

LAND USE



II. LAND USE

SUMMARY

Only 3 percent of all land within town borders has been developed to accommodate housing, businesses, community facilities, roads, railroads and power lines. Agriculture accounts for another 2 percent of Sandwich's land area. The town is fortunate to have approximately 16,000 acres of public and semi-public parks and conservation preserves accounting for about 27 percent of its total land area. Remaining land (68% of all land) is classified as undeveloped land in private ownership.

Sandwich enjoys numerous natural and man-made assets which together help define the image of the town. Natural features such as locations with significant views, wildlife habitats, surface water and forests constitute a vital part of the town's landscape. Man-made features such as historic sites, active farmland, and dirt roads and trails complement the town's natural assets. Such special features should be respected and preserved as an important part of the town's heritage.

Land use patterns have changed somewhat over the past two decades. The largest change occurs in the 58 percent decrease in idle land, most of which turned to forests. Agricultural land declined during this period by 11 percent. Developed land increased by 19 percent.

Analysis of land capability indicates that the land can comfortably support much more development than currently exists. The timing and quality of future development should be guided by carefully formulated policies and a critical review of all proposed development. A large portion of the town's total land area is occupied by "critical resources": wetlands, steep slopes, floodplains and prime agricultural soils. These areas should be protected.

INTRODUCTION

The remarkable extent to which land use pervades all aspects of town life is perhaps best illustrated by the fact that, of the 15 community goals set forth by Sandwich's Planning Board in 1980, most relate directly to some aspect of land use in the town. It is an inescapable fact that almost any factor which affects the quality of life in Sandwich will leave its imprint on the physical environment. Population growth, housing, commerce, industry, transportation corridors and community facilities must inevitably be integrated into the town's landscape. Whether the built environment enhances or destroys the bequests of nature is largely a question of the quality of local land use planning.

This chapter provides data which, coupled with Sandwich community land use goals, can provide the basis for sensitive and progressive planning. First, existing land use patterns are documented and described. Second, some of Sandwich's "Special Features" - those resources of particular cultural or scenic interest - are examined. Third, land use changes and local subdivision activity in recent years are reviewed. Fourth, projections are made regarding future land use patterns if current trends continue. Finally, the capability of the land to support development is assessed and certain areas are designated as "critical resources".

Community Goals and Attitudes

In the 1980 Community Goal Statement, prepared by the Planning Board as a policy guide for future planning activities, the following overall land use goal was established:

Land Use - "Sandwich should promote a well-balanced land use pattern capable of meeting present and future community needs in an efficient, environmentally sound, economical, equitable and aesthetically pleasing manner."

This statement was prepared on the basis of the results of the Sandwich Community Survey which gave residents the opportunity to express their feelings about various aspects of community life and to indicate their preferences for future land uses in Sandwich.

Generally speaking, Sandwich's year-round and seasonal residents place a high value upon the scenic beauty, environmental quality and small-town atmosphere of Sandwich and they do not want these attributes altered by inappropriate development or rapid population increase.

With respect to future housing, only two types of housing - single-family units and retirement housing - were desired, while extreme opposition was expressed toward high rise units, mobile home parks and condominiums.

Businesses thought suitable for Sandwich's future development include farms, home businesses, professional offices, retail businesses and restaurants. The respondents were evenly split in their attitudes toward light industry and rooming houses, while shopping centers, motels and heavy industry were strongly opposed. Route 25 and the village centers of Center Sandwich, North Sandwich and East Sandwich were most often listed as desirable locations for business activity.

Local land use regulations were strongly supported by both year-round and seasonal residents. A large majority of the respondents were in favor of zoning, subdivision regulations, wetlands regulations, septic field codes, building codes, water pollution control, steep slopes regulations, current use laws, and the Town Master Plan.

Existing Land Use

The present land use pattern reflects the town's historical development. Sandwich developed with a number of small villages, most of which have either disappeared or have been reduced to remnants, and with farms widely scattered over the countryside. In these early days each village contained a cluster of houses, at least one general store, a school and frequently a grist mill. Some of them also had churches to act as a community center and to serve religious needs. The larger villages contained more shops, taverns, etc. The decline in Sandwich's population resulted in the abandonment of farmhouses and the decline or elimination of villages. Today, only Center Sandwich has the characteristics of an active village.

Over the years many of the old buildings have been renovated for year-round or seasonal occupancy and many new buildings have been constructed. However, the predominant pattern of land use in 1980 continues to be extremely rural and forested. Vast areas of the town (about 15,000 acres which is about $\frac{1}{4}$ of the land area) are preserved in virtual wilderness by the White Mountain National Forest. Another 728 acres are subject to development restrictions as either publicly or privately owned conservation lands. Finally, steep slope and wetland areas, which together comprise a large portion of the land area, are protected from development by local ordinances.

Most of the residential development in Sandwich is scattered around the town. The only concentrations of housing are in the old villages of Center Sandwich, North Sandwich and Sandwich and the East Sandwich area.

The largest concentration of seasonal homes can be found on or near Squam Lake and its many coves. There are also several seasonal homes on or near Bearcamp Pond, with the rest scattered around town in scenic locations.

Many of the commercial businesses are concentrated in Center Sandwich. The remainder of the businesses are scattered throughout the community and most of these could be termed home businesses.

There are only three industrial firms in Sandwich. Bearcamp Mills (shingles) is located on the Upper Road between Center Sandwich and North Sandwich. Bickford Lumber (sawmill) operates on Bearcamp Pond Road near Tamworth. Ambrose Construction Company, a sand and gravel operation, is located on Route 113 near the Tamworth border.

Sandwich's community facilities are largely concentrated in Center Sandwich where one can find the Central School, athletic fields, the Post Office, Town Hall, Central Fire Station, Library and Health Center. To a lesser extent some community facilities also exist in North Sandwich (Town Garage, Post Office and skating rink) and Whiteface (Fire Station and swimming area).

The following table is a summary of existing land use in Sandwich in 1980.

TABLE II-1

Existing Land Use,
Sandwich, 1980

I.	DEVELOPED LAND	Acres	Percent of Total Land Area
	Housing ¹	745	1.3
	Year-Round	401	(0.7)
	Single-Family	389	(0.7)
	Multi-Family	55	*
	Mobile Homes	7	*
	Seasonal	344	(0.6)
	Single-Family	344	(0.6)
	Commercial and Industrial ²	86	0.1
	Community Facilities	43	0.1
	Roads	558	0.9
	Power Lines	271	0.5
	Total Developed Land	1,703	2.9
II.	AGRICULTURAL LAND		
	Active Agricultural	1,190	2.0
	Idle	374	0.6
	Total Agricultural Land	1,564	2.6
III.	PUBLIC AND SEMI-PUBLIC LAND		
	Conservation Lands (public and private)	728	1.2
	Sandwich Fairgrounds	31	0.1
	State	3	*
	Federal	15,272	25.7
	Total Public and Semi-Public Land	16,034	27.0
IV.	UNDEVELOPED LAND (private ownership)		
	Tree Farms	7,144	12.0
	Remaining Undeveloped Land	33,040	55.5
	Total Undeveloped Land	40,184	
	TOTAL LAND AREA	59,485	100.0

*Percentage less than 0.01%.

¹Based on estimate of one unit per acre.

²Home businesses are included under total housing acreage.

Active Agriculture

Farming was the main economic activity in Sandwich during the late 1700's and early 1800's when the population was largely composed of subsistence farmers and their families. As the population migrated to the cities and to more fertile lands in the midwest, many farms were abandoned with fields and pastures growing up to bushes, sapplings and finally renewed forest.

Today, there are only a handful of farms left in Sandwich and few rely on farming to make a living. The significance of these farms should not be underestimated, however. In addition to producing crops, livestock and poultry which increase local self-reliance, the farms in Sandwich are an important part of the town's rural character. Much of the open space in town is farmland, and these open spaces are often the locations of many scenic views.

The following is a list of active farms in Sandwich.

TABLE II-2

Active Farmland, Sandwich, 1980

<u>Owner</u>	<u>Acreage</u>	<u>Products</u>
1. Mrs. Henry Balch	32.0	Fruit, pasture, hay
2. Fred M. Bickford	---	Hay, berries
3. Robert Brewer	5.0	Pasture
4. Robert Butcher	125.0	Hay, grain
5. Raymond Conley	4.0	Vegetables, fruit
6. Wilbur Cook, Jr.	85.0	Swine, cattle, hay, pasture
7. Donald DiFillipi	4.0	Vegetables, flowers, seedlings
8. Denley Emerson	15.0	Hay
9. Francis G. Hambrook	5.0	Pasture, cattle
10. Arnold Hammond	---	Vegetables, fruit
11. Uri Lamprey	---	Hay
12. William Leach	1.0	Vegetables, potatoes
13. Raymond Martel	1.0	Poultry
14. Caroline Nesbitt	6.0	Pasture, horses
15. Richard Papen	1.0	Vegetables
16. Charles Stevenson	23.0	Hay
17. Rita Taylor	---	Honey
18. Edgar Wyman	5.0	Maple Syrup

Scenic Views

The varying topography of Sandwich affords town residents and visitors numerous scenic views which contribute to the town's unique character. The following table lists places in the community where significant views are visible from the roadside. The best of these should be considered for "pull-off" and/or picnic areas, while some may warrant the negotiation of scenic easements, development rights or outright purchase. In addition, tree cutting practices should be established which will ensure that Sandwich's residents and visitors will be able to enjoy these beautiful views in the years ahead.

The visual quality of the subjects of these views should also be protected. Development on the town's hilltops would significantly alter the town's rural character and clear-cut logging operations on hillsides can turn beautiful scenes into marred landscapes overnight. The following is a list of scenic views in Sandwich.

TABLE II-3

Scenic Views, Sandwich, 1980

<u>Location</u>	<u>Direction</u>	<u>Object</u>
1. Metcalf Road at Causeway	SE	Lake, islands, Ossipees, Red Hill
2. Route 113 by Tilton's	SSW	Squam Lake, Intervale Pond
3. Route 113 E of Chick's Corner	N	Sandwich Range
4. End of Smithville Road	N	Mts. Dinsmore & Israel
5. Notch Road-Beede's Falls	NW/SE	Beede's Falls and Ossipees
6. End of Smith Road, Mead Base	S/SE	Ossipees
7. Junction Notch Road-Smith Road	N	Mt. Israel
8. Diamond Ledge Road	SW/S	Squam Lake, Red Hill
9. Diamond Ledge Road	SW/S	Squam Lake, Red Hill
10. Diamond Ledge Road	SE	Center Sandwich, Ossipees
11. Ctr. Sandwich Intersection	NW,NE,SE	Architecture, Landscape
12. Church Street at Baptist Church	NW	Mt. Israel, Church
13. Maple Street (113) Sunshine Farm	SE	Ossipees
14. Maple Street (113) Stanton Brook	N	Sandwich Range
15. Mt. Israel Road, Bearcamp River	N	Mt. Israel
16. Mt. Israel Road	SE	Ossipees
17. Mt. Israel Road, Jake's Brook	SE	Ossipees
18. Maple Ridge Road, Chapman Refuge	S	Panorama
19. Davis Road	N	Teacup Lake, Sandwich Range
20. Maple Ridge Road	SW/S/SE	Panorama
21. Maple Ridge	SW/S/SE	Panorama
22. Maple Ridge	SW/S/SE	Panorama
23. Upper Road	NW/N	Sandwich Range
24. Upper Road, Bearcamp	SE	River, Meadow, Ossipees
25. Plummers Road	NW/SE	Millsite, Sandwich Range
26. Jct. Plummer Road, Elm Hill Road	NW	Bearcamp Meadow, Sandwich Range
27. Upper Road	SE	Ossipees
28. Route 113, Angier Hill	SW	Squam Range
29. Jct. Route 113, Upper Road	SE	Ossipees
30. Wentworth Library	NW,SE,SW	Village, Sandwich Range, Red Hill, Ossipees
31. Route 109 S of Firehouse	S	Red Hill, Watson Ledge
32. Route 109 Near Quaker Cemetery	NW/SW	Mt. Israel, Notch, Red Hill

<u>Location</u>	<u>Direction</u>	<u>Object</u>
33. Route 109, Wentworth Hill	360°	Panorama
34. Route 109 above Sandwich P.O.	NE/S	Chocorua, Ossipees
35. Little Pond Road	E	Ossipees
36. Little Pond Road	W	Great Wall, Image Hill
37. Little Pond Road	NW/N	Mt. Israel, Sandwich Range
38. Little Pond Road	E	Mt. Larcom, Ossipees
39. Vittum Hill Road	E/SE	Ossipees
40. Vittum Hill Road	S	Ossipees
41. Route 25 Whittier Highway	N	Sandwich Range
42. Route 25 Whittier Highway	SE	Mt. Larcom, Ossipees
43. Route 25 Whittier Highway	W	Red Hill, Squam Mts., Sandwich Range
44. Sandwich Slopes	W,N	Wentworth Hill, Squam Mts. S. Range
45. Bearcamp Road (Town Beach)	W/NW	Sandwich Range, Squam Mts.
46. Bearcamp Pond	360°	Panorama
47. Route 25 Whittier Highway (Town Line)	N/NE	Sandwich Range
48. Bearcamp Road	NW/SE	Sandwich Range, Ossipees
49. Route 113	SW/SE	Bearcamp Valley, Ossipees
50. Foss Flats Road, N of Power Line	N/S	Tree lined road
51. Foss Flats Road		Durgin Bridge (covered)
52. Cleveland Hill Road	S	Ossipees
53. Brown Hill Road	S	Ossipees
54. Brown Hill Road near pond	N	Sandwich Range
55. Fellows Hill Road	N/S	Sandwich Range, Ossipees
56. Route 113A, Whiteface Road	N	Whiteface Mt., Sandwich Range
57. Wing Road	S	Panorama
58. Route 113A Whiteface Bridge	E	Gorge, Cold River
59. Route 113A Whiteface Bridge (Town Beach)		Pothole, Pond Brook
60. Route 113A	W,S,N	Young Mt., Panorama, Whiteface Mt.
61. Bennett Street	SW/S	Panorama
62. Bennett Street	S	Panorama, Young Mt.
63. Whiteface Intervale Road	N	Whiteface Mt., Sandwich Range
64. Whiteface Intervale Road	S	Panorama
65. Route 113A Chase Road	N	Panorama
66. Route 113A Chase Road	N	Panorama

Forests

If you're a resident of Sandwich, the owner of a seasonal home here, a regular visitor, or just an occasional tourist, no one needs to tell you that the Town's forests are a major asset which constitutes the predominant pattern of land use in Sandwich. It is estimated that approximately 83 percent of Sandwich is forested.

