the time when plant protection specialists and scientists in allied fields are called upon to take a lead on actions that have been suggested. The benefits to be gained in this collaborative effort are immeasurable.

Summary

The need, value, and procurement of reliable crop loss data are examined in the light of current economic, sociological, and ecological requirements for a modern agriculture. Initiatives already under way to secure more useful information are examined and the need for further work in crop loss methodology and surveys is emphasized.

References and Notes

1. *The Locust Handbook* (The Anti-Locust Research Centre, London, 1966), (38056) 37.
2. J. Neumeyer, D. G. Gibbons, H. Trask, *Chem. Week*, **104**, 38–68 (1969).
3. V. M. Stern, R. F. Smith, R. van den Bosch, K. S. Hagen, *Hilgardia* **29**, 81 (1959).
4. *Report of the Secretary's Commission on Pesticides and their Relationship to Environmental Health* (U.S. Government Printing Office, Washington, D.C., 1969), parts I and II, pp. 59, 231–233, 179.
5. G. W. Irving, Jr., *Science* **160**, 1419 (1970); *FAO (Food Agr. Organ. U.N.) Agr. Stud.* No. 84 (World Health Tech. Rep. Ser. No. 458).
6. K. S. Chester, *Plant Dis. Rep. Suppl.* **193**, 196 (1950).
7. Papers presented at Symposium on Crop Losses (FAO, U.N., Rome, 1967).
8. C. A. Edwards and G. W. Heath, *The Principles of Agricultural Entomology* (Chapman & Hall, London, 1964).
9. V. M. Stern, *J. Econ. Entomol.* **60**, 485 (1967).
10. *Estimates of Crop Losses and Disease Control Costs in California, 1963* (Univ. of California Agr. Exp. Sta. and Agr. Ext. Serv., 1965).
11. *U.S. Dep. Agr. Handb.* No. 291 (1965).
12. W. C. James, *Ann. Appl. Biol.* **63**, 253 (1969).
13. L. Chiarappa, *FAO Food Agr. Organ. U.N. Plant Protect. Bull.* **18**, 29 (1970).
14. *Crop Loss Assessment Methods* (FAO, AGP: CP/22, Rome 1970).

Population Trends of the 1960's

Some early results from the 1970 census are given.

Conrad Taeuber

The nineteenth decennial census of the United States was taken as of 1 April 1970, and, like its predecessors, it provides a great deal of information about all areas of the country. The Founding Fathers established a decennial count of the population in order to solve the vexing question of how to allocate seats in the House of Representatives. They recognized that there would be changes in the rate of growth of the existing states and that new states would be added as the territory to the West was settled. Periodic reallocation of the seats in the House was established as the best way of providing for equitable representation. It was recognized at the outset that a count of the entire population could provide much useful information. Over the years, the census has become the source of much of the information needed by the citizens and their government—it reveals progress and lack of progress, growth and decline, and increased opportunity and lack of opportunity. From it we learn what progress has been made in dealing with some major problems and the magnitude of the problems that remain. It is not all flattering, for it reaches into the inner-city ghettos as well as the suburban gold coasts; into almost forgotten backwoods, as well as the most modern, rapidly growing suburbs.

A major contribution of the census is the information it provides for every state, county, village, town, and city, as well as the smaller areas within them. It confirms or corrects the national indications provided by sample surveys during the decade, and it provides adequate data for detailed cross-tabulations. In this way, it adds depth to such analyses of broad national trends as those provided annually by the *Current Population Survey* (*1*).

The author is associate director for demographic fields, Bureau of the Census, U.S. Department of Commerce, Social and Economic Statistics Administration, Washington, D.C. 20233.

Overall National Trends

There are now about 209 million residents of the United States—almost twice as many as there were in 1921. About 24 million were added to the current total between 1960 and 1970, a larger absolute gain than in any other decade in our history except during the 1950's. However, the rate of growth was slower in the last decade than it was in the 1950's; in fact, it was about the same as the rate in the 1920's and 1940's and double that in the 1930's, the Depression years. Overall rates of growth have varied sharply in this century. They were declining during the 1920's and dropped to all-time lows in the 1930's. They recovered somewhat in the 1940's, but the war years were not favorable to population growth. After the end of World War II, there was a period of relatively rapid growth, with annual increases that averaged about 1.7 percent per year. During the 1960's the rate of growth slowed down, and in the last years growth has been at about 1 percent per year. The total growth during the decade of about 24 million resulted from 39 million births, 18 million deaths, and a net immigration of nearly 4 million (see Table 1).

