	197	73.0	1	21

Bucksport	226	83.7	202	74.8	24	203	75.2	1	23
Burnham	214	79.3	200	74.1	14	204	75.6	4	10
Buxton	223	82.6	198	73.3	25	198	73.3	0	25
Byron	214	79.3	193	71.5	21	194	71.9	1	20
C Surplus	213	78.9	192	71.1	21	192	71.1	0	21
Cambridge	206	76.3	188	69.6	18	192	71.1	4	14
Camden	215	79.6	177	65.6	38	188	69.6	11	27
Canaan	213	78.9	199	73.7	14	202	74.8	3	11
Canton	217	80.4	192	71.1	25	193	71.5	1	24
Cape Elizabeth	219	81.1	200	74.1	19	201	74.4	1	18
Caratunk	208	77.0	183	67.8	25	183	67.8	0	25
Carmel	215	79.6	198	73.3	17	199	73.7	1	16
Carrabasset Valley	208	77.0	175	64.8	33	175	64.8	0	33
Carrying Place Town Twp	209	77.4	190	70.4	19	191	70.7	1	18
Carrying Place Twp	207	76.7	163	60.4	44	175	64.8	12	32
Carthage	215	79.6	191	70.7	24	192	71.1	1	23
Casco	215	79.6	194	71.9	21	195	72.2	1	20
Castine	223	82.6	182	67.4	41	190	70.4	8	33
Chain of Ponds Twp	206	76.3	177	65.6	29	178	65.9	1	28
Charleston	210	77.8	197	73.0	13	200	74.1	3	10
Chelsea	214	79.3	183	67.8	31	189	70.0	6	25
Chesterville	217	80.4	196	72.6	21	196	72.6	0	21
China	212	78.5	197	73.0	15	202	74.8	5	10
Clifton	219	81.1	205	75.9	14	205	75.9	0	14
Clinton	212	78.5	189	70.0	23	195	72.2	6	17
Coburn Gore	205	75.9	171	63.3	34	171	63.3	0	34
Concord Twp	208	77.0	186	68.9	22	190	70.4	4	18
Coplin Plt	203	75.2	191	70.7	12	192	71.1	1	11
Corinna	216	80.0	196	72.6	20	201	74.4	5	15
Corinth	213	78.9	197	73.0	16	204	75.6	7	9
Cornish	217	80.4	194	71.9	23	196	72.6	2	21
Cornville	214	79.3	190	70.4	24	194	71.9	4	20
Criehaven Twp	203	75.2	112	41.5	91	154	57.0	42	49
Cumberland	218	80.7	192	71.1	26	198	73.3	6	20
Cushing	216	80.0	196	72.6	20	205	75.9	9	11
Dallas Plt	208	77.0	190	70.4	18	190	70.4	0	18
Damariscotta	214	79.3	189	70.0	25	197	73.0	8	17
Davis Twp	207	76.7	174	64.4	33	175	64.8	1	32
Dayton	217	80.4	197	73.0	20	197	73.0	0	20
Dead River Twp	210	77.8	182	67.4	28	183	67.8	1	27
Dedham	223	82.6	195	72.2	28	196	72.6	1	27
Deer Isle	223	82.6	204	75.6	19	207	76.7	3	16
Denmark	216	80.0	195	72.2	21	195	72.2	0	21
Detroit	216	80.0	186	68.9	30	192	71.1	6	24
Dexter	209	77.4	193	71.5	16	195	72.2	2	14
Dixfield	214	79.3	195	72.2	19	196	72.6	1	18
Dixmont	215	79.6	187	69.3	28	189	70.0	2	26
Dover-Foxcroft	209	77.4	200	74.1	9	200	74.1	0	9
Dresden	217	80.4	182	67.4	35	194	71.9	12	23
Durham	217	80.4	198	73.3	19	199	73.7	1	18
East Moxie Twp	207	76.7	185	68.5	22	186	68.9	1	21
Eddington	219	81.1	197	73.0	22	198	73.3	1	21
Edgecomb	214	79.3	183	67.8	31	201	74.4	18	13
Edinburg	213	78.9	207	76.7	6	210	77.8	3	3
Eliot	218	80.7	201	74.4	17	202	74.8	1	16
Ellsworth	226	83.7	206	76.3	20	207	76.7	1	19
Embden	208	77.0	188	69.6	20	191	70.7	3	17