Sandwich's abundant forests have several functions and benefits. These include: (1) to provide a permanent supply of fuelwood, lumber and other wood products, (2) to hold soil in place, especially on hillsides, where deforestation diminishes the soils ability to absorb and hold water and results in the erosion of slopes, sedimentation in streams and lakes, and more frequent and severe flooding, (3) to provide natural wildlife habitats, (4) to offer areas for outdoor recreational opportunities such as hiking, skiing, hunting and camping, (5) to act as a screen or buffer of sights, sounds and the wind, and (6) to provide natural beauty and scenic views for both residents and tourists, especially in the fall.

A number of factors suggest that there is an increased need to develop policies which specifically address land use issues relating to Sandwich's forests including:

- the regions rapid growth over the past decade has placed new pressures on forest land for conversion to more intensive uses;
- housing development on the fringes of large tracts of forested land increases the dangers of forest fires and also increases the threat to life and property should a forest fire occur;
- national demand for lumber and finished wood products has driven up the price of lumber over the past decade, making timber harvesting increasingly attractive to woodlot owners;
- high energy costs and the uncertainty of energy supplies have spurred a rapidly expanding fuelwood market, placing additional pressures on our forests as an energy resource; and
- ownership of forest land is increasingly fragmented, complicating educational efforts directed toward forest management.

The first step toward developing policies and recommendations which will ensure proper forest management and use is an examination of existing forests, including the size and location of particular types of forest stands. These areas will then be analyzed in terms of their projected use and their relationship to other land uses.

Information on the type, size (i.e., trunk diameter), density and location of forest stands within the State is available from a forestry study conducted by the Cooperative Extension Service (UNH) in cooperation with the North Country Resource Conservation and Development Project (RC&D). The data presented on Map II-1 is based upon type (hardwood, white pine, hemlock, etc.), size class (sapling, pole and saw timber), and density (fully stocked, medium and light).

The classes of forest stands can be ranked according to their market value relative to the feasibility of commercial harvesting (see Table II-4).

TABLE II-4

Forest Stand Market Potential

<u>Rank</u>	<u>Type</u>	<u>Size Class</u>	<u>Density</u>	<u>Map Symbols</u>
1	A11	Sawtimber	Fully Stocked	A11 3A's
2	A11	Sawtimber	Medium	A11 3B's
3	A11	Sawtimber	Light	A11 3C's
4	Hardwoods	Pole	Fully Stocked	H2a, HS2A, HWP 2A

*Sawtimber Diameter = 10"+; Pole Diameter = 5" - 10".

Category 1, 2 and 3 forest stands have a high market value for commercial harvesting. Category 4, hardwood pole stands would generally not have the market potential for commercial logging operations. The identification of prime forest stands provides information on the probable location of future cutting activities and thus should be monitored relative to their implications on water quality, erosion, drainage and scenic resources. Monitoring local logging operations is also important to insure that the town is receiving its fair share of yield tax. The viability for the long-term harvesting of any of the general areas which have commercial market potential is influenced by land use trends, road accessibility and salient material characteristics such as slope and drainage patterns.

The following table lists the acreage of forest stands in Sandwich by type. Approximately 53 percent of the town's land area contains concentrations of timber stands which have sufficient market potential to be harvested.

*The focus of this study was statewide. Forest Type Maps were prepared at a 1:62500 scale. As a result, data for individual towns are highly generalized.

TABLE II-5

Forest Type Acreages, Sandwich, 1980

S2A	166	WP2A	204
SH1A	2,076	WP2B	193
SH2A	707	WP3B	257
WS2A	386	HWP2A	311
WSH2A	214	H ₁ 2A	161
HW2A	676	H ₁ 3A	2,546
HW3A	1,306	H ₁ 3B	632
HW3B	236	H ₁ WP2A	6,059
H2A	311	H ₁ WP2B	728
H2B	44	H ₁ WP3A	6,572
H2C	273	H ₁ WP3B	2,044
H3A	10,318	WPH ₁ 2A	2,109
H3B	877	WPH ₁ 2B	1,370
WH2A	4,798	WPH ₁ 3B	728
WH3A	247	All Non-Forested	9,947
		Total	58,423

Forest Type Symbols

S	- spruce fir	75-100%
SH	- spruce-fir	50- 74%
H	- no. hardwood	75-100%
HS	- no. hardwood	50- 74%
WP	- white pine-hemlock	75-100%
WPH	- white pine-hemlock	50- 74%
HWP	- hardwood-white pine-hemlock	
Ce	- n. white cedar	75-100%
P-P	- pitch pine	75-100%
H ₁	- transition hardwoods	

<u>Size Class</u>	<u>dbh</u>	<u>Density</u>
1. sapling	5"	A. Fully stocked
2. pole	5-10"	B. Medium
3. sawtimber	10+"	C. Light

Existing patterns of land use and/or land ownership provide restraints to the long-term harvesting of certain areas. They include expanding commercial or residential areas and lands under public ownership.

Land areas with steep slopes are especially sensitive to overcutting due to the potential for erosion and increased surface water runoff. Much of the marketable forest land in Sandwich is located on steep slopes. Examples include Buzzell Ridge, Young Mountain, Tasker and Brown Hills, Mt. Squam and Doublehead Mountain and the area along Mountain Road. All tree-cutting operations on steep slopes should be closely monitored, especially areas containing potential firewood stands which are susceptible to improper cutting practices by "non-professionals".

Surface drainage patterns and surface waters can also be affected by logging operations in that the removal of vegetative cover increases the velocity of stormwater runoff and sedimentation. Every river and brook in Sandwich runs through or beside significant forest stands. Lakes and ponds are also threatened, especially Barville Pond, Kusumpe Pond and Red Hill Pond and the surrounding wetland areas.

Road accessibility is another feature which impacts the viability of logging operations.

Projected Use of Forest Resources

Population projections for the year 2000 indicate Sandwich will increase to 1,200 residents. This growth will certainly place increased pressure on the forest resources. The majority of the present population uses wood as a primary heat source. Greater dependence on wood will increase as alternatives become more costly.

Fragmentation of private ownerships into small woodlots will remove more of the resource base from the commercial sawtimber market. These small lots, five to ten acres in size, will be reserved largely for fuelwood production.

The proposal to place a large portion of the National Forest acreage located in Sandwich into a non-manageable "wilderness category" may have far-reaching ramifications. The exact boundaries have not yet been determined; however, the National Forest comprises approximately 30 percent of the total forest land in the town. A decision to remove a portion of this from the National Forest's managed forest land category may lead to an increase of commercial harvesting activity on Sandwich's privately-owned forest lands.

Tree Farms

As of June 27, 1980, there were 29 certified Tree Farms in Sandwich covering a total of 7,144 acres, which is approximately 12 percent of the total land area in town. These forest lands must be managed in a manner which will assure continuous production of commercial forest crops in accordance with forestry practices approved by American Forest Institute.

TABLE II-6

Certified Tree Farmers, Sandwich, 1980

<u>Owner</u>	<u>Acreage</u>
1) Langdon Ambrose	155
2) Bearcamp Tree Farm, F. Kent Mitchell	200
3) Fred and Janet Bickford	15
4) Jacob Burghardt	80
5) Walter Carlson	55
6) Harold Coolidge	500
7) Roger Coolidge	95
8) Denley Emerson	3,200
9) Dorothea Gifford	32
10) Donald Hight	120
11) Roland B. Hoag	55
12) Hoag Island Trust, c/o Hamilton Coolidge	75
13) Thomas Johnson	90
14) Victor King	201
15) Keith Lakey	67
16) Glenn Lawrence	225
17) Gabriel Litt	240
18) Derek and Linda Marshall	60
19) Molly Michael	148
20) Mrs. Frederick Noss, c/o Randy Mutter	350
21) Charles Penrose	36
22) Peter Pohl	260
23) R. Dean Postlewaite	85
24) George Schrader	100
25) Armand Siegel	65
26) Mrs. Aldrich Taylor	450
27) Christopher Tompkins	65
28) John Visny	60
29) Peggy Watson (formerly Prof. Greene, Elm Hill)	60
Total	7,144

Source: Peter Pohl, Carroll County Forester, 1980.

Surface Water Bodies

Surface water bodies are important for a number of reasons including: (1) recreational opportunities, such as swimming, boating, fishing and winter open space for snowmobiling, skating and cross-country skiing; (2) the attraction of seasonal homes which, in turn, ease the tax burden for year-round residents; (3) wildlife habitats; (4) scenic views; (5) flood protection and (6) water supplies.

It is therefore important from both an economic and environmental standpoint that the town protect these waters from pollution. Some of the existing and potential threats to water quality include: (1) inappropriate shoreline development where nutrients (predominately phosphates) from subsurface sewage disposal systems migrate through the groundwater and into the surface waters, resulting in health hazards, increased water vegetation and eutrophication; (2) excessive boat activity; (3) erosion and sedimentation caused by construction activity and logging operations and (4) acid rain (or snow) which raises the level of sulfuric and nitric acids in ponds and lakes, resulting in the release of toxic metals from surrounding soils into the water which changes the lake chemistry so it is unable to support fish life. Sandwich's high altitude lakes are especially vulnerable because their water and surrounding watershed soils contain few materials to neutralize acids.

The following is a description of each lake and pond in Sandwich:*

- (1) Atwood Pond - a 2-acre beaver pond with an average depth of 9 feet and a maximum depth of 15 feet. The shoreline is 65 percent swampy, 30 percent wooded, and 5 percent rocky and the bottom is 90 percent muck and 10 percent rock. It has a 90 percent shoal area. Horned pout are present.
- (2) Barville Pond - a 39-acre natural pond with an average depth of 11 feet and a maximum depth of 17 feet. Barville Pond's 1.2-mile shoreline is 95 percent wooded and 5 percent swampy and the bottom is 90 percent muck, 5 percent rock and 5 percent sand. It has a 50 percent shoal area. The pond contains chain pickerel, yellow perch, horned pout, red-fin shiner, sunfish and suckers. Large-mouth bass may do well in this pond.
- (3) Bearcamp Pond - a 167-acre natural pond with an average depth of 14 feet and a maximum depth of 32 feet. Bearcamp Pond's 2.6 mile shoreline is 85 percent wooded, 10 percent swampy and 5 percent sand and the bottom is 75 percent muck, 25 percent rock and 5 percent sand. It has a 10 percent shoal area. The pond contains chain pickerel, horned pout, yellow perch and sunfish. Practically speaking, the pond is a wide spot in the Bearcamp River and must be managed accordingly. For this reason the introduction of other species that may move into the river and provide competition for trout does not seem wise.

*Source: Biological Survey of the Lakes and Ponds in Sullivan, Merrimack, Belknap and Strafford Counties, N.H. Dept. of Fish and Game, 1963.

- (4) Black Mountain Pond - a 6-acre natural pond raised by a beaver dam with an average depth of 18 feet and a maximum depth of 32 feet. Black Mountain Pond's shoreline is 100 percent wooded and its bottom is 60 percent muck and 40 percent gravel. It has a 15 percent shoal area. The pond was reclaimed in 1952 and is infrequently stocked with fingerling brook trout.
- (5) Dinsmore Pond - a 37-acre natural pond raised by a beaver dam with an average depth of 11 feet and a maximum depth of 23 feet. Dinsmore Pond's 1.1-mile shoreline is 60 percent wooded and 40 percent swampy and its bottom is 100 percent muck. It has a 60 percent shoal area. Chain pickerel, horned pout, golden shiners, sunfish and yellow perch are present. Largemouth bass might do well here.
- (6) Guinea Pond - a 10-acre natural pond raised by a beaver dam with an average depth of 7 feet and a maximum depth of 21 feet. The shoreline is 50 percent wooded and 50 percent bog and the bottom is 100 percent muck. It has a shoal area of 70 percent. Brook trout, golden shiners, and long nose dace are present. It is stocked with a limited number of fingerling brook trout.
- (7) Hall Pond, Lower - a 20-acre natural pond raised by a beaver dam with an average depth of 3.5 feet and a maximum depth of 5 feet. The 0.6-mile shoreline is 100 percent wooded and the bottom is 90 percent muck and 10 percent sand. It has a 100 percent shoal area. The pond contains brook trout and long nose dace and is stocked with brook trout.
- (8) Hall Pond, Middle - an 8-acre natural pond with an average depth of 30 feet and a maximum depth of 56 feet. The shoreline is 100 percent wooded and the bottom is 98 percent muck and 2 percent sand. The pond has very little shoal area. It contains brook trout and long nose dace. Due to the contours of this pond, there is very little food-producing area. Therefore, stocking should be kept to a minimum.
- (9) Hall Pond, Upper - a 48-acre natural pond with an average depth of 19 feet and a maximum depth of 39 feet. The 0.9-mile shoreline is 100 percent wooded and the bottom is 90 percent muck, 6 percent gravel, 3 percent rock and 1 percent sand. It has a 20 percent shoal area. This pond contains brook trout, lake trout and long nose dace and is stocked with brook trout.
- (10) Intervale Pond - a 43-acre natural pond with an average depth of 32 feet and a maximum depth of 47 feet. Intervale Pond's one mile shoreline is 95 percent wooded and 5 percent meadow and its bottom is 50 percent muck, 25 percent gravel and 25 percent rock. It has a 20 percent shoal area. The pond contains yellow perch, horned pout, chain pickerel, smallmouth bass, smelt, rainbow trout and brook trout. If this pond were to be reclaimed, either brook or rainbow trout would do well.

- (11) Kiah Pond - a 6-acre natural pond raised by beaver with an average depth of 12 feet and a maximum depth of 18 feet. The shoreline is 90 percent wooded and 10 percent swampy and the bottom is 100 percent muck. It has a 20 percent shoal area. This pond contains brook trout and horned pout and is stocked with brook trout fingerlings.
- (12) Kusumpe Pond - a 56-acre natural pond raised by beaver with an average depth of 19 feet and a maximum depth of 22 feet. The 1.3-mile shoreline is 99 percent wooded and 1 percent rocky and the bottom is 94 percent muck, 3 percent gravel and 3 percent rock. There is very little shoal area. The pond contains horned pout, chain pickerel, yellow perch and smallmouth bass, and is considered marginal for the stocking of brook trout.
- (13) Little Pond - an 11-acre natural pond raised by a dam with an average depth of 18 feet and a maximum depth of 25. The 0.9 mile shoreline is 55 percent wooded, 40 percent meadow and 5 percent swampy and the bottom is 85 percent muck, 10 percent gravel and 5 percent sand. It has a 10 percent shoal area. This pond has been stocked with brook trout annually and is considered marginal for that species.
- (14) Miles Pond - no description available.
- (15) Plummer Pond - a 3-acre natural pond with an average depth of 5 feet and a maximum depth of 8 feet. The shoreline is 98 percent wooded and 2 percent rocky, while the bottom is 50 percent rock, 35 percent sand and 15 percent muck. It has a 100 percent shoal area. The pond contains brook trout and shiners. The old dam that created this pond has gone out and only a stream remains. It is considered a wide spot in the stream and is managed as such.
- (16) Red Hill Pond - a 99-acre natural pond with an average depth of 16 feet and a maximum depth of 25 feet. The 2.1-mile shoreline is 90 percent wooded and 10 percent swampy and the bottom is 60 percent muck, 20 percent gravel and 20 percent rock. It has a 30 percent shoal area. The pond contains horned pout, pickerel, yellow perch and smallmouth bass.
- (17) Squam Lake - a 6,765-acre natural lake raised by a dam on Little Squam Lake. Squam Lake has an average depth of 36 feet and a maximum depth of 98 feet at a pool level of 560 feet. The 60.5-mile shoreline is 90 percent rocky and wooded, 5 percent meadow and 5 percent swampy, while the bottom is 40 percent muck, 40 percent sand and gravel and 20 percent rock. It has a shoal area of only 5 percent. The lake has been stocked with Salmon, lake trout, smallmouth bass, whitefish fry, horned pout, yellow perch and chain pickerel. In addition to these, brook trout, American smelt, eastern common sucker, fallfish, bridled shiner, redbfin shiner, golden shiner, common and red-breasted sunfish, white perch, northern sculpin and cusk are also present.
- (18) Taylor Pond - no description available.
- (19) Teacup Lake - no description available.

