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The American Community Survey in counties with "seasonal" populations

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Abstract The U.S. Census Bureau designed the American Community Survey (ACS) to provide annual estimates of social and economic characteristics for states, counties, municipalities, census tracts, and block groups. Because of its April 1 reference date, in northern nonmetropolitan counties with substantial seasonal population fluctuations the decennial census provides a statistical representation of the demographic and social characteristics of the population at a time when the population is close to its annual minimum. The year-round monthly ACS sample survey has the potential to provide local communities with an unprecedented understanding of the average population characteristics over the course of a year. In the future, the ACS even has the potential for providing social and economic characteristics of the population by season. This paper examines four ACS pilot data collection counties, Oneida and Vilas Counties in northern Wisconsin, and Lake and Flathead Counties in northwest Montana. We hypothesize that the ACS will reflect a resident population over the course of the year that is different from the traditional April 1 decennial census population. While the ACS holds much promise, our research uncovered some sampling problems that are not yet fully resolved. In addition, our analysis was not able to examine ACS estimates for minor civil divisions (MCDs), which are functioning governmental units in many states. The fact that these MCDs often have very small populations, together with the fact that estimated standard errors at the much larger census tract level in these counties are disconcertingly large, raises (currently unanswerable) questions concerning the eventual statistical quality of ACS estimates for small MCDs. Consequently, the adequacy of the ACS as a replacement for the census long form may depend on the ability of the Census Bureau to effectively address the concerns presented in this analysis.

Keywords American Community Survey · Seasonal populations · Census long form

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Introduction

Since 1940, the decennial census has used a ''short form'' to enumerate the population of the U.S. for Congressional reapportionment, political redistricting, and other purposes, and has surveyed (i.e., a 1-in-6 sample nationally in recent decades) households using the ''long form'' to obtain detailed demographic, housing, social, and economic information. Because the census is taken only once every 10 years, the information rapidly becomes obsolete. As each decade progresses, it becomes increasingly difficult to base critical decisions upon the census with confidence (U.S. Census Bureau, 2003b), yet the decennial census remains, by necessity, an important resource for both the public and private sectors. The lack of current information particularly disadvantages relatively small units of government, such as rural counties and municipalities. These local governments generally do not have the same capacity as their suburban and urban counterparts to collect and analyze alternative information, and are often forced to rely on the census throughout each decade and beyond until data from the most recent census is released. Other state and local practitioners rely on methods of uncertain reliability to make intercensal population estimates. Indeed, in most U.S. states, ''annual postcensal estimates are used to allocate resources, and there are often questions about these estimates that lead to conflict in the form of appeals and even legal actions'' (Swanson, 2004, p. 380).

In 1941, immediately following the first implementation of the census long form (CLF), Phillip Hauser of the Census Bureau conceived of an alternative approach, an ''annual sample survey'' (Hauser, 1942). This approach eventually evolved into the Current Population Survey (CPS), a continuous measurement tool that surveys a sample of about 50,000 households monthly (U.S. Census Bureau, 1996). Proponents of the concept of continuous measurement assert that it will produce more accurate, relevant, and usable data than a once-a-decade implementation. Early proponents of the concept included George Gallup, who, at mid-century, credited his organization's 15-year history of continuous sampling of public opinion for greater accuracy in predicting the outcome of the 1950 national election (Gallup, 1951). The CPS remains in use but has not replaced the CLF, as it is a national-level survey used primarily to provide information about the United States labor force. The ''rolling survey,'' a different take on continuous measurement, is the underlying concept of the American Community Survey (ACS), and was developed by statistician Leslie Kish (Alexander, 2002; Kish, 1990; Spar, 2003). As Kish said in a 1996 interview, ''I believe that having censuses for local data once every ten years isn't good enough anymore, and it hasn't been for some time'' (Frankel & King, 1996, p. 83).

Recognizing the importance of improving the accuracy of detailed information about the population for resource allocation decisions and their own social research, demographers and statisticians in the United States had discussed a large-scale monthly survey for several decades. It was not until after the 1990 census, however, that Congressional interest in producing more accurate and timely social and economic information for states, counties, municipalities, and neighborhoods prompted the Census Bureau to explore seriously the feasibility of a large-scale continuous measurement system (U.S. Congress, 2000). The U.S. General Accounting Office declared that, ''the established approach used to conduct the 1990 Census had exhausted its potential for counting the population cost-effectively and that fundamental design changes were needed to reduce costs and improve the quality of the data collected’’ (GAO, 2002, p. 6).

The ACS originated as a series of general discussions of continuous measurement in Census Bureau and Commerce Department advisory committees, and matured during the decade into a formal initiative (U.S. Census Bureau, 2003b). The ACS survey design includes a monthly sample of addresses and a questionnaire similar to the traditional CLF. These monthly samples, when pooled across years, are designed to provide annual intercensal estimates of social and economic characteristics for all areas of the nation, including small geographic areas, such as rural townships, census tracts, and block groups, as well as characteristics of small subpopulations, such as detailed race and ancestry groups. The ACS will give communities a ‘‘fresh look at how they are changing’’ (U.S. Census Bureau, 2003b).