Enfield	214	79.3	206	76.3	8	208	77.0	2	6
Etna	218	80.7	197	73.0	21	200	74.1	3	18
Eustis	205	75.9	190	70.4	15	190	70.4	0	15
Exeter	217	80.4	192	71.1	25	200	74.1	8	17
Fairfield	214	79.3	197	73.0	17	198	73.3	1	16
Falmouth	221	81.9	197	73.0	24	203	75.2	6	18
Farmingdale	212	78.5	180	66.7	32	182	67.4	2	30
Farmington	215	79.6	194	71.9	21	194	71.9	0	21
Fayette	217	80.4	196	72.6	21	196	72.6	0	21
Flagstaff Twp	206	76.3	185	68.5	21	185	68.5	0	21
Frankfort	220	81.5	196	72.6	24	199	73.7	3	21
Freedom	214	79.3	186	68.9	28	191	70.7	5	23
Freeman Twp	209	77.4	185	68.5	24	186	68.9	1	23

Freeport	220	81.5	192	71.1	28	197	73.0	5	23
Friendship	216	80.0	190	70.4	26	197	73.0	7	19
Fryeburg	222	82.2	210	77.8	12	211	78.1	1	11
Gardiner	213	78.9	174	64.4	39	175	64.8	1	38
Garland	209	77.4	195	72.2	14	201	74.4	6	8
Georgetown	217	80.4	184	68.1	33	192	71.1	8	25
Gilead	222	82.2	191	70.7	31	192	71.1	1	30
Glenburn	218	80.7	199	73.7	19	205	75.9	6	13
Gorham	222	82.2	194	71.9	28	198	73.3	4	24
Grafton Twp	219	81.1	191	70.7	28	191	70.7	0	28
Gray	216	80.0	198	73.3	18	199	73.7	1	17
Greenbush	217	80.4	204	75.6	13	205	75.9	1	12
Greene	215	79.6	193	71.5	22	194	71.9	1	21
Greenwood	221	81.9	193	71.5	28	194	71.9	1	27
Guilford	207	76.7	185	68.5	22	190	70.4	5	17
Hallowell	209	77.4	170	63.0	39	171	63.3	1	38
Hampden	215	79.6	193	71.5	22	201	74.4	8	14
Hanover	213	78.9	175	64.8	38	175	64.8	0	38
Harmony	210	77.8	189	70.0	21	193	71.5	4	17
Harpswell	218	80.7	182	67.4	36	182	67.4	0	36
Harrison	216	80.0	194	71.9	22	195	72.2	1	21
Hartford	221	81.9	202	74.8	19	203	75.2	1	18
Hartland	216	80.0	198	73.3	18	200	74.1	2	16
Hebron	216	80.0	188	69.6	28	190	70.4	2	26
Hermon	215	79.6	201	74.4	14	201	74.4	0	14
Hibberts Gore	203	75.2	177	65.6	26	179	66.3	2	24
Highland Plt	207	76.7	177	65.6	30	177	65.6	0	30
Hiram	218	80.7	191	70.7	27	192	71.1	1	26
Holden	221	81.9	194	71.9	27	195	72.2	1	26
Hollis	218	80.7	205	75.9	13	206	76.3	1	12
Hope	217	80.4	184	68.1	33	194	71.9	10	23
Howland	212	78.5	198	73.3	14	198	73.3	0	14
Hudson	217	80.4	210	77.8	7	213	78.9	3	4
Indian Island	211	78.1	164	60.7	47	164	60.7	0	47
Industry	210	77.8	182	67.4	28	183	67.8	1	27
Isle Au Haut	221	81.9	172	63.7	49	189	70.0	17	32
Isleboro	217	80.4	164	60.7	53	164	60.7	0	53
Jackson	212	78.5	176	65.2	36	182	67.4	6	30
Jay	216	80.0	192	71.1	24	192	71.1	0	24
Jefferson	214	79.3	196	72.6	18	200	74.1	4	14
Jim Pond Twp	204	75.6	191	70.7	13	192	71.1	1	12
Kenduskeag	215	79.6	193	71.5	22	198	73.3	5	17
Kennebunk	219	81.1	211	78.1	8	212	78.5	1	7
Kennebunkport	219	81.1	205	75.9	14	206	76.3	1	13
Kibby Twp	206	76.3	185	68.5	21	186	68.9	1	20