Rivers and Brooks

Sandwich is endowed with numerous brooks and small rivers which are tributaries to several larger rivers and lakes in the area. Examples include the Beebe River, which empties into the Pemigewasset River; Smith and Eastman Brooks which run into Squam Lake; Red Hill River, which makes its way to Lake Winnepesaukee; and Whiteface River, Cold River, Meadow Brook and Atwood brook, whose waters travel into the Bearcamp River, which extends to Ossipee Lake.

It is extremely important that these rivers and streams be kept clean from both a local and a regional perspective. In addition to their importance as a water supply, the rivers and brooks of Sandwich are vital to a variety of wild-life species and offer numerous recreational opportunities. Town residents, hunters, fishermen, environmentalists and even businessmen who want to capture the tourist's dollar all have a stake in the quality of Sandwich's waters. The water resources of Sandwich are an asset which should not be abused. The following is a listing of the rivers and brooks in Sandwich.

Rivers

1. Bearcamp River
2. Beebe River
3. Cold River
4. Red Hill River
5. Whiteface River

Brooks

1. Atwood Brook
2. Cook Brook
3. Eastman Brook
4. Heath Brook
5. Meadow Brook
6. Montgomery Brook
7. Pond Brook
8. Smarts Brook
9. Smith Brook
10. Stanton Brook
11. Tewksberry Brook
12. Tilton Brook
13. Weed Brook

Land Use Changes in Recent Years

The following table documenting land use change in Sandwich from 1954 to 1970 was compiled and published by researchers at the University of New Hampshire using aerial photographs of the town.

TABLE II-7

Land Use Changes, Sandwich, 1954-1970

<u>Land Use</u>	<u>1954 Land Area</u>	<u>1954 % of Total</u>	<u>1970 Land Area</u>	<u>1970 % of Total</u>	<u>1954-70 Change</u>	<u>1954-70 % Change</u>
Agricultural	1,340	2.25	1,190	2.00	-150	-11.19
Idle	902	1.52	374	.63	-528	-58.54
Forested	55,777	93.77	56,405	94.82	628	1.13
Developed	309	.52	368	.62	59	19.09
Other	<u>1,157</u>	<u>1.95</u>	<u>1,148</u>	<u>1.93</u>	- 9	- .78
Total Land	59,485	100.00	59,485	100.00	0	0.00

Source: Institute of Natural & Environmental Resources, UNH, 1977.

The figures above indicate that active agricultural and idle agricultural lands have diminished, while forested and developed lands have increased over the 16-year period. Agricultural lands decreased by 150 acres and idle lands dropped by 528 acres while forested lands increased by 628 acres and developed land increased by 59 acres. The following table reveals land use changes for the Lakes Region as a whole.

TABLE II-8

Land Use Changes, Lakes Region, 1950's-1970's

	<u>1950's Land Area</u>	<u>1950's % Total</u>	<u>1970 Land Area</u>	<u>1970 % Total</u>	<u>1950's-70 Change</u>	<u>1950's-70 % Change</u>
Lakes Region Totals						
Agricultural	62,583	8.17	46,659	6.09	- 15,924	- 25.44
Idle	14,217	1.86	13,307	1.74	- 910	6.40
Forested	663,784	86.62	661,680	86.34	2,104	.32
Developed	14,526	1.90	32,231	4.21	17,705	121.88
Other	11,229	1.47	12,462	1.63	1,233	10.98
Total Land	766,339	100.00	766,339	100.00	0	.00

Source: Institute of Natural and Environmental Resources, UNH, 1977.

Compared to the Lakes Region, Sandwich has been gaining rather than losing forest land and is losing agriculture land at a rate slower than in the Lakes Region. The amount of developed land is also increasing at a slower rate. However, idle land which was once used for agricultural purposes decreased dramatically over the 16-year period. In the Lakes Region idle land dropped by 6.4 percent, while in Sandwich it dropped by 58.5 percent. Some of this land was developed while most of it grew up into forests.

Land Subdivision

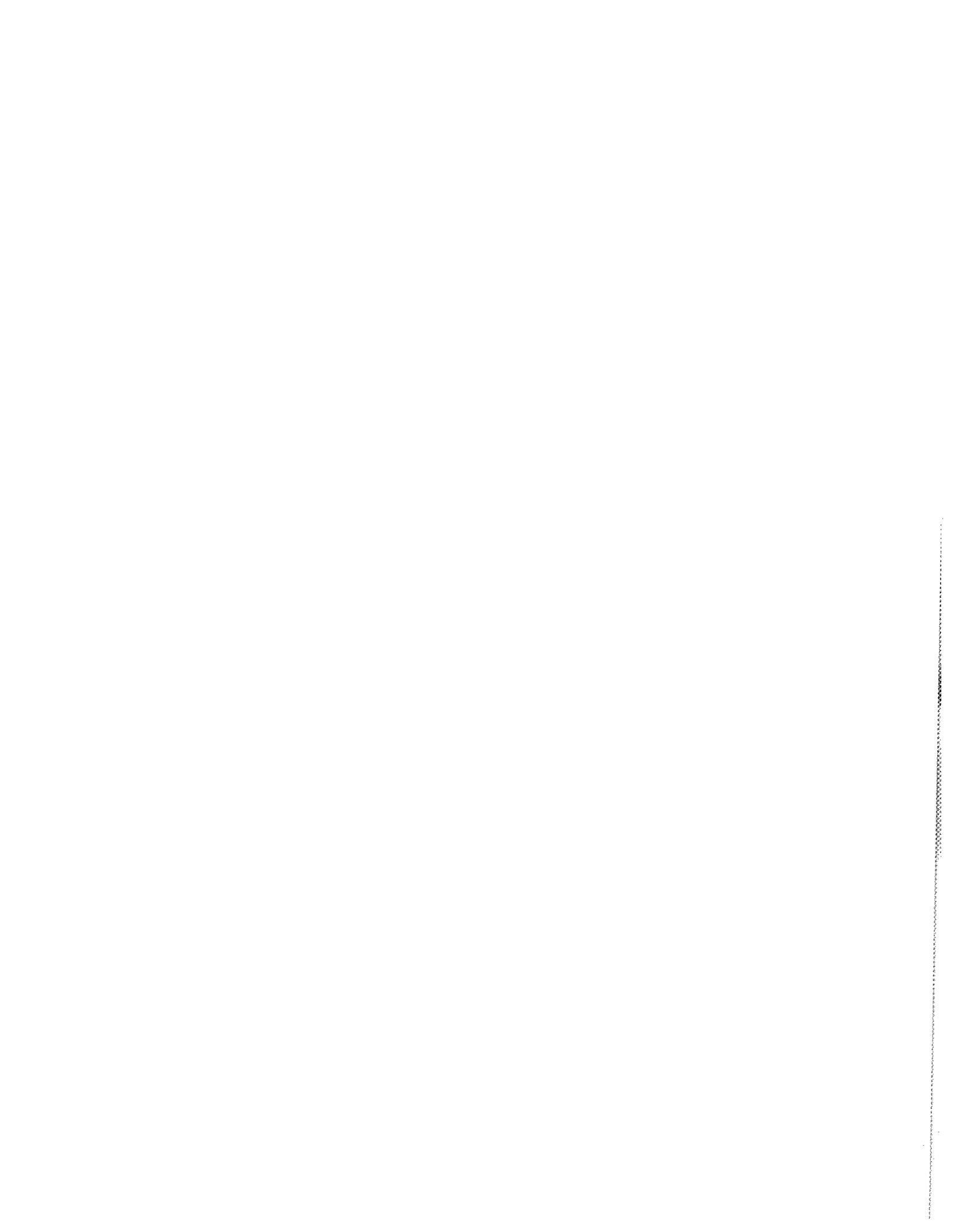
A large portion of Sandwich's subdivided land has not been developed. The Subdivisions Map on the following page, which shows the location of subdivisions that have occurred since 1975 (and a few others with undeveloped lots dating as far back as 1967), reveals that there were only 88 homes in these subdivisions in 1980 on a total of 284 subdivided lots (31%). The lots generally range in size from 2 acres to 15 acres, with most between four and seven acres. If one assumes that one year-round home will be constructed on each lot (some will probably be seasonal, however) and that there will be an average of 2.2 persons per home, an additional 431 persons could be added to Sandwich's population from these subdivided lots. If 431 were added to Sandwich's 1980 population of 895, the resulting potential population would be 1,326 persons, which is higher than the projected population for the year 2000. This does not even include the number of seasonal homes which may be converted from seasonal to year-round use. Thus, Sandwich's population could rise substantially without any new subdivision approvals.

Projections of Future Land Use

Year-round population in the year 2000 was projected to be about 1,200 people, requiring about 140 new year-round dwelling units above the 1980 level. The seasonal population is projected to reach 1,752 by the year 2000, which would occupy about twenty units above the number of seasonal units in 1980. Many of the "new" year-round units may be homes which are now used seasonally (see Population and Housing Chapters).

Future housing construction can be expected to occur along existing streets due to the high costs of road construction. The Subdivisions Map on the previous page shows that recent subdivisions have been scattered throughout the town. Could the town guide development into locations which will tend to (1) minimize the cost of providing services (and thus minimize town taxes), (2) decrease dependence on the automobile, and (3) help protect open space and forest resources?

Finally, the town must strictly enforce its ordinances which protect steep slopes and wetland areas and adopt measures to ensure that agricultural and forest land are properly protected so that these resources are available for present and future residents.



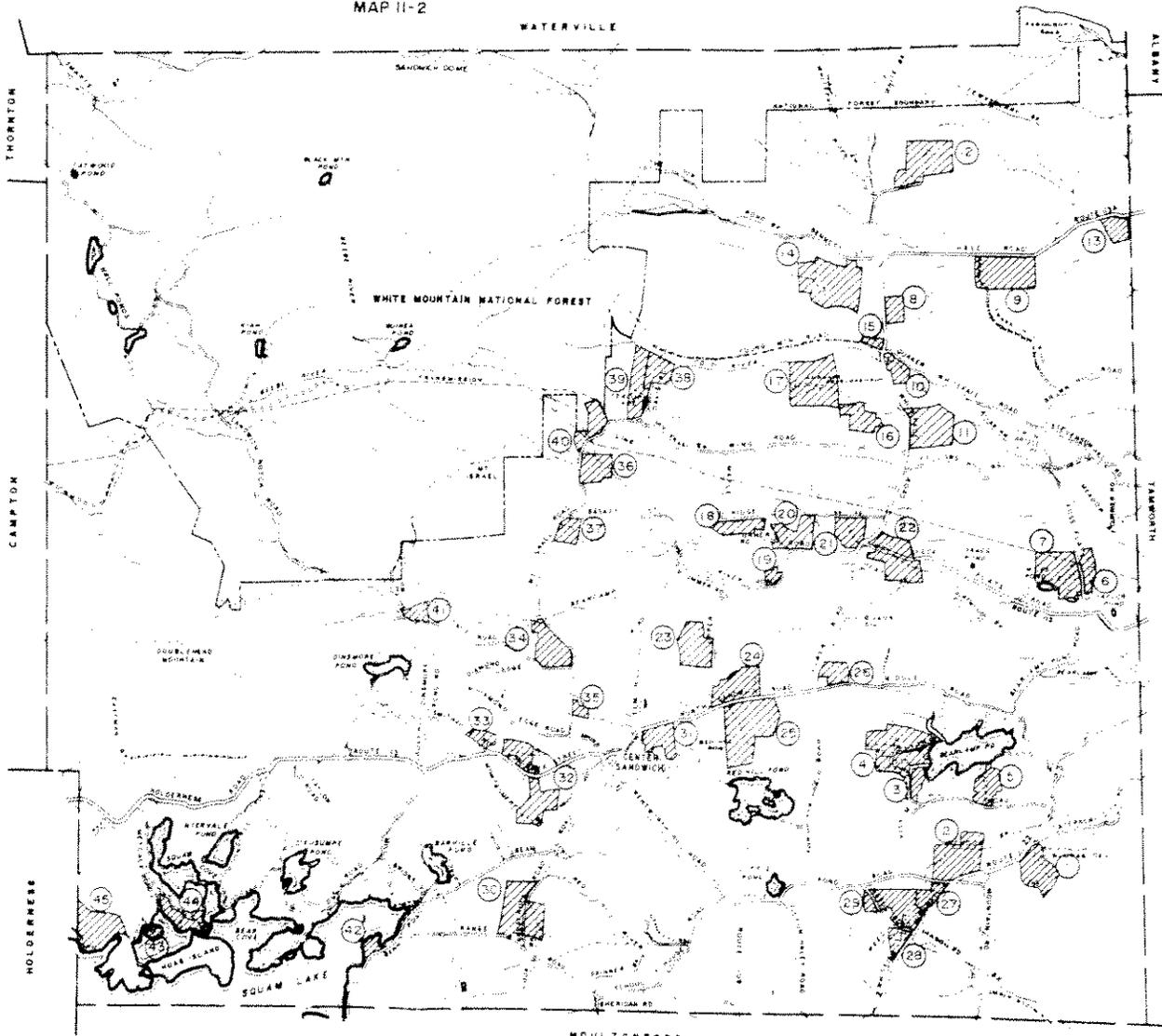
MAP II-2

WATERVILLE

RECENT SUBDIVISIONS

LEGEND:
Lots/Structures

- 1 25/5
- 2 9/1
- 3 3/1
- 4 22/7
- 5 5/2
- 6 6/0
- 7 19/6
- 8 7/3
- 9 6/0
- 10 5/1
- 11 3/3
- 12 3/3
- 13 2/0
- 14 6/1
- 15 5/3
- 16 6/2
- 17 24/0
- 18 6/2
- 19 2/1
- 20 4/2
- 21 5/2
- 22 7/2
- 23 2/1
- 24 2/2
- 25 10/0
- 26 3/0
- 27 7/1
- 28 4/2
- 29 4/1
- 30 3/1
- 31 4/1
- 32 6/2
- 33 2/1
- 34 7/4
- 35 3/3
- 36 2/0
- 37 3/2
- 38 3/2
- 39 2/1
- 40 2/1
- 41 3/1
- 42 7/3
- 43 3/0
- 44 14/10
- 45 8/3