Changes by Age

The age composition of the population in 1970 clearly reflects the variations in the number of births in previous years. Birthrates in the late 1960's had declined from earlier levels, and there were fewer children under age 5 in 1970 than in 1960. However, the number of children between ages 5 and 14 years was up approximately 15 percent over the number in 1960. The relatively high birthrates of 1947 through 1955 are reflected by an increase in the number of 15- to 24-year-olds—an increase of nearly 50 percent during the decade (see Table 2). These persons are in the prime ages for family formation, entrance into the labor force, and college

attendance. The relatively large number of persons in this age bracket is the basis for the expectation of substantial increases in family formation during the 1970's. Their younger brothers and sisters are even more numerous, and they will sustain an increase in family formation into the 1980's.

The large number of young families likely to be established in the 1970's and the early part of the 1980's suggests that, even with some reduction in birthrates, there will be continued growth of the national population. It is not unreasonable to expect that there will be more children under age 5 in 1980 than there were in 1970.

Reflecting the relatively lower birthrates between 1925 and 1945, the age group 25 to 44 showed only a small increase during the 1960's; the age group 30 to 39 actually showed a decline. The number of persons age 65 and over increased by about 20 percent. They number about 20 million, approximately 10 percent of the total. In part, the location of these persons reflects earlier migrations. The nonmetropolitan areas have a larger share of this age group than of the total population. Central cities also have a disproportionately large number, whereas the suburban areas have a smaller proportion of these older persons than of the total population. The distribution by states is also uneven. In Florida, 14.6 percent of the total population is 65 years old or over, reflecting some in-migration of older persons. Conversely, there are relatively large proportions of older persons in areas of sustained out-migration of young adults.

The Growth of Metropolitan Areas

Throughout this century the metropolitan areas have grown more rapidly than the rest of the country, and this trend was continued during the 1960's. More than 80 percent of the national growth occurred in the standard metropolitan statistical areas (SMSA's) (*2*), which also increased in number from 212 in 1960 to 243 in 1970. Within the SMSA's, more than 80 percent of the growth occurred in the suburban areas —that is, those portions of the SMSA's that are outside the central cities. Many of the larger cities lost or gained people only by virtue of annexation. In spite of the population losses that suburban areas sustained when cities extended their boundaries, the areas outside the central cities increased by 28 percent—more than double the national total. These areas have been increasing in population more rapidly than the central cities since 1920, but it was only in 1970 that they exceeded the central cities in total population. They now account for a total of 76 million persons, whereas the central cities have a total of 64 million. The total population outside the SMSA's was 63 million, which is less than the population of the central cities.

Table 1. Rates of change in the population of the United States by decade, 1900 to 1970 (source: Bureau of the Census Series PC(1) 1A, table 2).

Decade	Population at end of decade	Increase during preceding decade	
		No.	%
1960–70	203,211,926	23,888,751	13.3
1950–60	179,323,175	27,997,377	18.5
1940–50	151,325,798	19,161,229	14.5
1930–40	132,164,569	8,961,945	7.3
1920–30	123,202,624	17,181,087	16.2
1910–20	106,021,537	13,793,041	15.0
1900–10	92,228,496	16,016,328	21.0

Suburban areas include a wide variety of density and settlement patterns. The 76 million residents who are classified as suburban include 47 million who live in separately identified cities, and about 11 of these 47 million live in cities of 50,000 or over. Such places would themselves be identified as central cities if they were not within the shadow of a larger central city.

Three-fourths of the gain in population of the SMSA's was due to the excess of births over deaths (natural increase); only one-fourth was due to migration into these areas, including both the migration from other parts of the country and that from abroad. This is net migration and does not take into account the large volume of migration within the country, which represents simply an exchange of population among the SMSA's. The overriding importance of the natural increase in the population of SMSA's holds for the white population as well as for other races, although there are some differences. For the white population, migration accounted for 21 percent of the total increase; for the population of Negro and other races, 42 percent of the increase is due to migration.