King & Bartlett Twp	204	75.6	187	69.3	17	188	69.6	1	16
Kingfield	208	77.0	175	64.8	33	175	64.8	0	33
Kingsbury Plt	206	76.3	191	70.7	15	192	71.1	1	14
Kittery	218	80.7	196	72.6	22	203	75.2	7	15
Knox	216	80.0	182	67.4	34	189	70.0	7	27
Lagrange	213	78.9	207	76.7	6	210	77.8	3	3
Lang Twp	206	76.3	189	70.0	17	189	70.0	0	17
Lebanon	222	82.2	202	74.8	20	203	75.2	1	19
Leeds	219	81.1	198	73.3	21	200	74.1	2	19
Levant	217	80.4	193	71.5	24	196	72.6	3	21
Lewiston	214	79.3	189	70.0	25	190	70.4	1	24
Lexington Twp	209	77.4	192	71.1	17	192	71.1	0	17
Liberty	212	78.5	196	72.6	16	197	73.0	1	15
Limerick	218	80.7	203	75.2	15	203	75.2	0	15
Limington	219	81.1	202	74.8	17	205	75.9	3	14
Lincoln Plt	208	77.0	185	68.5	23	186	68.9	1	22
Lincolnville	217	80.4	194	71.9	23	202	74.8	8	15
Lisbon	216	80.0	187	69.3	29	188	69.6	1	28
Litchfield	216	80.0	189	70.0	27	189	70.0	0	27
Livermore Falls	215	79.6	195	72.2	20	196	72.6	1	19
Long Island	210	77.8	151	55.9	59	165	61.1	14	45
Lovell	223	82.6	203	75.2	20	204	75.6	1	19
Lowell	216	80.0	205	75.9	11	208	77.0	3	8
Lower Cupsuptic Twp	206	76.3	191	70.7	15	192	71.1	1	14
Lower Enchanted Twp	204	75.6	188	69.6	16	191	70.7	3	13

Lyman	219	81.1	207	76.7	12	208	77.0	1	11
Lynchtown Twp	208	77.0	185	68.5	23	182	67.4	-3	26
Madison	212	78.5	187	69.3	25	194	71.9	7	18
Madrid	208	77.0	161	59.6	47	161	59.6	0	47
Magalloway Plt	213	78.9	186	68.9	27	187	69.3	1	26
Manchester	216	80.0	192	71.1	24	193	71.5	1	23
Mason Twp	222	82.2	183	67.8	39	184	68.1	1	38
Massachussets Gore	206	76.3	170	63.0	36	170	63.0	0	36
Matinicus Isle Plt	213	78.9	166	61.5	47	175	64.8	9	38
Mattamiscontis Twp	213	78.9	191	70.7	22	191	70.7	0	22
Maxfield	211	78.1	192	71.1	19	197	73.0	5	14
Mayfield Twp	205	75.9	192	71.1	13	192	71.1	0	13
Mechanic Falls	212	78.5	191	70.7	21	193	71.5	2	19
Medford	210	77.8	193	71.5	17	198	73.3	5	12
Mercer	215	79.6	193	71.5	22	195	72.2	2	20
Mexico	216	80.0	192	71.1	24	193	71.5	1	23
Milford	219	81.1	206	76.3	13	208	77.0	2	11
Milo	209	77.4	196	72.6	13	200	74.1	4	9
Milton Twp	216	80.0	170	63.0	46	170	63.0	0	46
Minot	212	78.5	185	68.5	27	187	69.3	2	25
Monhegan Island Plt	206	76.3	134	49.6	72	152	56.3	18	54
Monmouth	215	79.6	197	73.0	18	199	73.7	2	16
Monson	204	75.6	185	68.5	19	187	69.3	2	17
Montville	213	78.9	196	72.6	17	199	73.7	3	14
Morrill	213	78.9	197	73.0	16	199	73.7	2	14
Moscow	208	77.0	193	71.5	15	193	71.5	0	15
Mount Abram Twp	206	76.3	164	60.7	42	164	60.7	0	42
Mount Vernon	220	81.5	194	71.9	26	195	72.2	1	25
Muscle Ridge Shoals Twp	213	78.9	126	46.7	87	146	54.1	20	67
Naples	217	80.4	196	72.6	21	197	73.0	1	20
New Gloucester	219	81.1	203	75.2	16	203	75.2	0	16