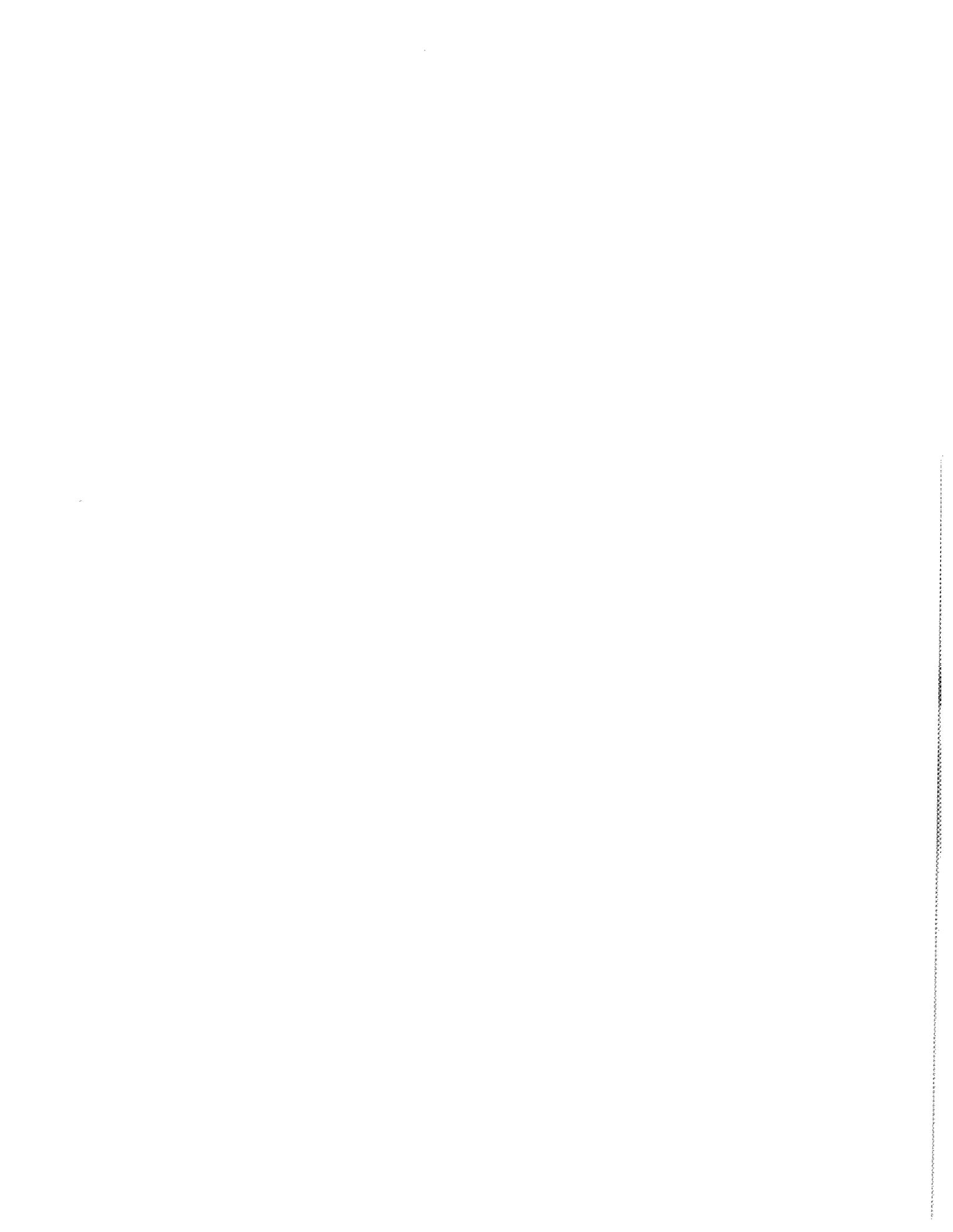


SANDWICH

NEW HAMPSHIRE

PREPARED BY
Lakes Region Planning Commission
Meredith, New Hampshire





LAND CAPABILITY

The practice of basing land use decisions and regulations on the natural capability of the land to support various levels of development is fundamental to the planning process in rural areas. The major premise of the land capability concept is that natural factors which make up the environment have inherently different characteristics and that these characteristics with their varying ability to support development should be a prime determinant in land use decisions.

This section examines the three major conditions which determine the uses which a site can support most economically (soils, slopes and water resources) and designates certain natural features as "critical resources" (wetlands, floodplains, aquifers, steep slopes and prime agricultural soils). In the last portion of this chapter, land capability and critical resource factors are summarized and all currently undeveloped land within the town is ranked according to its development capability.

A. Determinants of Development Capability

1. Soil Conditions (see Sandwich Soil Conditions Map on file at the Town Hall)

The map depicting Sandwich soil conditions was derived from the Carroll County Soil Survey published by the U.S. Soil Conservation Service (SCS). With SCS help, soils were grouped into a number of categories based upon similarity of characteristics, such as parent material, particle size, drainage and depth to bedrock. The categories shown on the map are:

- Wetland Soils: Included in this group are the organic soils; Muck, Peat and Marsh; non-stony and very stony, poorly and very poorly drained mineral soils. The water table ranges typically at or near the ground surface from 5 to 9 months of the year. Some of these soils have standing water on them most of the year.
- Seasonally Wet Soils: This group includes all moderately well-drained soils. The water table rises within 1 - 2½ feet from the ground surface in wet seasons.
- Alluvial Soils on the Floodplains: This group includes all drainage classes that are of stream deposited materials subject to flooding. Some of these Flood Plain soils are also wetland soils. These few soils will appear in both categories, which are indicated on the map legend by cross-hatching.
- Sand and Gravel Soils: These soils are excessively and well-drained soils on Glacial Outwash and Stream Terraces consisting of stratified layers of sand and gravel. Outwash refers to deposition of material by melt water as it flowed from glacial ice.

- Non-Hardpan Glacial Till Soils: This group includes the well-drained soils formed in material called glacial till. The till consists of varying amounts of different size fragments ranging in size from clay to boulders which were deposited directly from the glacier with little or no water transport.
- Hardpan Glacial Till Soils: This group includes the moderately well-drained and well-drained soils formed in glacial till having a distinct compact hardpan layer which retards the downward movement of water.
- Shallow to Bedrock Soils: This group includes somewhat excessively drained soils formed in glacial till. They are predominately shallow to bedrock soils intermingled with deeper soils. Outcrops are few to many.

Each of these soils varies in its capacity to support urban and non-urban uses. For example, wetland soils are suited in their natural condition only for non-urban uses and have been designated as a critical resource on the land capability map which will be described later. Alluvial or floodplain soils are also critical resources. The remaining soils can be classed into three general groups according to their capability to support development. The first group, which has the highest capability to support development, includes both sand and gravel soils and non-hardpan glacial till soils. These soils, due to high to medium permeability, generally can give adequate treatment to septic tank effluent and can support construction activities. The second group has moderate capability and consists of the soils formed on hardpan glacial till. The compact hardpan layer within these soils can prevent the proper movement and treatment of sewage effluent in the soil. It can also be an obstacle in construction. The last group includes those soils which have a seasonably high water table and those with a shallow depth to bedrock. Both have poor development potential. High water table and proximity of ledge to the surface present serious problems in the proper operation of leachfields and in construction operations.

The general soil groupings discussed above can be summarized as follows:

GROUP 1 SOILS

Sand and gravel soils
Non-Hardpan glacial till soils

GROUP 2 SOILS

Hardpan glacial till soils

GROUP 3 SOILS

Seasonally wet soils
Shallow to bedrock soils

2. Slopes (see Sandwich Slope Map on file at the Town Hall)

The slope of the land refers to its general gradient and is defined as the change in elevation over horizontal distance (i.e., vertical distance/horizontal). Slope is measured and expressed as a percentage that represents the relationship between vertical and horizontal distance. Data on slopes within a given community can be obtained from topographic maps prepared by the United States Geological Survey.

The Sandwich Slopes Map was prepared using base topographical information from the U.S. Geological Survey. Slopes were mapped according to degree and steepness and were placed into five categories to coincide with the categories used by the U.S. Soil Conservation Service. The five categories are:

0 - 3%
3 - 8%
8 - 15%
15 - 25%
Over 25%

Similar to the analysis done for soil types, slope can also be further grouped into a three-level hierarchy based upon the capacity to support development. These groups are defined as follows:

Group 1: 0 - 8% - has the least restrictions and consequently has the highest capability for development.*

Group 2: 8 -15% - has restrictions for some types of development and thus rates as having moderate capacity.

Group 3: 15 -25% - has significant restrictions and poor capability to support development.

Very flat land can pose some development problems - often such land provides a monotonous view and is too flat to drain sewage effluent properly. Best development potential is found within the 3-15% range of slopes; such moderate inclines provide good views, good drainage and a varied setting for development. Slopes of 15-25% are suitable for limited development only, and may require special provisions for stormwater and erosion control devices, larger lot sizes, appropriate sewage disposal techniques and special care in construction and landscaping.

*Land with a 0-3% slope may present severe development restrictions due to poor drainage or flood hazard. These factors are accounted for, however, through identification of wetlands and floodplains.

3. Surface Drainage (see Sandwich Surface Drainage Map on file in the Town Hall)

Understanding the direction of water flow and knowing the size of natural drainage areas is another important factor in the analysis of Sandwich's land capability. Man-made development which alters the natural drainage and filtering of rainwater can lead to increased soil erosion and negatively effect water quality.

For the purposes of this analysis, drainage basins have been classified according to size, in the following manner:

1. Larger than 25 square miles.
2. Larger than 10, but less than 25 square miles;
3. Less than 10 square miles;
4. Immediate drainage into lakes and ponds.

The size and configuration of a drainage basin is related to its capacity to support development. A small basin with a relatively undeveloped stream network and with periods of very low flow can be more susceptible to surface water contamination because of a relatively low capacity to assimilate pollutants. When septic leachate or fertilizers enter the receiving waters, they can result in periods when the water has high levels of nutrients or the potential for pathogenic contamination.

Water quality is generally highest in the undeveloped, upland areas. It deteriorates as the water passes through more developed, downstream areas. Inefficient drainage networks (i.e., ones with meandering streams and adjacent wetlands) tend to improve water quality. Once pollutants enter streams, however, they are most rapidly dissipated through rapid, efficient flows.

Basins that are long and narrow provide more opportunity for direct contamination from abutting land uses than basins that are more circular. Basin boundary influence must be measured ultimately in the context of slope, soils and geological conditions.

4. Availability of Groundwater (see Groundwater Map on file in the Town Hall)

Areas which have a significant potential to yield groundwater are called aquifers. These stratified deposits of sand and gravel have large pore spaces between grains which permit the storage and transmission of groundwater. A map showing the location of aquifers in

Sandwich was compiled from reports entitled Availability of Groundwater in the Saco River Basin, East-Central New Hampshire (1975) and Availability of Groundwater in the Pemigewasset and Winnepesaukee River Basins, Central New Hampshire (1975), both of which were published by the U.S. Geological Survey.

The map shows eleven areas in Sandwich with varying potential to yield groundwater. The potential to yield water was rated in one of three classes:

- (a) High potential to yield water;
- (b) Medium potential to yield water; and
- (c) Low potential to yield water.

Most of these areas have already incurred some degree of development. As the town has no sewerage system, the situation deserves careful monitoring to insure that excessive development utilizing septic tanks does not cause the contamination of groundwater in those areas. It should be noted that the map identifies potential areas. It does not mean that groundwater definitely exists. In addition, there may be areas in Sandwich not identified on the map which may yield significant quantities of water. The Groundwater Map is based on the best available information, however.

B. Critical Resources (see Land Capability Map on file in the Town Hall)

Certain of Sandwich's natural resources have been designated on the Land Capability Map as "critical resources". These critical resources include:

1. Wetlands: Wetlands are defined as those areas that are inundated or saturated by surface or ground waters at a frequency and duration sufficient to support a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs and very poorly and poorly drained soils (as designated by the SCS Soil Survey).

In their natural condition, wetlands perform a number of valuable functions for man. Among them are: storage of floodwaters during peak overflow periods; storage and retention of nutrients, thus preventing addition of nutrients to downstream lakes; discharge of water to streams during periods of low flow; and provision of prime habitat for many types of wildlife. They are unsuitable for development purposes because of their year-round high water table.

Sandwich has a fairly substantial amount of wetlands; they comprise 5,064 acres and constitute almost 9 percent of the total land area in Sandwich. They are found to the north and west of Bearcamp Pond, in the area surrounding Red Hill Pond and along the paths of Montgomery and Cook Brooks and the Red Hill River. Other wetlands are found in areas surrounding Weed and Meadow Brooks in the southeast corner of Sandwich.

2. Floodplains: Floodplains are the periodically inundated flat lands adjacent to rivers and streams. Floodplains serve as storage areas for water during times of flooding and provide travel corridors for wildlife.

Due to their important ecological functions, development in floodplains present some special problems, including: (1) a high probability of property damage during flooding; (2) the restriction of periodic water storage resulting in potentially greater flooding; and (3) the increased likelihood of erosion and sedimentation. The latter factor can cause increased turbidity of water in rivers and streams.

As with wetlands, the definition of floodplain areas is based upon soil type (specifically Alluvial Soils on the Floodplains). These areas are quite limited in Sandwich; small concentrations of floodplain soils are found along the paths of the Bearcamp, Cold and Beebe Rivers and near Meadow Brook.

3. Prime Agricultural Soils: Prime agricultural soils are an important natural resource which is both highly productive and limited in quantity. The Soil Conservation Service has defined prime farmland based upon soil quality, moisture supply, and availability (i.e., land is not presently in another use).

The encroachment of development on prime agriculture soils is an important issue relative to the long-term needs of the community. Although existing market forces make the economic feasibility of large scale agriculture in Sandwich seem improbable, the long-term cost and availability of fuel for the transport of food products necessitates the consideration of local market autonomy. The preservation of a portion of prime agricultural soils from irrevocable use would allow for local small-scale agriculture production should future market forces so dictate.

Sandwich has relatively little prime agricultural land. Small concentrations of this prime farmland are found in Whiteface Intervale, an area between Route 113 and the Bearcamp River near the Tamworth border, Burley Hill, Wentworth Hill, Smith Road, North Sandwich and Chick's Corner.