Table 2. Age composition of the population, 1960 and 1970 (source: Bureau of the Census Series PC(1) B1, summary, table 52).

Age (years)	1970	1960	Change (%)
Under 5	17,154,337	20,320,901	−1.6
5–14	40,745,715	35,465,272	+1.5
15–24	35,441,369	24,020,004	+4.8
25–44	47,995,234	46,899,662	+0.2
45–64	41,809,769	36,057,756	+1.6
65+	20,065,502	16,559,580	+2.1

One of the major population trends in the United States has been the rapid urbanization of the black population. Nearly 60 percent of all black residents live in the central cities of the SMSA's. The black population is more concentrated within the central cities and the SMSA's than is the white population.

In 1900 the central cities included 1.3 million blacks, and in 1940 they included 4.4 million. By 1970 they totaled 13.1 million. As a result of this rapid increase, blacks now account for 21 percent of the population of central cities. They account for 28 percent of the population of SMSA's with 2 million or more people, and the percentage is progressively lower for the smaller SMSA's.

Central cities as a whole increased their black population by 3.2 million during the last 10 years, an increase that was partially offset by a net decline of 600,000 whites. However, in the largest SMSA's, those of 2 million and over, there was a decline of 2.5 million whites and an increase of 1.8 million blacks—an increase in the black population of 37 percent in 10 years. In the smaller SMSA's the differences were less marked. Four major cities now have a black majority: Atlanta, Gary, Newark, and Washington, D.C. In nine others—Baltimore, Birmingham, Charleston, Detroit, New Orleans, Richmond, Savannah, St. Louis, and Wilmington—more than 40 percent of the population is black. Although the larger cities reported the greatest increase in the proportion of blacks, a number of smaller cities also had a rapid increase in their black population during the decade.

The black population in the suburbs increased at about the same rapid rate as the white population. However, the number of black residents in the suburbs was relatively small at the beginning of the decade, and in 1970 blacks still comprised only about 5 percent of the suburban total. There are indications that most of the increase occurred in the older suburban areas, or those

near the city limits, rather than in the sections further out.

The rural population in 1970 was about the same as in 1960. However, this statement masks the fact that, whereas urban population increased (both within and outside of the SMSA's), the rural population outside declined, while that within the SMSA's increased. Thus, in the more rural sections of the SMSA counties, there was continued growth of the population, but this growth was not necessarily followed by incorporation into municipalities that would qualify as urban.

Geographic Shifts

The growth of population within the country has never been evenly distributed. During the 1960's there were shifts from the center of the country to the seacoasts. In 1970 a little more than half the total population were living within 50 miles of the seacoast, including the shores of the Great Lakes.

The changes within the states were very uneven. Three states—North Dakota, South Dakota, and West Virginia—and the District of Columbia had losses. The states with relatively low rates of increase included the largely agricultural states of Alabama, Iowa, Kansas, Maine, Mississippi, Montana, Nebraska, Pennsylvania, and Wyoming. At the other end of the scale was Nevada, with a growth rate of 71.3 percent, and Arizona and Florida, with about 36 percent each. In terms of absolute numbers, California led all other states, with an increase of 4.2 million persons, while Florida gained 1.9 million. Illinois, Michigan, New Jersey, New York, and Texas each gained 1 million or more.

About two-fifths of the counties lost population, and about one-third of the counties gained at less than the national average rate. This leaves only one-fourth of the counties with a growth rate more rapid than the national average. Almost two-thirds of the counties that lost population during the 1960's also had losses between 1950 and 1960 and between 1940 and 1950. In fact, a considerable number of counties have had population declines for four, five, or more decades. There are many areas in which population loss is not new, and for many of them it is likely to continue. There were 124 counties in which there were more deaths than births in the 1960's. In many areas, the continual out-migration in the past has left behind an elderly population that is likely in the future to contribute more deaths than births.