New Portland	209	77.4	190	70.4	19	190	70.4	0	19
New Sharon	216	80.0	184	68.1	32	188	69.6	4	28
New Vineyard	210	77.8	188	69.6	22	189	70.0	1	21
Newburgh	210	77.8	191	70.7	19	198	73.3	7	12
Newcastle	215	79.6	186	68.9	29	200	74.1	14	15
Newfield	217	80.4	201	74.4	16	201	74.4	0	16
Newport	219	81.1	196	72.6	23	200	74.1	4	19
Newry	224	83.0	183	67.8	41	184	68.1	1	40
Nobleboro	215	79.6	194	71.9	21	200	74.1	6	15
Norridgewock	212	78.5	182	67.4	30	188	69.6	6	24
North Berwick	217	80.4	207	76.7	10	208	77.0	1	9
North Haven	215	79.6	181	67.0	34	185	68.5	4	30
North Yarmouth	216	80.0	189	70.0	27	189	70.0	0	27
Northport	216	80.0	194	71.9	22	205	75.9	11	11
Norway	219	81.1	198	73.3	21	199	73.7	1	20
Oakland	216	80.0	192	71.1	24	194	71.9	2	22
Ogunquit	218	80.7	196	72.6	22	202	74.8	6	16
Old Orchard Beach	219	81.1	200	74.1	19	202	74.8	2	17
Old Town	220	81.5	206	76.3	14	208	77.0	2	12
Orland	225	83.3	205	75.9	20	206	76.3	1	19
Orneville Twp	210	77.8	199	73.7	11	204	75.6	5	6
Orono	218	80.7	201	74.4	17	204	75.6	3	14
Orrington	221	81.9	195	72.2	26	197	73.0	2	24
Otis	221	81.9	198	73.3	23	198	73.3	0	23
Otisfield	215	79.6	194	71.9	21	195	72.2	1	20
Owls Head	214	79.3	181	67.0	33	185	68.5	4	29
Oxbow Twp	207	76.7	167	61.9	40	167	61.9	0	40
Oxford	215	79.6	195	72.2	20	196	72.6	1	19
Palermo	212	78.5	190	70.4	22	194	71.9	4	18
Palmyra	216	80.0	199	73.7	17	199	73.7	0	17
Paris	215	79.6	187	69.3	28	188	69.6	1	27
Parkertown Twp	207	76.7	171	63.3	36	172	63.7	1	35
Parkman	206	76.3	189	70.0	17	190	70.4	1	16
Parmachenee Twp	207	76.7	187	69.3	20	186	68.9	-1	21
Parsonsfield	220	81.5	203	75.2	17	203	75.2	0	17
Passadumkeag	213	78.9	206	76.3	7	207	76.7	1	6
Penobscot	225	83.3	205	75.9	20	208	77.0	3	17
Perkins TWP	198	73.3	122	45.2	76	161	59.6	39	37
Perkins Twp	209	77.4	163	60.4	46	163	60.4	0	46

Peru	219	81.1	191	70.7	28	192	71.1	1	27
Phillips	209	77.4	176	65.2	33	176	65.2	0	33
Phippsburg	220	81.5	192	71.1	28	196	72.6	4	24
Pierce Pond Twp	205	75.9	191	70.7	14	194	71.9	3	11
Pittsfield	216	80.0	198	73.3	18	202	74.8	4	14
Pittston	213	78.9	184	68.1	29	193	71.5	9	20
Pleasant Ridge Plt	209	77.4	175	64.8	34	180	66.7	5	29
Plymouth	216	80.0	198	73.3	18	203	75.2	5	13
Poland	214	79.3	194	71.9	20	194	71.9	0	20
Porter	216	80.0	192	71.1	24	194	71.9	2	22
Portland	221	81.9	181	67.0	40	196	72.6	15	25
Pownal	215	79.6	195	72.2	20	195	72.2	0	20
Prospect	223	82.6	182	67.4	41	192	71.1	10	31
Randolph	207	76.7	157	58.1	50	160	59.3	3	47
Rangeley	208	77.0	187	69.3	21	187	69.3	0	21
Rangeley Plt	208	77.0	184	68.1	24	184	68.1	0	24
Raymond	218	80.7	188	69.6	30	188	69.6	0	30
Readfield	217	80.4	187	69.3	30	187	69.3	0	30