4. Steep Slopes: Steep slopes limit the natural capability of land to support development in two ways. First, land areas with steep slopes are subject to a higher volume and velocity of surface water runoff, increasing the likelihood for erosion. The resulting sedimentation effects both the immediate site and lower lying areas as well. Secondly, soil depth is thinner on steep slopes, decreasing the capacity of the land to filter septic tank effluent in areas which lack public sewers.

On Sandwich's Land Capability Map, slopes exceeding 25 percent are designated as a critical resource. Sandwich has a Steep Slopes Ordinance requiring that any new development on slopes exceeding 15 percent must be reviewed and approved by the Planning Board.

Sandwich's abundance of steep slopes is an outstanding natural feature of the town. Portions of the White Mountain Range jut into the north and western regions of Sandwich, while the Ossipee Mountain Range extends into the southeast corner of the town. Slopes exceeding 25 percent are found throughout the area surrounding Sandwich Notch Road (Dinsmore Mountain, Mount Squam and Double-head Mountain), along the shores of Squam Lake and south of Route 25 to the Tamworth and Moultonboro borders.

5. Undeveloped Aquifer Areas: Aquifers are susceptible to pollution due to the ease and speed with which water-borne pollutants are transmitted through the soil. Septic tank effluent and landfill leaching are two potential sources of aquifer pollution. In addition, development which involves extensive amounts of impervious material cover (e.g., asphalt or cement) can reduce the productivity of aquifer areas. Consequently, in planning for the future water requirements of the Sandwich population, consideration should be given to controlling the intensity of development in these areas.

Most of the existing development in Sandwich has occurred in areas which do not overly major aquifers, and Sandwich's Wetland Ordinance protects much of the area with some potential to yield groundwater from future development. Sandwich's largest and best aquifer area (located in the vicinity of Miles and Taylor Ponds) is only partially comprised of wetlands, however, and is still vulnerable to development. The area is covered by sand and gravel deposits; there is currently an extensive sand and gravel mine operating in the Taylor Pond area. This area may be subject to increased development pressures in the future because of its proximity to several ponds, its relatively gentle topography and its suitability for septic disposal due to the presence of sandy soils. All new development in this area should be carefully monitored; the percolation of sewage effluent could jeopardize the quality of water stored in this major aquifer area. A simple aquifer protection overlay district should be considered.

C. Composite Land Capability (see Land Capability Map on file at the Town Hall)

The range of capability conditions and constraints discussed earlier in this Chapter can be synthesized to yield an overview of Sandwich's development capability. The Sandwich Land Capability Map on file at the Town Hall summarizes natural and man-made features of the town based on a three-step process:

1. Existing land use was mapped first; areas in which development currently exists and open space which is protected by public ownership were dismissed from further capability analysis, since these areas are essentially pre-empted from other uses.
2. Critical resources were mapped and eliminated from any further capability analysis. All critical resource areas are considered to be inappropriate for any type of development. Critical resource areas can, however, be properly used for recreation and education purposes and, if suitable, for farming, flood storage and water supply.

3. For all remaining areas in the town, the three natural factors which are the primary determinants of land capability (soils, slopes and surface) were mapped. All three factors considered simultaneously to arrive at a composite capability rating which is an indication of the capability of the land to support varying intensities of urban development. All land areas which were not eliminated earlier, by the presence of critical resources, public land or existing development) are ranked on the map from most capable to least capable of sustaining development.

The combination of soils, slopes and surface drainage basins (as indicated in Step 3) produced the following land capability classification matrix:

TABLE II-9

Land Capability Matrix

	<u>Capability Class</u>	<u>Slope</u>	<u>Soil Group</u>	<u>Surface Drainage</u>
Excellent Development Capability	1	0 - 8%	1	25
	2	0 - 8%	1	10-25
	3	0 - 8%	1	10
Good Development Capability	4	0 - 8%	1	immediate
	5	0 - 8%	2	10-25, 25
	6	0 - 8%	2	10, immediate
	7	8 -15%	1	10-25, 25
Capable of Fair and Limited Poor Development Capability	8	8 -15%	1	10, immediate
	9	0 - 8%	3	10-25, 25
	10	0 - 8%	3	10, immediate
	11	8 -15%	2	10-25, 25
	12	8 -15%	2	10, immediate
	13	8 -15%	3	10-25, 25
	14	8 -15%	3	10, immediate
Special Considerations Necessary	15	15 -25%	1,2 or 3	Any Drainage

Land with excellent development capability is considered adequate to support development on a level of one unit per acre without the provision of public water and sewer systems. It is important to stress that, even in areas with excellent development capability, a safe distance should be maintained between wells and leachfields on the one hand and surface water and leachfields on the other. It is also important to note that, even though large areas of land with excellent development capability exist in Sandwich, there are many other factors to be considered when determinations about the location of future development are made (among them, of course: compatibility with community goals, proximity to services, maintenance of open space, etc.).

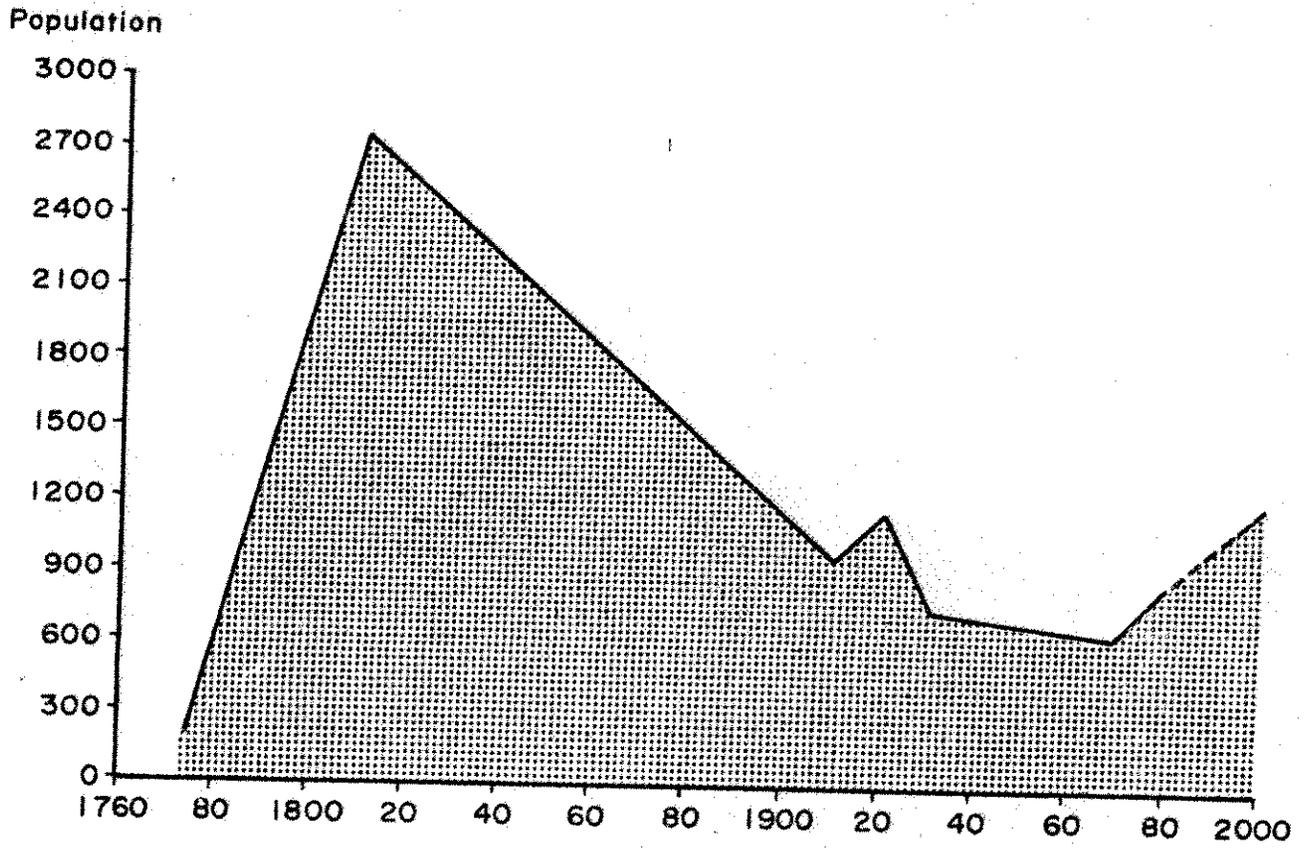
Sandwich has relatively little land which falls in the excellent development capability category. Concentrations of land with excellent development capability are found in the area surrounding Center Sandwich, Chick's Corner, the Wentworth Hill/Lower Corner area, to the south of North Sandwich along Route 113 and at the intersection of Bearcamp Pond Road and Route 113. A sizeable concentration of land in this category is also found in the northeastern quadrant of Sandwich along Route 113A and Bennett Street.

Land with good development capability demands a slightly larger lot size for the safe disposal of septic effluent. Sandwich has very little land with good development capability; small concentrations are, however, found in the Sandwich Bay and Squaw Cove areas and at the northern tip of Sandwich along Intervale Road.

Land with fair and poor development capability may require greater minimum lot sizes. Special design and construction considerations will be necessary where the slope ranges between 15 and 25 percent (poor development capability). A significant proportion of Sandwich's available land area falls within these two categories. Major areas lie in the region surrounding Tasker and Brown Hills in the area to the north of North Sandwich, in the Diamond Ledge area, and along Sandwich Notch Road.



POPULATION





III. POPULATION

INTRODUCTION

An analysis of changing trends in a town's population is one of the most fundamental aspects of a master planning effort. Any significant changes in the population of a town will consequently affect land use patterns, the town's economic base, and local demand for housing, transportation, human services and community facilities. Shifts in the composition of the population are important, since knowledge of changes in the school age, elderly and seasonal population is a prerequisite to providing for proper education, elderly housing and the timing and tailoring of services in the future.

This chapter examines five facets of population change in Sandwich. First, historical population trends in Sandwich are summarized and contrasted to those of Carroll County, the State and the United States as a whole. Next, migration patterns affecting Sandwich population growth are analyzed. Third, selected characteristics of the Sandwich population are examined (age and sex distributions, income and education). Fourth, the town's seasonal population is described. The final section of this chapter contains population projections through the year 2000. These projections indicate the degree of change to expect for the 20-year span between 1980-2000.

Information used in this chapter was derived from a variety of sources. Information regarding historical population trends was derived from population estimates published by the Office of State Planning. Data on population characteristics, migration and Sandwich's seasonal population was compiled from town records, local school records, the Bureau of the Census, the N.H. Bureau of Vital Statistics, and the 1980 Sandwich Community Survey. Population projections were developed by the Office of State Planning and the Lakes Region Planning Commission.

Historic Trends

Sandwich was granted its charter in 1763 and was settled in either 1765 or 1767. The town grew rapidly in the late 1700's and early 1800's, reaching a peak of 2,744 residents in 1830 which is about three times the 1980 population. Except for a growth spurt between 1910 and 1920, Sandwich's population decreased steadily from 1830 to 1930. From 1930 to 1970 the population remained fairly constant with a range of only 127 persons.

From 1970 to 1980 Sandwich has experienced rapid population growth with the addition of 229 persons (34% increase) over the decade. Tables III-1, III-2 and Figure III-1 on the following pages present the historical trends of Sandwich's population.

The first village in the town grew up on Wentworth Hill at the place now known as "Lower Corner" where Little's Pond Road meets Route 109. (The original "Lower Corner" was at the bottom of the hill near what was then known as Little's Pond where the Tilton-Haley Road meets Little's Pond Road.) This area, which still has the Sandwich Post Office, persisted as an active village until about the middle of the nineteenth century when it declined in favor of Center Sandwich.

TABLE III-1

HISTORICAL POPULATION TRENDS
 SANDWICH, CARROLL COUNTY, N.H., AND U.S.A., 1773-1980

YEAR	SANDWICH	NUMERICAL CHANGE	PERCENT CHANGE	CARROLL COUNTY	PERCENT CHANGE	STATE	PERCENT CHANGE	U.S.A.	PERCENT CHANGE
1767	---	---	---	---	---	---	---	---	---
1773	204	---	---	1,194	---	---	---	---	---
1775	245	+ 45	20.1	1,581	32.41	---	---	---	---
1783	---	---	---	1,172	-25.87	---	---	---	---
1786	653	+408	166.5	2,180	86.01	---	---	---	---
1790	905	+252	38.6	4,821	121.15	---	---	---	---
1800	1,413	+508	56.1	9,230	91.45	141,885	29.58	---	---
1810	2,232	+819	58.0	13,199	43.00	183,858	16.64	---	---
1820	2,368	+136	6.1	17,581	33.20	214,460	13.85	---	---
*1830	*2,744	+376	15.9	20,008	13.80	244,161	10.31	---	---
1840	2,625	-119	- 4.3	21,313	6.52	269,328	5.66	---	---
1850	2,577	- 48	- 1.8	21,507	.91	284,574	11.74	---	---
1860	2,227	-350	-13.6	20,465	- 4.84	317,976	2.55	---	---
1870	1,854	-373	-16.8	17,332	-15.31	326,073	-2.38	---	---
1880	1,701	-153	- 8.3	18,224	5.15	318,300	9.01	---	---
1890	1,303	-398	-23.4	18,124	-.55	346,991	8.51	---	---
1900	1,077	-226	-17.3	16,895	- 6.78	376,530	9.31	76,212,168	---
1910	928	-149	-13.8	16,316	- 3.43	411,588	4.61	99,222,496	30.19
1920	1,175	+247	26.6	15,017	- 7.96	430,572	2.90	106,021,537	6.85
1930	731	-444	-37.8	14,277	- 4.93	443,083	5.01	123,202,624	16.20
1940	742	+ 11	1.5	15,589	9.17	465,293	5.63	132,164,569	7.27
1950	615	-127	-17.1	15,868	1.79	491,524	8.49	151,325,798	14.49
1960	620	+ 5	.8	15,829	-.25	533,242	13.82	179,323,175	18.50
1970	666	+ 46	7.4	18,548	17.18	606,921	21.53	203,211,926	13.32
1975	843	+177	26.6	22,606	21.88	737,578	13.03	---	---
1980	895	+ 52	6.2	27,728	22.67	833,697	10.21	---	---
						918,827		226,504,825	11.46

Source: Population Estimates, Office of State Planning

Analysis: Lakes Region Planning Commission

*Peak population in Sandwich.