Population losses occurred in a broad band of counties in the Great Plains, extending from the Canadian border through Montana, North Dakota, and Minnesota, south to Texas, and then across the Southern states and into the southern Appalachians. Interspersed among these counties are SMSA's that have continued to grow and some smaller places that have had significant industrial growth. Some other counties with substantial growth are the sites of colleges or universities that grew significantly, or of military establishments that increased their station strength during the decade. A location with ready access to one or more of the interstate highways is also conducive to population growth.

Internal Migration

Americans have generally been characterized as a mobile people. At the end of a given year, some 20 percent of all persons are living at an address that is different from the one at which they had lived at the beginning of that year. The 1960 census found that almost half the people had moved at least once during the preceding 5 years, and more than one-third of those had moved across a county line.

Differences in the rates of growth of states and other areas are in large part the result of differences in the extent of migration. During the 1960's, the North Central states were generally areas of out-migration, and the Northeastern states had a small net in-migration. The West was clearly an area of in-migration. The South, which had for many years been an area of out-migration, had a net gain by migration during the 1960's. That gain was the result of a net inflow of about 1.8 million whites, in contrast to a net out-migration of 1.4 million blacks. A large part of the net migration into the South was due to the movement of population into Florida, which attracted a net of 1.3 million persons. Maryland, Virginia, and Texas were the other Southern states with significant gains by migration. In contrast, Alabama, Arkansas, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and West Virginia were states with a net out-migration (see Table 3).

Table 3. Net migration by region and race, 1960 to 1970 (sources: population—Bureau of the Census Series PC(1) B1; net migration—Bureau of the Census Series P-25, No. 460).

Region and race	Population 1970 (1000's)	Net migration 1960–70 (1000's)
Northeast	49,041	+365
White	44,387	−399
Negro	4,344	+614
North Central	56,572	−756
White	51,692	−1,221
Negro	4,572	+382
South	62,795	+590
White	50,487	+1,965
Negro	11,970	−1,474
West	34,804	+2,849
White	31,504	+2,396
Negro	1,695	+301
U.S. total	203,213	3,049
White	178,069	+2,741
Negro	22,580	−178

California led all other states as the goal of migrants. It had a net gain of 2.1 million migrants during the decade. Florida, with a net gain of 1.3 million, was next. No other states gained as many as 1 million persons by migration, but ten states each gained between 100,000 and 500,000 migrants.

Pennsylvania led all other states in the number of migrants it contributed to other states, with a total of nearly 400,000. Alabama, Mississippi, and West Virginia each contributed more than 200,000. The District of Columbia, Iowa, Kansas, Kentucky, Louisiana, New Mexico, New York, Ohio, and South Carolina each contributed more than 100,000, while North Carolina, North Dakota and South Dakota each contributed nearly that number.

Although on the whole the volume of interstate migration was somewhat less than it was during the 1950's, these numbers indicate that many persons are involved in this exchange of population. The numbers cited are net figures; the total volume of migration is, of course, much larger. The figures for Mississippi illustrate one aspect of the interchange: the net out-migration of 267,000 includes a net out-migration of about 277,000 persons of Negro and other races, but a net inflow of about 10,000 whites. Georgia's net gain of about 50,000 by migration reflects a net out-migration of about 150,000 Negroes, but a net inflow of nearly 200,000 whites. New York showed a net out-migration of about 500,000 whites, but an in-mi-

gration of 400,000 Negroes; the net out-migration was only about 100,000. Twenty-six states and the District of Columbia reported a net out-migration; the remaining 24 states had a net in-migration.

Although the net migration is large, it was only in the West that migration contributed a significant portion of the total increase for the decade. In that region, 42 percent of the growth during the decade was the result of in-migration. In the Northeast and the South, the volume of net migration contributed only about 7.5 percent to the total growth. On the other hand, if there had been no net out-migration from the North Central states, their total increase would have been about one-seventh greater than it was. Clearly, the natural increase within the region was the more important element in determining the growth of the population in the region. The same statement applies to most of the states, although in the case of Florida, Nevada, and New Hampshire net migration contributed more than half of the total increase, and in a number of other states migrants accounted for more than 40 percent of the gain during the decade.