Redington Twp	208	77.0	187	69.3	21	188	69.6	1	20
Richardsontown Twp	212	78.5	182	67.4	30	182	67.4	0	30
Richmond	213	78.9	188	69.6	25	189	70.0	1	24
Riley Twp	220	81.5	150	55.6	70	151	55.9	1	69
Ripley	209	77.4	189	70.0	20	194	71.9	5	15
Rockland	214	79.3	199	73.7	15	203	75.2	4	11
Rockport	216	80.0	181	67.0	35	194	71.9	13	22
Rome	218	80.7	192	71.1	26	193	71.5	1	25
Roxbury	218	80.7	190	70.4	28	193	71.5	3	25
Rumford	223	82.6	196	72.6	27	196	72.6	0	27
Sabattus	215	79.6	187	69.3	28	188	69.6	1	27
Saco	219	81.1	206	76.3	13	209	77.4	3	10
Saint Albans	216	80.0	196	72.6	20	200	74.1	4	16
Saint George	217	80.4	184	68.1	33	192	71.1	8	25
Salem Twp	207	76.7	172	63.7	35	172	63.7	0	35
Sandy River Plt	208	77.0	172	63.7	36	172	63.7	0	36
Sanford	222	82.2	210	77.8	12	210	77.8	0	12
Sangerville	207	76.7	192	71.1	15	194	71.9	2	13
Scarborough	221	81.9	210	77.8	11	211	78.1	1	10
Searsmont	217	80.4	199	73.7	18	201	74.4	2	16
Searsport	221	81.9	187	69.3	34	203	75.2	16	18
Sebago	218	80.7	198	73.3	20	199	73.7	1	19
Sebec	209	77.4	195	72.2	14	197	73.0	2	12
Sedgwick	224	83.0	203	75.2	21	207	76.7	4	17
Seven Ponds Twp	207	76.7	180	66.7	27	180	66.7	0	27
Shapleigh	217	80.4	201	74.4	16	202	74.8	1	15
Shirley	208	77.0	187	69.3	21	188	69.6	1	20
Sidney	219	81.1	191	70.7	28	196	72.6	5	23
Skowhegan	212	78.5	195	72.2	17	198	73.3	3	14
Smithfield	215	79.6	198	73.3	17	199	73.7	1	16
Solon	209	77.4	178	65.9	31	193	71.5	15	16
Somerville	210	77.8	193	71.5	17	196	72.6	3	14
South Berwick	218	80.7	206	76.3	12	209	77.4	3	9
South Bristol	218	80.7	177	65.6	41	193	71.5	16	25
South Portland	221	81.9	183	67.8	38	189	70.0	6	32
South Thomaston	215	79.6	189	70.0	26	198	73.3	9	17
Southport	212	78.5	165	61.1	47	176	65.2	11	36
Standish	220	81.5	205	75.9	15	208	77.0	3	12
Starks	212	78.5	183	67.8	29	184	68.1	1	28
Stetson	218	80.7	194	71.9	24	198	73.3	4	20
Stetsontown Twp	207	76.7	186	68.9	21	187	69.3	1	20
Stockton Springs	222	82.2	194	71.9	28	202	74.8	8	20
Stoneham	224	83.0	190	70.4	34	190	70.4	0	34
Stonington	221	81.9	191	70.7	30	191	70.7	0	30
Stow	225	83.3	199	73.7	26	200	74.1	1	25
Strong	213	78.9	185	68.5	28	185	68.5	0	28
Summit Twp	215	79.6	206	76.3	9	207	76.7	1	8
Sumner	221	81.9	199	73.7	22	200	74.1	1	21
Surry	226	83.7	205	75.9	21	208	77.0	3	18
Swanville	219	81.1	199	73.7	20	205	75.9	6	14
Sweden	219	81.1	202	74.8	17	203	75.2	1	16
T3 R4 BKP WKR	208	77.0	191	70.7	17	195	72.2	4	13

T3 R5 BKP WKR	204	75.6	185	68.5	19	188	69.6	3	16
Temple	214	79.3	185	68.5	29	185	68.5	0	29
The Forks Plt	206	76.3	186	68.9	20	187	69.3	1	19
Thomaston	215	79.6	200	74.1	15	205	75.9	5	10
Thorndike	210	77.8	165	61.1	45	181	67.0	16	29