TABLE III-2

RELATIVE SHARES OF POPULATION,
SANDWICH, CARROLL COUNTY, N.H., AND U.S.A., 1773-1980

YEAR	SANDWICH	PERCENT SAND./CC	CARROLL COUNTY	PERCENT SAND./STATE	STATE	PERCENT CC/STATE	U.S.A.	PERCENT STATE/USA
1767	---	---	---	---	---	---	---	---
1773	204	17.1	1,194	---	---	---	---	---
1775	245	15.5	1,581	---	---	---	---	---
1783	---	---	1,172	---	---	---	---	---
*1785	653	*30.0	2,180	---	---	---	---	---
1790	905	18.8	4,821	.64	141,885	3.4	---	---
1800	1,413	15.3	9,230	.77	183,858	5.0	---	---
*1810	2,232	17.0	13,199	*1.04	214,460	6.1	---	---
1820	2,368	13.5	17,581	.97	244,161	7.2	---	---
1830	2,744	13.7	20,008	1.02	269,328	7.4	---	---
*1840	2,625	12.3	21,313	.92	284,574	*7.5	---	---
1850	2,577	12.0	21,507	.81	317,976	6.8	---	---
1860	2,227	10.9	20,465	.68	326,073	6.3	---	---
1870	1,654	10.7	17,332	.58	318,300	5.4	---	---
1880	1,701	9.3	18,224	.49	346,991	5.2	---	---
1890	1,303	7.2	18,124	.35	376,530	4.8	---	---
1900	1,077	6.4	16,895	.26	411,588	4.1	76,212,168	*.54
1910	928	5.7	16,316	.22	430,572	3.9	99,222,496	.43
1920	1,175	7.8	15,017	.27	443,083	3.4	106,021,537	.42
1930	731	5.1	14,277	.16	465,293	3.1	123,202,624	.38
1940	742	4.8	15,589	.15	491,524	3.2	132,164,569	.37
1950	615	4.1	15,068	.12	533,242	2.8	151,325,798	.35
1960	620	3.9	15,829	.10	606,921	2.6	179,323,175	.34
1970	666	3.6	18,548	.09	737,578	2.5	203,211,926	.36
1975	843	3.7	22,606	.10	833,697	2.7	---	---
1980	895	3.2	27,728	.10	918,827	3.0	226,504,825	.40

Source: Population Estimates, Office of State Planning

Analysis: Lakes Region Planning Commission

*Peak percentages.

The village at Center Sandwich started very early with the construction of the Beede Mill on the Red Hill River, and was of sufficient size to have had a substantial church by 1793. Other small villages were also established, notably at the end of Squam Lake and at North Sandwich, but of the two, only the latter still has any semblance of a village.

In 1830 Sandwich was the eighth largest town or city in New Hampshire, and was by far the most northerly of the large towns. The population was largely composed of subsistence farmers and their families. The town must have presented a far different appearance than it does today. Many cellar holes, stone walls and abandoned town roads indicate that most of the tillable land was either cultivated or in hay fields, and pastures extended farther up at least some of the mountain slopes than appears credible today. Life was very hard by today's standards with all members of the family working long hours. The typical farmer raised almost all the food his family ate, the wool and flax from which his wife and daughters made the family clothes, the leather for his shoes and harnesses, and cut the wood that heated the house and cooked the food. Such wants as could not be satisfied by the farm were eased by the sale or barter of labor or cash crops, chiefly livestock that could be marketed by being driven to the cities. There was, of course, some industry, but it was chiefly for local consumption. included saw and grist mills, shoe and harness shops, charcoal and saltpeter making, baskets, and a variety of wooden articles. Travel was by horseback and stage coach, with freight moved by oxen. Some passengers and freight moved on Squam Lake and on nearby Winnepesaukee by sail, oar and horse-powered boats or on ice in the winter.

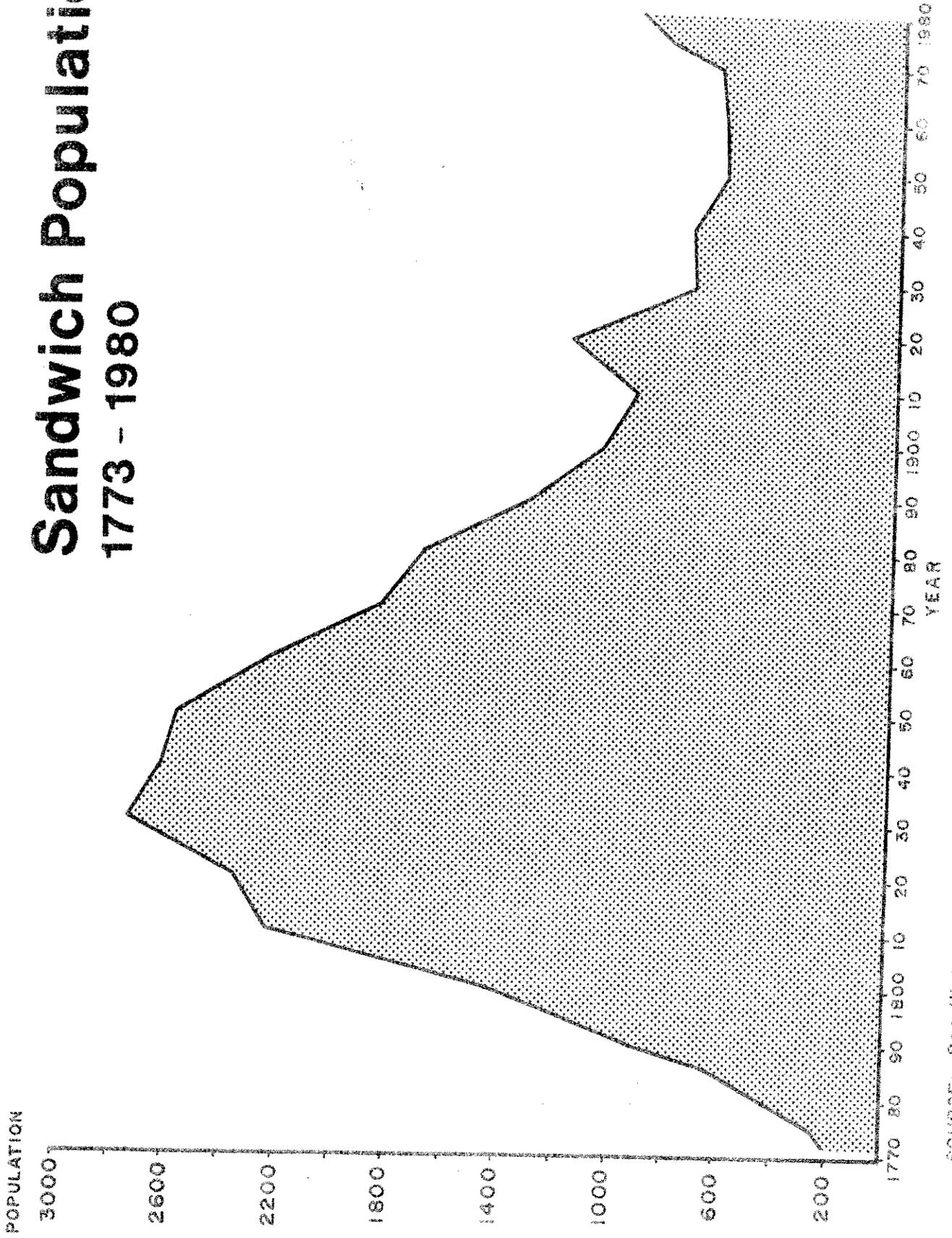
The decline in population after 1830 was the direct result of the growing industrialization of the cities and the opening up of more fertile land in the west. Subsistence farming of the thin rocky and hilly soils of Sandwich came to mean for many a life of hard work and poverty with little hope of the future. Usually the younger and the more vigorous left to improve their economic condition, leaving the old folks to till the farm until death, fire or exhaustion put an end to it. The fields and pastures then grew up to bushes, trees and renewed second growth forests.

After the Civil War, the railroads and growing wealth in the cities created a prosperous tourist business in New Hampshire. This era was characterized by railroad travel, large resort hotels, and substantial private seasonal homes in the mountains and along lakefronts. Sandwich gained little from this tourist invasion, as compared with nearby towns, because no railroads came to the town or even close enough for convenient travel by horse.

Near the turn of the century the demand for timber caused by the exhaustion of more readily available forests resulted in large lumber operations in the remaining stands of the White Mountains. Large areas were cut over with the process ending only with the exhaustion of the forest, and the creation of the National Forest. Much of the northern mountainous part of the town was lumbered at that time. This activity had, however, little economic impact on Sandwich outside of providing some employment in the woods, because topography dictated that the lumber go out mostly to the Pemigewasset Valley or through Tamworth.

FIGURE III-1

Sandwich Population 1773 - 1980

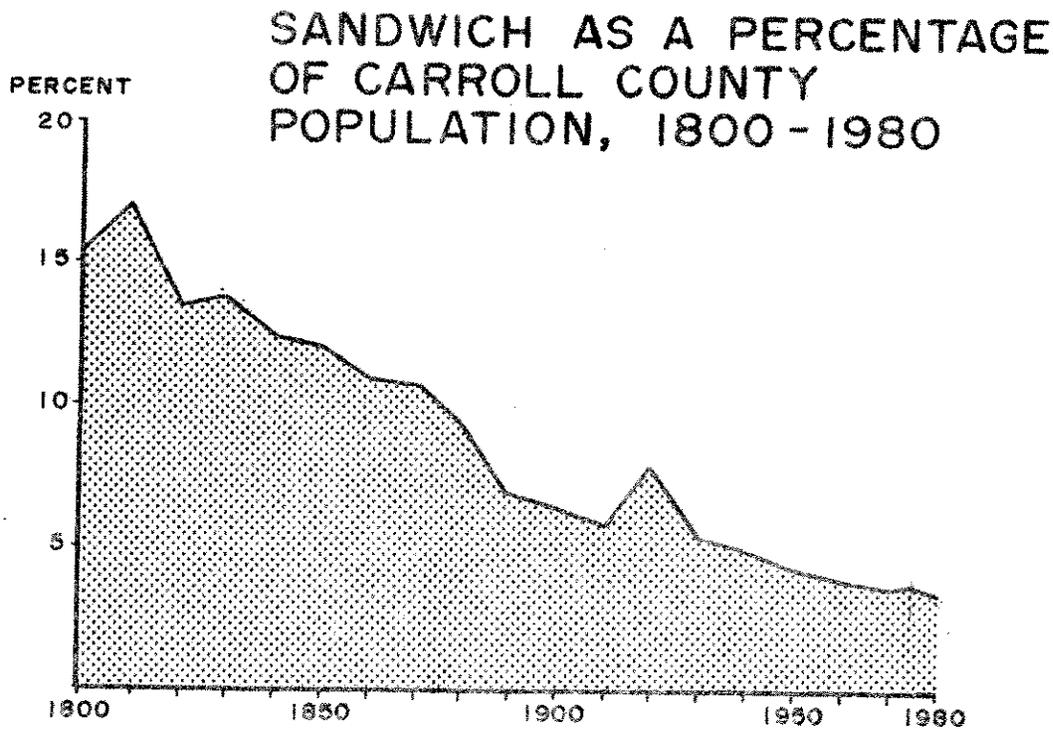


SOURCE: See Historical Trends Table

The automobile and hard-surfaced roads have made Sandwich readily accessible. No main north-south artery, however, goes through the town, and the chief east-west highway (Route 25) passes through only a small portion of Sandwich missing the villages by a substantial distance. Many of the other roads either dead end in the mountains or connect to dirt roads, and all tend to be narrow, rough and twisting, except for some improved sections. The result is that the town experiences no large influx of passing tourists. Outside of that on Route 25, most of the traffic in Sandwich has the town for either its origin or destination. There has consequently been no concentration of the tourist business in Sandwich. The automobile has, however, made the town accessible to a considerable number of seasonal residents and to retired people who live in town year-round.

Figure III-2 shows that Sandwich's population has steadily declined as a percentage of Carroll County's population. The peak was in 1786, when Sandwich represented 30 percent of the county population. Since 1790 Sandwich's share has followed a gradual downward slope. Sandwich had 15.3 percent of the county population in 1800, 12.0 percent in 1850, 9.3 percent in 1880, 6.4 percent in 1900, 4.1 percent in 1950, and by 1980 Sandwich's share of the county population fell to 3.2 percent.

FIGURE III-2



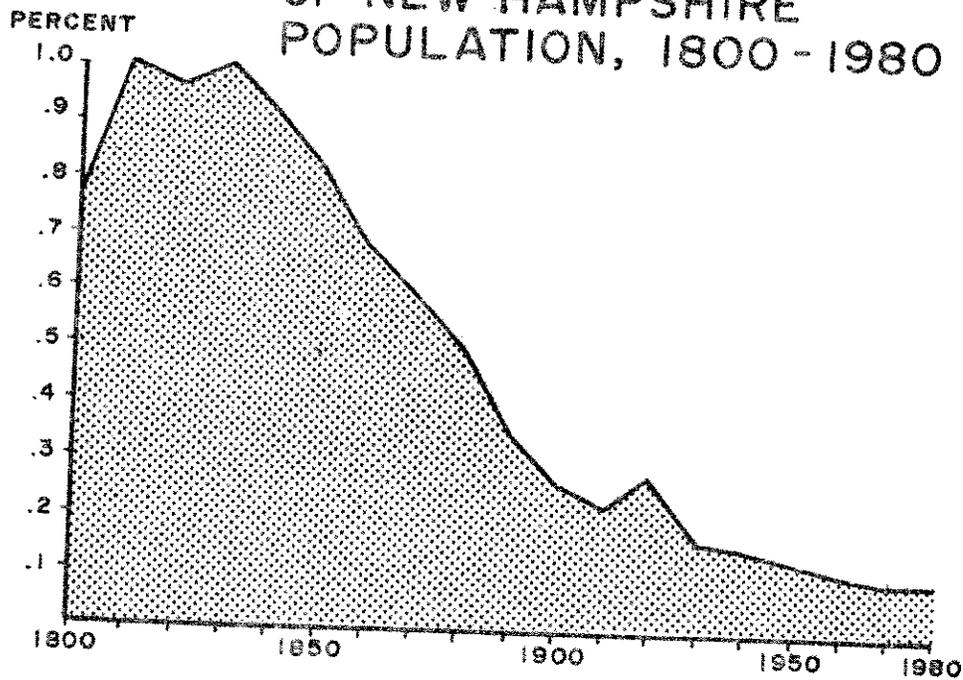
SOURCE: See Historical Trends Table

Figure III-3 shows the relationship of Sandwich's population to New Hampshire's population. In the early 1800's Sandwich represented about one percent of the State population, and in 1830 Sandwich was the eighth largest town in New Hampshire. In 1980 a city representing one percent of the State's population would have about 9,000 persons, while Rochester presently ranks eighth in population.

From 1830 to 1930 Sandwich's share of the State population fell sharply from 1.0 percent to .16 percent. The proportion then dropped gradually to .10 percent in 1960 and has virtually remained at that percentage for the past 20 years.