Natural increase was the dominant factor in the increase of the Negro population of most states that had an increase. In only two of the states that had a black population of more than 1 million in 1970—New York and California—did migration contribute more than half the gain. In the five states that experienced a decline in their Negro population, out-migration was the cause; without it they would have registered gains in their Negro population.

Living Arrangements

Increasing affluence and some decline in family size are only two of the factors that affected living arrangements during the decade. The number of households increased more rapidly than the population, with the result that there was a decline in the average size of households. A major element was the increase of one-person households, which grew by more than 50 percent; about one household in every six is a one-person household. This increase reflects not only a greater tendency on the part of elderly people to maintain their own homes, but also some increase in the proportion of young people who leave the parental household to establish their own. There was also a rapid increase in the number and proportion of two-person households, reflecting the growing number of couples who maintain their own homes after the children have left home, as well as some delay in the arrival of the first child in newly established families. Increases in the number of households with more than two persons were small in comparison with the increases of one- and two-person households. The increase in one-person households occurred within and outside of SMSA's.

There has also been a substantial increase in the number of families headed by a woman. In census terms, this means a group of related individuals headed by a woman who is not married, or whose husband is not a member of the family. The number of such families increased by a third during the decade. Nearly 11 percent of all families are in this category, but among black families approximately 20 percent are headed by a woman. The number of cases in which the absent man is an important source of economic support cannot be large, although there is no good information on what that number might be. The incomes and living arrangements of the majority of such families clearly reflect their economic disadvantage.

The nation's housing reflects some of the changes that occurred in the style of life during the decade. By 1970, about half of the housing had been built since the end of World War II. During that time, including the last 10 years, the average quality of housing increased. One index of quality is the presence of complete plumbing facilities (bathtub or shower, hot running water, flush toilet) for the exclusive use of the household. The number of units without these facilities in 1970 was only half as large as in 1960, and this followed a relatively large decline during the 1950's. In 1950 about one-third of the housing units in the country lacked these facilities; by 1970 this had been cut to 7 percent. Within the SMSA's, the number of housing units without plumbing facilities was only half the national figure. However, there had been a substantial decline in the number and percentage of such units, both inside and outside the SMSA's. The proportion for Negro households also declined sharply during the 1960's, though it is still higher than that for whites within and outside of the central cities. More than half the housing units in the South that are not in SMSA's and that are occupied by black households do not have these facilities.

Home ownership has long been a prized value in American life. There has been a steady increase in the proportion of owner-occupied homes since the Depression years of the 1930's. That percentage increased from 44 in 1940 to 62 in 1960. However, during the 1960's there was virtually no change in this proportion. Housing units in multi-unit structures increased much more rapidly than did those in single-family dwellings. Multi-unit structures—primarily apartment houses—increased rapidly in the suburbs. The number of suburban housing units in multi-unit structures almost doubled during the decade. More than half the units in multi-unit structures are still in the central cities, but the suburban areas increased their share from 20 to 28 percent. This trend is continuing. In recent years, more multi-unit structures have been erected in the suburban areas than in the central cities. Nevertheless, a little more than one-third of all housing units in 1970 were classified as single-family dwellings.

The increased popularity of mobile homes is reflected in the approximately 150 percent increase in the number of occupied mobile homes during the 1960's. They now account for nearly 3 percent of the national housing inventory.

Despite the growing use of trailers and apartments, the average housing unit in 1970 was slightly larger, in terms of number of rooms, than its 1960 counterpart. With larger homes and smaller households, there was a decline in the proportion of homes that can be considered crowded—that is, as having more persons than rooms. The proportion of crowded units declined especially rapidly in the suburbs.

Summary

The 1960's witnessed substantial growth in the nation's population. That growth was unevenly distributed within the age groups, reflecting major variations in birthrates and numbers of births in earlier years. It was also unevenly distributed geographically, with more than 80 percent of the growth occurring in the SMSA's, where the subur-

ban sections accounted for nearly all of the total. The urbanization of blacks continued at a rapid rate, with particular increases in the larger central cities. Substantial displacement of whites by blacks occurred in a number of the SMSA's, especially the largest ones. The rural population outside SMSA's declined; that within the SMSA's—that is, within reach of the central cities—increased. Three states lost population. Altogether, about 40 percent of all counties lost population. About 75 percent of all counties contributed migrants to the remainder of the country. Although migration was an important element in the differential growth rate of states and of areas within states, in most areas the bulk of the increase was due to the excess of births over deaths.