Tim Pond Twp	206	76.3	181	67.0	25	183	67.8	2	23
Topsham	218	80.7	201	74.4	17	202	74.8	1	16
Township 6 North of Weld	212	78.5	158	58.5	54	158	58.5	0	54
Township C	214	79.3	186	68.9	28	186	68.9	0	28
Township D	209	77.4	175	64.8	34	175	64.8	0	34
Township E	209	77.4	160	59.3	49	160	59.3	0	49
Trenton	209	77.4	108	40.0	101	108	40.0	0	101
Troy	214	79.3	196	72.6	18	200	74.1	4	14
Turner	218	80.7	197	73.0	21	198	73.3	1	20
Union	217	80.4	197	73.0	20	202	74.8	5	15
Unity	215	79.6	199	73.7	16	202	74.8	3	13
Unity Twp	209	77.4	184	68.1	25	190	70.4	6	19
Upper Cupsuptic Twp	205	75.9	177	65.6	28	178	65.9	1	27
Upton	216	80.0	197	73.0	19	198	73.3	1	18
Vassalboro	217	80.4	191	70.7	26	195	72.2	4	22
Veazie	214	79.3	159	58.9	55	170	63.0	11	44
Verona	222	82.2	167	61.9	55	168	62.2	1	54
Vienna	218	80.7	190	70.4	28	190	70.4	0	28
Vinalhaven	216	80.0	177	65.6	39	184	68.1	7	32
Waldo	214	79.3	192	71.1	22	198	73.3	6	16
Waldoboro	218	80.7	204	75.6	14	206	76.3	2	12
Wales	214	79.3	190	70.4	24	191	70.7	1	23
Warren	218	80.7	202	74.8	16	206	76.3	4	12
Washington	212	78.5	198	73.3	14	200	74.1	2	12
Washington Twp	199	73.7	104	38.5	95	104	38.5	0	95
Waterboro	220	81.5	207	76.7	13	207	76.7	0	13
Waterford	221	81.9	201	74.4	20	202	74.8	1	19
Waterville	213	78.9	179	66.3	34	180	66.7	1	33
Wayne	217	80.4	194	71.9	23	195	72.2	1	22
Weld	216	80.0	187	69.3	29	187	69.3	0	29
Wellington	205	75.9	181	67.0	24	182	67.4	1	23
Wells	219	81.1	212	78.5	7	212	78.5	0	7
West Bath	217	80.4	174	64.4	43	178	65.9	4	39
West Gardiner	213	78.9	192	71.1	21	195	72.2	3	18
West Paris	219	81.1	193	71.5	26	194	71.9	1	25
Westbrook	221	81.9	189	70.0	32	189	70.0	0	32
Westport	215	79.6	165	61.1	50	167	61.9	2	48
Whitefield	212	78.5	193	71.5	19	199	73.7	6	13
Williamsburg Twp	207	76.7	185	68.5	22	185	68.5	0	22
Willimantic	207	76.7	187	69.3	20	188	69.6	1	19
Wilton	214	79.3	183	67.8	31	183	67.8	0	31
Windham	221	81.9	196	72.6	25	197	73.0	1	24
Windsor	213	78.9	183	67.8	30	194	71.9	11	19
Winslow	214	79.3	190	70.4	24	197	73.0	7	17
Winterport	218	80.7	198	73.3	20	200	74.1	2	18
Winthrop	216	80.0	189	70.0	27	190	70.4	1	26
Wiscasset	215	79.6	189	70.0	26	196	72.6	7	19
Woodstock	221	81.9	196	72.6	25	197	73.0	1	24
Woolwich	219	81.1	197	73.0	22	206	76.3	9	13
Wyman Twp	208	77.0	177	65.6	31	177	65.6	0	31
Yarmouth	219	81.1	191	70.7	28	194	71.9	3	25
York	218	80.7	203	75.2	15	208	77.0	5	10

[a] - Krohn, W.B., R.B. Boone, S.A. Sader, J.A. Hepinstall, S.M. Schaefer, and S.L. Painton. 1998. Maine Gap Analysis – a geographic analysis of biodiversity. Final contract report to USGS Biological Resources Division, Gap Analysis Program, Moscow, Idaho. 123pp plus appendices.