FIGURE III-3

SANDWICH AS A PERCENTAGE OF NEW HAMPSHIRE POPULATION, 1800-1980



SOURCE: See Historical Trends Table

The rapid population growth experienced in Sandwich and the Lakes Region recently has resulted in a change in the appearance of the landscape. Table III-3 shows that the average population density in the Lakes Region in 1970 was 50 persons per square mile; by 1980 this density had increased to 67 persons per square mile. Sandwich's density is the lowest in the Lakes Region and despite rapid growth, its density has increased only slightly because the town covers such a large land area. Sandwich has a total land area of 94.0 square miles, making it the third largest town in New Hampshire, being exceeded in area only by Pittsburgh and Lincoln. Of this area 2.7 square miles is water leaving a land area of 91.3 square miles, of which 23.9 square miles lies in the White Mountain National Forest, leaving 67.4 square miles.

The population densities shown in Table III-3 are somewhat misleading because approximately one-third of Sandwich's land area is either in National Forest or is too mountainous for reasonable settlement. If this area is subtracted from the total, Sandwich's population density in 1980 would be approximately 15 persons per square mile.

TABLE III-3

Population Density in Selected Lakes Region Communities
1970-1980

<u>Town</u>	<u>No. Persons Per Square Mile</u>	
	<u>1970</u>	<u>1980</u>
Centre Harbor	47.8	71.5
Gilford	84.0	125.7
Holderness	34.0	51.3
Laconia	733.4	767.4
Meredith	72.8	116.2
Moultonboro	22.6	37.3
Ossipee	23.1	34.8
Sandwich	7.3*	9.8
Tamworth	17.7	27.9
Lakes Region	49.9	66.6

*Note: Lowest in Lakes Region.

Natural Increase and Migration

The two major determinants of population change are natural increase and migration. The excess of births over the number of deaths, in any one period, is called natural increase. Migration refers to the number of people who have moved into and out of the town. If a community has little in and out-migration almost all changes in population are attributable to natural factors alone. The total amount of natural increase and migration in Sandwich is based on the following formula: "The population of Sandwich at the close of a period is equal to its population at the start of the period, plus natural increase (the excess of births over deaths) during the period plus the net migration during the period."

In the period from 1970 to 1980 in Sandwich there was a natural decrease of 44 persons. Since Sandwich's population increased by 229 persons over that span, there was a net in-migration of 273 persons. Thus, almost all of Sandwich's net population growth in the 1970's can be attributed to outsiders who have moved into town.

TABLE III-4

Births, Deaths and Population Growth Sandwich, 1970-

<u>Year</u>	<u>Births</u>	<u>Deaths</u>	<u>Increase/Decrease</u>	<u>Population</u>
1970	7	10	- 3	666
1971	5	12	- 7	
1972	4	10	- 6	
1973	6	7	- 1	
1974	8	10	- 2	
1975	5	13	- 8	
1976	7	10	- 3	
1977	3	10	- 7	
1978	10	12	- 2	
1979	10	15	- 5	
1980				
			-44	895
				+229
			Net In-Migration =	371

Sources: Birth & Death Counts - N.H. Department of Health and Welfare, Bureau of Vital Statistics.
Population - U.S. Census, 1970, 1980.

In comparison to the State of New Hampshire and Carroll County, Sandwich's birth rates have consistently been lower than State and County figures since 1960. On the other hand, Sandwich's death rates have generally been higher than State and County death rates, perhaps resulting from the town's large retirement population.

TABLE III-5

Comparative Birth and Death Rates for
New Hampshire, Carroll County and Sandwich, 1960-1978

<u>Birth Rates/1000 Population</u>			
<u>Year</u>	<u>New Hampshire</u>	<u>Carroll County</u>	<u>Sandwich</u>
1960	22.7	18.9	11.3
1970	18.3	15.6	10.5
1975	13.3	11.2	5.9
1978	13.6	11.8	10.5

<u>Death Rates/1000 Population</u>			
<u>Year</u>	<u>New Hampshire</u>	<u>Carroll County</u>	<u>Sandwich</u>
1960	10.9	15.6	14.5
1970	10.0	13.5	15.0
1975	8.6	11.9	15.4
1978	8.0	9.2	12.6

Source: N.H. Department of Health and Welfare, Bureau of Vital Statistics.

It is interesting to note that while New Hampshire and Carroll County birth and death rates have followed a downward trend over the past two decades, the birth and death rates for Sandwich do not seem to follow any noticeable pattern. This is probably due to the small population in Sandwich, where slight changes in the number of births and deaths cause large variations in the rates.

In-Migration Characteristics

The 1980 Sandwich Community Survey revealed some interesting statistics concerning the origins of in-migration. Eighty-three percent (83%) of the respondent households indicated that they moved to Sandwich from another state while only 17% moved from another New Hampshire community. Of those who migrated from another state, 29% came from Massachusetts, 15% came from another New England state, and 56% came from a state outside New England. Most of the households who moved from another New Hampshire community came from neighboring towns such as Meredith and Tamworth, and almost all moved from a town which is more populated than Sandwich.

The survey also revealed some important information concerning the conversion of seasonal dwellings to year-round homes. Twenty-seven percent (27%) of the respondents said that the house in which they are living was once a seasonal dwelling. Sixty-two percent (62%) of the conversions occurred between

1970 and 1980. This recent trend is important because (1) the Town has no control over conversions; (2) since almost half of the dwelling units in Sandwich are seasonal, the town's population could almost double through conversions without the construction of a single new home; (3) many seasonal homes have poor road access and septic systems which are inadequate for year-round use; and (4) the town's tax base would be changed, since homes which once demanded services for only a portion of the year would demand town services (possibly including education) throughout the year.

This trend of conversions can be expected to continue. Sixty percent (60%) of the seasonal households who responded to the 1980 Community Survey plan to retire in Sandwich. Assuming two persons per household, this means that a minimum of 128 persons plan to retire in Sandwich. The actual figure will probably be much higher since only 27% of the seasonal property owners responded to the survey and many homes may be bought and converted by younger families who are not ready to retire.

Household Size

The average number of persons per dwelling in Sandwich has dropped dramatically over the past decade. According to the U.S. Census, there was an average of 3.1 persons per year-round household in 1960 and an almost identical 3.0 persons per unit in 1970. However, from 1970 to 1980 average household size dropped to 2.2 persons per household.

The average number of persons per year-round household was calculated according to both town records and the results of the 1980 Community Survey. In both cases the household size for Sandwich was 2.2 persons per household. This decline in household size is consistent with national trends and the 1980 average is only slightly lower than the 1980 averages in other Lakes Region communities. The Sandwich trend also may reflect growth in the town's elderly population and the out-migration of youth.

Education

Most Sandwich residents have a high level of education. According to the 1980 Sandwich Community Survey, 93% of the year-round resident adults have at least a high school diploma and 70% have beyond a high school education. In addition, an astonishing 43% are college graduates and 14% have graduate school degrees.

Seasonal residents have an even higher level of education. According to the 1980 Survey of Seasonal Residents, 97% of the seasonal respondents have at least a high school diploma and 89% have beyond a high school education. Furthermore, 74% are college graduates, 39% hold at least a Master's degree and 16% have doctorates.

Income

According to the Office of State Planning, the 1979 Median Family Income in Sandwich was \$15,919., which was above the Carroll County figure of \$13,600. and very close to the New Hampshire level of \$15,972. Only 3.9% of the families were below poverty level (\$3,721 for a family of four) in 1970 (eight or nine households).

The 1980 Community Survey also provided income information. Forty-one percent (41%) of the year-round adults who answered the survey indicated that they receive less than \$9,000 per year, 20% between \$9,000 and \$15,000, 8% between \$15,000 and \$20,000, 5% between \$20,000 and \$30,000 and 5% above \$30,000. In addition, 19% receive social security checks and only 1% receive welfare assistance. The median individual income range for the respondents was \$9,000 to \$12,000. This appears to be consistent with the state figures when one considers that many households have more than one income-earner.

Seasonal residents have much higher incomes. According to those who answered, 51 % of the seasonal heads-of-households earn \$30,000 or more per year and 69% earn \$20,000 or more per year. Family incomes would be even higher.

AGE DISTRIBUTION

The age composition of a community has great importance in planning for future needs. An increase in the school-age population, for example, indicates the need for greater investment in educational facilities. Likewise, growth in the elderly population requires a different range of services and housing.

In comparison to other New Hampshire communities, Sandwich could be characterized as a town with a fairly old population. The table below reveals that the median age of Sandwich's population is higher than both the county and statewide figures.

TABLE III-6

Median Ages: Sandwich, Carroll County, and
New Hampshire, 1960, 1970

	<u>1960</u>	<u>1970</u>
Sandwich	34.7	40.8
Carroll County	36.2	34.7
New Hampshire	32.0	27.8

Source: N.H. Office of State Planning

School-Age Population

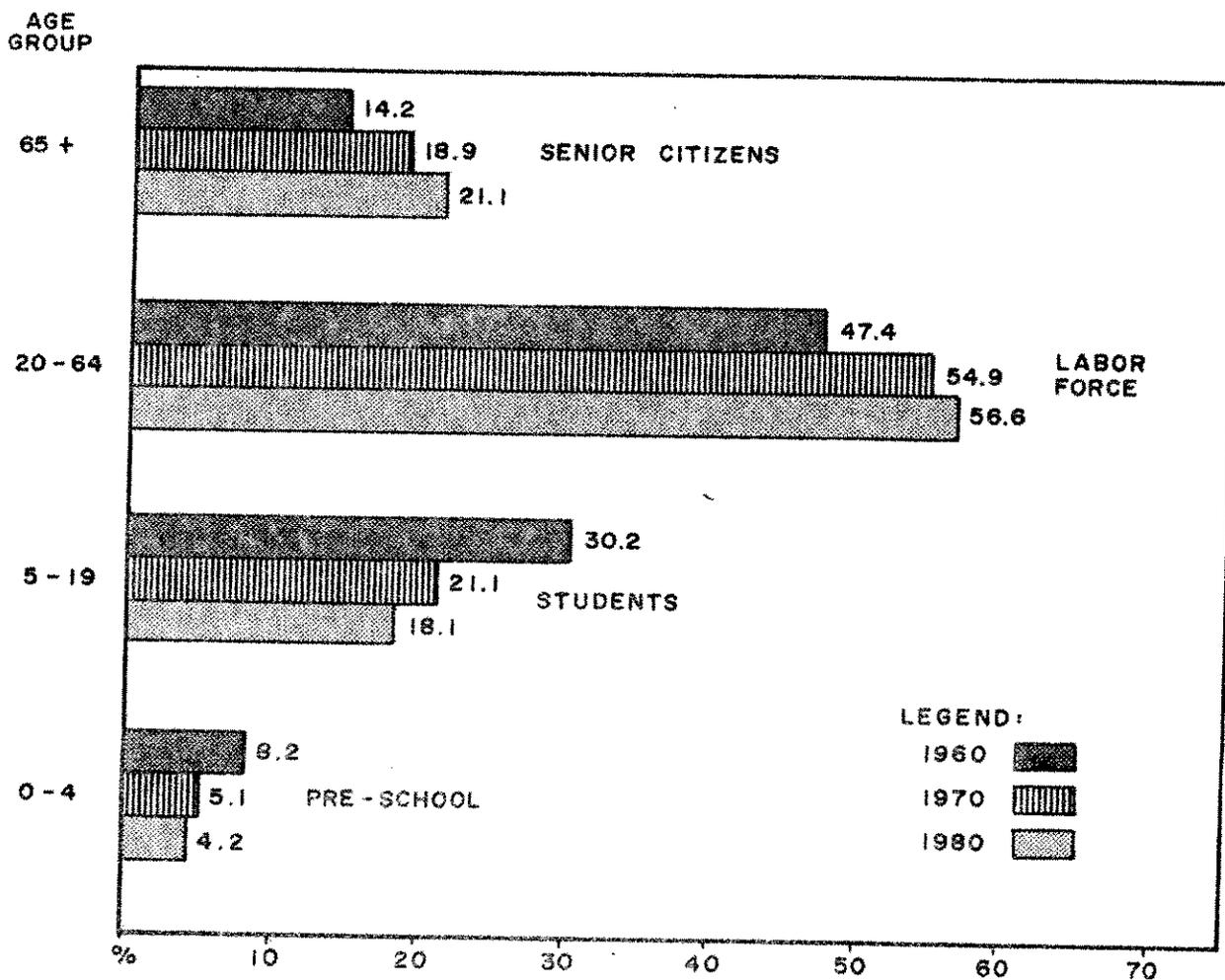
The school-age (0-19) population in Sandwich, as seen in Figure III-4, has declined as a percentage of the total population. In 1960 38% of the population fell into this age group. In 1970 it dropped to 26% and in 1980 the school-age population represented only 22% of Sandwich's population.

The decline in this age group can be expected to continue in the future. Nationally, birth rates have been declining since 1955. Sandwich's birth rates have been lower than those for Carroll County and New Hampshire for the past twenty years. During the 1970's there was an average of only six births per year in Sandwich.

Growth in the school-age population in the future will probably be largely attributable to in-migration rather than to natural increase. Assuming that the school-age population declines to 20% of Sandwich's population over the next twenty years, it is projected that there will be approximately 240 persons in this age group in the year 2000.

FIGURE III-4

AGE DISTRIBUTIONS SANDWICH, 1960, 1970, 1980



SOURCE: U.S. Census, 1960, 1970
Sandwich Community Survey, 1980

Working Age Group

The working age group (20-64) is often referred to as the labor force although not all persons in this group are actually in the labor force, i.e., employed or looking for work. This age group has increased substantially over the past twenty years. In 1960, 47% of Sandwich's population was included in this group. In 1970 it rose to 55% and by 1980 the working age group climbed to 57% of the town's population. Much of this increase came from in-migration. Assuming that this age group reaches 58% of the total population over the next twenty years, it is projected that about 700 persons will be included in this group in the year 2000.

Elderly Population

The elderly population is comprised of persons sixty-five years of age and over. Although most of the persons in this group are retired, some are employed full or part-time. As shown in Figure III-5, there are more women than men in this age group. Sandwich's elderly population has grown rapidly over the past twenty years. The following table shows that Sandwich's elderly age group is a much higher percentage of the overall population than it is in Carroll County and in the State as a whole.