Only part of the 1970 census results have become available. The full data will provide information on changes in occupation, education, journey-to-work, and related matters, thus contributing to a more complete view of the changes that have been and are occurring in American society. That information is currently being issued and will be completed during the latter half of 1972.

Notes

1. The *Current Population Survey* is an ongoing survey conducted monthly. In the course of a year, it produces statistics on a variety of topics; the results are published as a series of reports by the Bureau of the Census, Washington, D.C.
2. An SMSA consists of a city of 50,000 or more and the county in which it is located, plus adjoining counties that meet certain criteria of metropolitan character and are closely integrated with the central city, as through commuting, for example. (In New England, the basic units are towns rather than counties.) Since an SMSA consists of whole counties, it includes urban and rural population. Much of that urban population lives outside the central city but within the boundary of the SMSA. The SMSA also includes rural territory and, therefore, rural population. There is substantial urban population outside the SMSA's.

NEWS AND COMMENT

Professional Societies: Identity Crisis Threatens on Bread and Butter Issues

Perhaps there was a time when scientific and engineering societies dealt solely with traditional professional and technical issues. But even if this ever was true, it no longer is. Protest against the Vietnam war, charges of discrimination against minority groups, and even a bit of tomato throwing at annual meetings have been known to ruffle the solemnity of their deliberations.

Possibly the most far-reaching challenge to U.S. professional societies in recent years, however, has been the demand that they act in some decisive fashion to alleviate rising unemployment and underemployment among the membership. An article last week reported on the potential of unionization as a response by scientists and engineers to the current recession. This week's piece concerns the response of the professional societies and the charge by critics that they have failed to be of substantive help.

Science contacted spokesmen for the following groups: the National Society of Professional Engineers (NSPE) with 67,000 members, the American Society of Mechanical Engineers (ASME) with 54,591 members, the Institute of Electrical and Electronic Engineers (IEEE) with 152,204 members, the American Physical Society (APS) with 29,152 members, the American Chemical Society (ACS) with 111,589 members, the American Institute of Aeronautics and Astronautics (AIAA) with 25,000 members, and the American Geophysical Union (AGU) with 10,000 members. Also contacted were spokesmen for federations of organizations, such as the Engineers Joint Council (EJC).

The dominant impression gained from the discussions was one of disunity and disagreement. There is debate on how much and what kind of political activity to undertake; there is debate on whether society leadership is so identified with management that it is at economic loggerheads with the hard-pressed members; there are myriad definitions of "professionalism." Last but not least, there are various stories about the nature of the economic crisis —whether it is temporary, permanent, or cyclic.

The following, necessarily spotty, list offers some samples of the activities of the last 3 years which the professional societies have engaged in and which critics—even from within these organizations—decry as tokenism.

► Almost by definition, the election earlier this year of reform advocate Alan C. Nixon to the post of president-elect of the American Chemical Society was a mind- and organization-bending act. Nixon ran for office on the platform that the chemists badly need economic assistance. On balance Nixon is critical of unionization, and he believes that ACS can steer a "professionalist" course "somewhere between unionization and laissez faire."

Since his election, Nixon's main reform has been shaping a Professional Enhancement Program (PEP). By having members each contribute $10, ACS can raise $1 million for professional activities, which might include, for example, loans, free short courses for the unemployed, or establishing professional employment contracts (see *Science*, 24 December 1971, and 14 and 21 April 1972). Prior to that time, ACS's response to the employment situation was traditional; many committees were established, surveys were taken, and a placement service, of sorts, was set up.

► The American Physical Society, which, like ACS, has traditionally been led by academics, was also cautious in its response. The Economic Concerns Committee last year, under Lee Grodzins of M.I.T., made an extremely comprehensive and detailed survey of the employment patterns of members. Placement services, new committees, and drops in advertising revenue in APS journals have also been signs of the times. The APS formerly had a representative in Washington, but decided to use its limited funds to hire a manpower expert for its New York headquarters instead.

► The American Geophysical Union,