TABLE III-7

Elderly Population as a Percent of Total Population,
Sandwich, Carroll County, and New Hampshire, 1960, 1970, 1980

	<u>1960</u>	<u>1970</u>	<u>1980</u>
Sandwich	14.2	18.9	21.1
Carroll County	15.1	15.2	13.6*
New Hampshire	11.4	10.6	10.7*

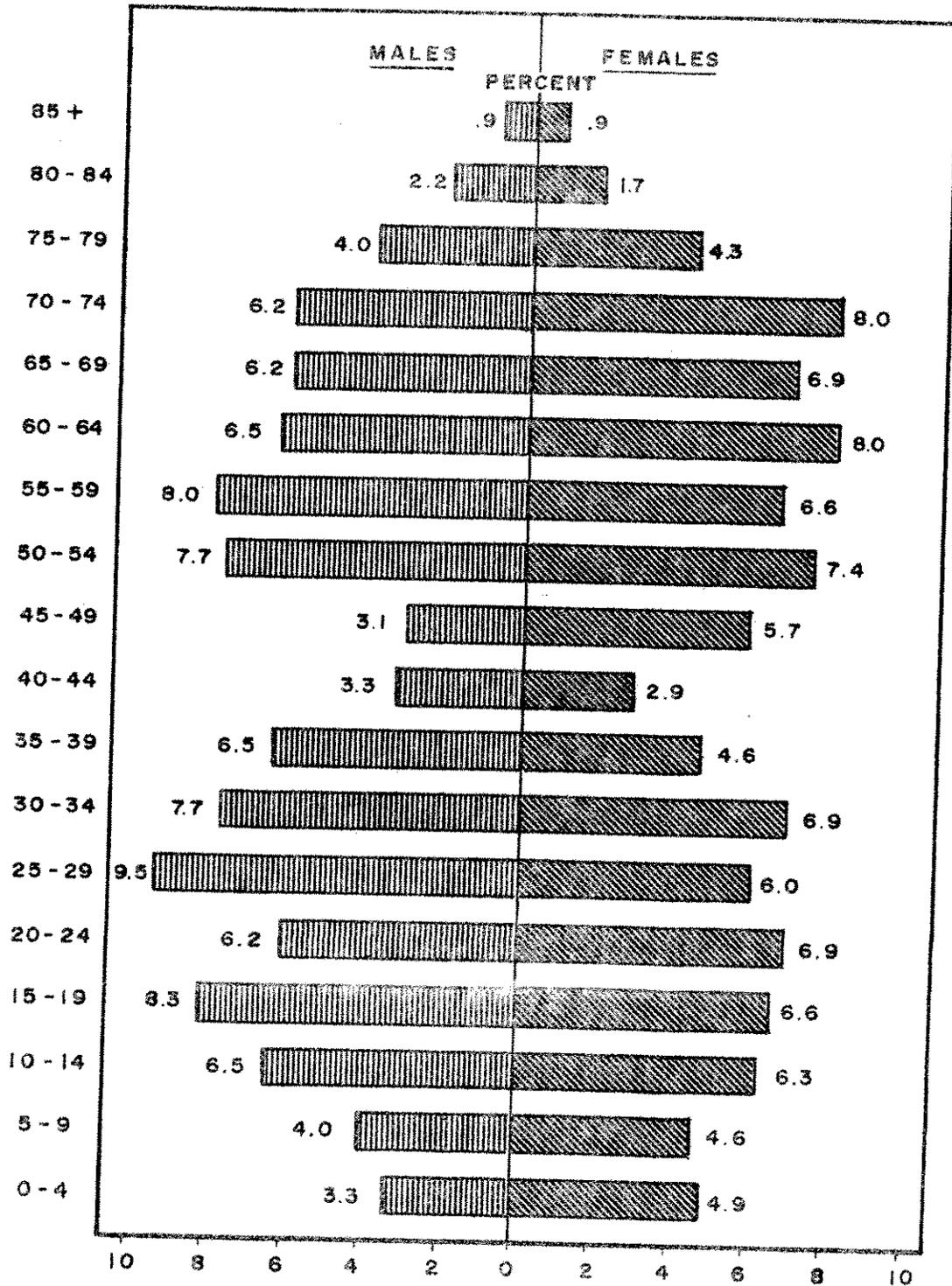
Source: U.S. Census 1960, 1970 and Sandwich Community Survey, 1980

* 1978 OSP estimates; will be updated

The population of the United States will show a relative increase in the 65-plus age group over the end of this century. Sandwich, Carroll County and New Hampshire will probably feel the effects of this population shift. The 1980 Community Survey revealed that many seasonal residents plan to retire in Sandwich. Assuming that the elderly age group will rise to 22% of the town's population it is projected that there will be approximately 265 persons in this group in the year 2000.

FIGURE III-3

POPULATION PYRAMID SANDWICH, 1980



SOURCE: 1980 Sandwich Community Survey

Seasonal Population

The seasonal population has been an important part of Sandwich since the 1930's. There are no major concentrations of seasonal homes. The largest number of seasonal homes are located by Squam Lake. There are also several seasonal homes on Bearcamp Pond, Vittum Hill Road and Mountain Road in East Sandwich, Foss Flats Road and the Center Sandwich village area. There are many others scattered throughout the town's rural setting.

The size of Sandwich's seasonal population is largely determined by the number of seasonal homes in the community. However, in addition to seasonal homes, those staying in the Corner House Inn and Camp Hale and Mead Base add to the influx of summer visitors.

The precise number of seasonal homes in Sandwich is difficult to determine. The town no longer distinguishes between seasonal and year-round residences in its records. In addition, many seasonal homes are used for different periods of time. With the winterization of seasonal homes, many are now used throughout the year, but by non-residents. In contrast, many "regular" residents (legally registered voters) are away much of the year - usually during the winter months. A further complication is that a "summer" resident may rent his house to a "year-round" resident during the period that he is away.

Based upon a thorough review of town records, it is estimated that there were 344 seasonal housing units in Sandwich in 1980. Table III-8 shows how this compares with the number of seasonal units in previous years. An extremely large increase in the number of seasonal units was noted in the period between 1940 and 1960, when the seasonal housing stock increased from 78 to 244 houses. The number of seasonal units has increased at a slower rate since that time, with 71 additional units between 1960 and 1970 and only 29 additional seasonal homes between 1970 and 1980. Hidden in these statistics is the number of conversions and the number of new seasonal homes which determine the total number of seasonal units.

TABLE III-8

Seasonal Housing Units in Sandwich, 1940-1980

<u>Year</u>	<u>Number of Seasonal Units</u>	<u>Percent Change</u>	<u>Number of Year-Round Units</u>	<u>Total Housing Units</u>	<u>Seasonal Units as a Percent of Total Units</u>
1940	78	---	250	328	23.8%
1960	244	+213%	200	444	55.0%
1970	315	+ 29%	227	542	58.1%
1980	344	+ 9%	389	733	46.9%

Sources: U.S. Census, 1940, 1960, 1970; 1980 estimates from Sandwich Town Records

The number of seasonal residents obviously varies according to the month and day. According to a statewide study of seasonal homes conducted in 1968 the average number of persons per seasonal household was 4.87. The study further established that each household had an average of 1.31 guests, for a total occupancy rate of 6.2. Multiplying the number of seasonal homes in 1980 (344) by this rate gives a 1980 seasonal population estimate of 2,133. However, it seems that the household size has probably declined since 1968. A 1980 survey of seasonal residents in Meredith, N.H., established an average seasonal household size of 5.4. Multiplying this new assumed rate by the number of seasonal units gives a revised 1980 estimate of 1,858. This figure does not, however, include the transient population in the Corner House Inn or residents of Camp Hale and Mead Base.

In projecting the future seasonal population, two assumptions have been made. First, the number of seasonal homes will be constant, with the number of conversions offsetting the number of new seasonal units. Secondly, the average size of families occupying seasonal homes will decrease as a reflection of national trends toward smaller family size. Carrying these assumptions through, the following table indicates that Sandwich's seasonal population is projected to decrease by 138 persons over the next twenty years.

TABLE III-9

Seasonal Population Projections, Sandwich, 1980-2000

<u>Year</u>	<u>Projected Number of Seasonal Housing Units</u>	<u>Projected Average Household Size</u>	<u>Projected Seasonal Population</u>
1980	344	5.4	1,858
1985	344	5.3	1,823
1990	344	5.2	1,789
1995	344	5.1	1,754
2000	344	5.0	1,720

YEAR-ROUND POPULATION PROJECTIONS

Unfortunately, a totally accurate method for predicting the future population of small areas has not been devised. Currently used methods requiring natural increase and migration rates cannot be used because these statistics are unreliable at the town level. Any unexpected variable change, such as the addition of a large industry or large housing development, can alter a projection drastically. One should, therefore, view population projections as a general guide which should be updated continuously as new information is available and as conditions change.

Earlier Studies. The following table highlights this problem. The first set of projections were developed by Anderson-Nichols in 1969 as part of a Public Water Supply Study for the New Hampshire Department of Resources and Economic Development. It included a review of economic analyses and projections, analysis of historical population trends and calculation of migrations into and out of each county by age groups. Note that Sandwich's 1980 population estimate is close to the projected population for the year 2010.

The second set of projections was produced in 1975 by the N.H. Office of Comprehensive Planning (now called the Office of State Planning). State and Regional projections were prepared using a cohort survival technique, which analyzes fertility, survival and net migration rates and projects them into the future. After the OCP developed population projections for the regions and the entire State, they allocated population increases to individual towns on the basis of a population growth index calculated for each community. The index is an attempt to quantify a town's relative attractiveness by using a mathematical equation. The factors in the equation are: (1) the potential saturation population of the town; (2) its accessibility to nearby urban centers; and (3) its competitive advantage for attracting growth as compared to the region's other towns.

On the basis of this growth index, individual town projections were developed and sent to the regional planning agencies for comment. After two rounds of this process, final adjustments were made and the figures were published. The 1980 projection appears to be reasonably accurate. Note that relatively slow growth was projected for the period between 1980 and 2000.

TABLE III-10

Previous Population Projections for Sandwich, 1980-2020

<u>Year</u>	<u>Anderson-Nichols (1969)¹</u>	<u>OCP (1975)²</u>
1980	700	930
1985		950
1990	700	970
1995		980
2000	800	1,000
2010	900	
2020	1,100	

¹ Population Projections of New Hampshire, N.H. Department of Resources and Economic Development, Anderson-Nichols Co., Inc., May, 1969.

² New Hampshire Population Projections for Towns and Cities to the Year 2000, N.H. Office of Comprehensive Planning, November, 1975.

NEW PROJECTIONS

After analyzing past trends, two simpler, and perhaps more reliable, projection methods were utilized. In the first projection a least squares line was fitted to the population estimates from 1960 to 1980 and carried out into the future. The projection, of course, is based on the assumption that economic, social, institutional, cultural and natural conditions of the 1960's and 1970's will generally remain constant (linear) until the year 2000. The second method which has produced the projections recommended by the LRPC is based on the historical trend of Sandwich's population as a percentage of the State's population. Examination of trends (see Figure III-3) revealed that Sandwich's share of the State's population has been fairly steady for the past 50 years and has remained almost constant for the past 20 years. In 1960 Sandwich had .1% of the State's population, in 1970 it had .09%, .1% in 1975 and .1% in 1980.

TABLE III-11

ALTERNATIVE POPULATION PROJECTIONS, SANDWICH, 1985-2000

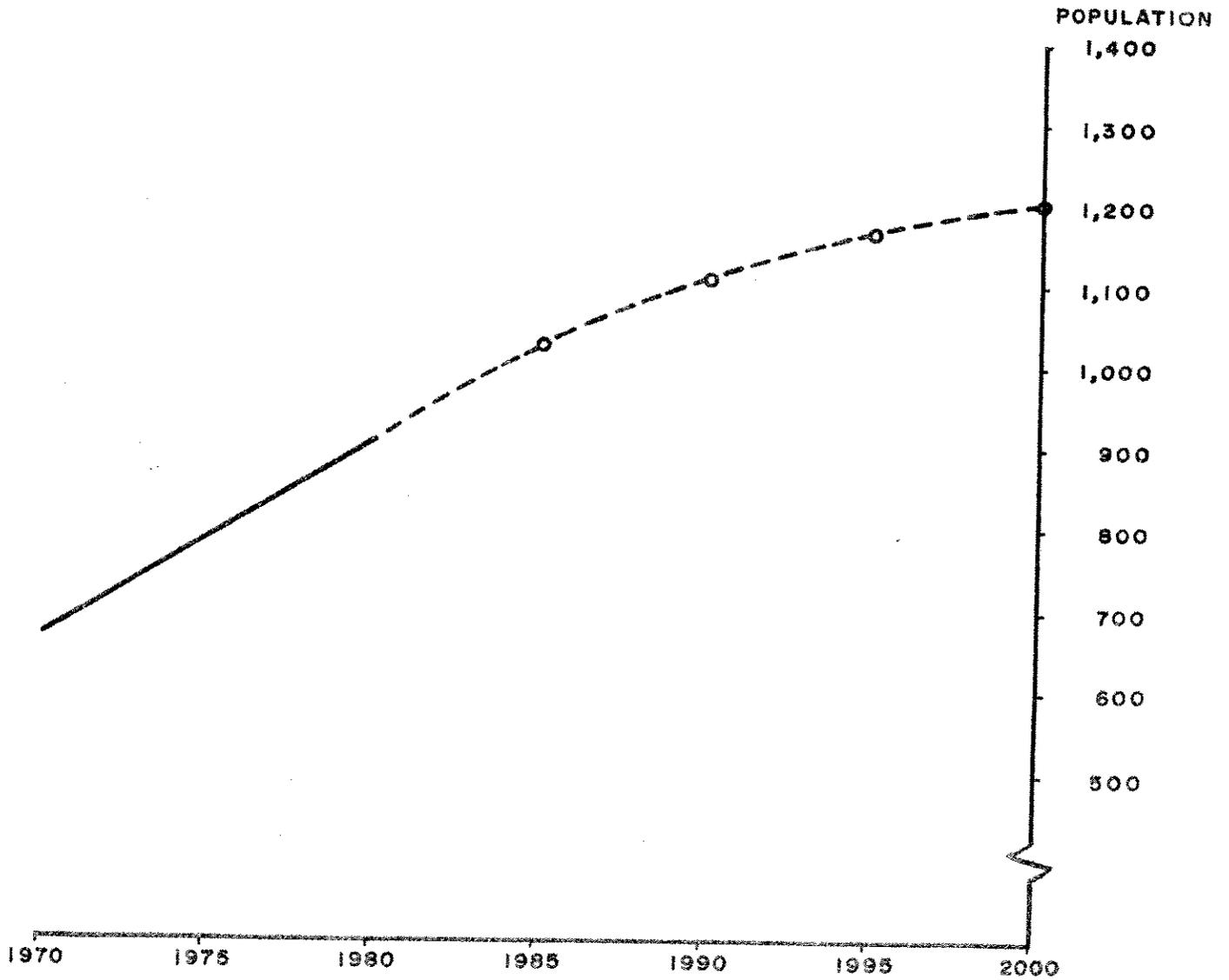
<u>Year</u>	<u>Least Squares Technique</u>	<u>Ratio Technique*</u>
1985	933	1,022
1990	1,002	1,092
1995	1,070	1,152
2000	1,139	1,207

*Recommended method.

The advantage of this method is that it relates the projection for Sandwich to the projection for a large area, which should be more reliable than individual projections for Sandwich. This method is still subject to error, but it seems to be the most reasonable alternative.

FIGURE III-6

Sandwich Population Projections 1980 - 2000



SOURCE: U.S. Census, 1970 & 1980
Projections by LRPC, ratio method, 1980-2000