In addition to the problem of census data becoming obsolete as the end of each decade approaches, in nonmetropolitan counties with substantial seasonal population fluctuations there is a general sentiment that the census has never provided an adequate appraisal of the demographic and social characteristics of the population. The April 1 nominal date of the census enumeration is particularly problematic for northern recreational counties because it coincides with the annual low ebb in population. This may also affect recreational counties in the south and west, as well as some types of agricultural counties, but not to the same extent. Because the ACS uses a shorter time interval to establish residence, its year-round monthly sample potentially will capture portions of the considerably larger summer population of these counties and provide crucial information on the ‘‘average’’ population, rather than the April 1 population, for the first time. Thus, in counties with significant seasonal population shifts, one would expect to find significant differences in population attributes between the CLF and the ACS. This paper examines four such counties—Oneida and Vilas Counties in northern Wisconsin, and Lake and Flathead Counties in northwest Montana—that served as ACS pilot areas beginning in 1999.

The Census Bureau selected pilot counties that could present unique challenges in data collection and estimation. These complicating factors include: the size of the county’s population, the populations in areas classified as hard to enumerate (based on mail response rates in the 1990 census), and the rate of growth or decline in population since 1990 (Bench, 2003). We compare the pooled 1999–2001 monthly ACS data with the corresponding Census 2000 long form population and housing characteristics at the county and census tract levels. Thirty-six months of pooled ACS data provide estimates of social and economic attributes of the household population with statistical precision only slightly lower than the CLF estimates at the county and census-tract levels for the household population. We assess the ACS attributes and quality measures at the county and tract levels relative to the 2000 CLF measures for each of the four counties, and evaluate the adequacy of the ACS as a replacement for the 2010 CLF. We assess the ACS using three criteria: (1) sampling, (2) dispersion (i.e., standard errors) of attributes, and (3) central tendency of attributes (means, medians, and counts).

Background

The decennial CLF—the basic source of detailed information about Americans—will soon be replaced by a new survey. The ACS has been designed by the U.S. Census Bureau as an ongoing monthly mail survey, which will spread the cost and effort of gathering long form-type data over the course of a decade. The ACS will provide estimates of demographic, housing, social, and economic characteristics each year for all units of census geography, down to block groups. The estimates for cities, counties, and metropolitan areas with populations of 65,000 or more will be based on 12 monthly surveys from the previous year (U.S. Census Bureau, 2003b). Estimates for areas with populations between 20,000 and 65,000 persons will be based on 36 monthly samples. For governmental units with populations under 20,000 people and for census tracts and block groups, it will take 5 years of pooled monthly surveys to create a sample that is roughly similar in statistical quality to that of the decennial CLF (U.S. Census Bureau, 2003b). The ACS will become a ‘‘rolling survey’’ when these averages are updated each year as the most recent 12 monthly surveys are added, and the oldest 12 monthly surveys area dropped from the estimates. The ability to update this demographic portrait of the U.S. population annually will ostensibly render the ACS data more useful than the ‘‘snapshot’’ taken on April 1 every 10 years.

There are other important differences between the CLF and ACS. The CLF utilizes the ‘‘usual residence’’ concept, defined as the place where a person spends ‘‘most’’ of his or her time, in determining residency status and eligibility for enumeration. The ACS, on the other hand, uses a rule more closely resembling ‘‘de facto’’ residence. The ACS counts persons who are resident in a sampled housing unit at the time of contact and whose total length of stay will be (or already has been) more than 2 months duration (U.S. Census Bureau, 2003b). For many areas in the country, this will lead to differences between who is included in the traditional CLF sample and those included in the ACS sample. Additionally, in the ACS socioeconomic characteristics such as income are averages derived from successive monthly samples, as opposed to the point-in-time or interval-of-time reference of the CLF, which further alters the conceptual basis of the measure (Salvo & Lobo, 2002).

Rather than relying upon temporary workers to assist in the collection of census data, the ACS will utilize permanent year-round staff. The CLF has been implemented using various combinations of mail surveys and face-to-face enumeration, from ‘‘mailout/mailback,’’ to ‘‘update/leave,’’ to ‘‘list or update/enumerate.’’ The ACS is designed to primarily be a mailout/mailback survey; telephone follow-up and ultimately personal visits will be utilized only if there is no response from the household (Bench, 2003). For each monthly sample, the ACS has a 3-month data collection period, with the first month being by mail and the second month by telephone follow-up. The households that have not responded by mail or telephone after 2 months are then sampled at various rates and those selected in the sample are then contacted via a personal visit from ACS staff during the third month of the data collection period (U.S. Census Bureau, 2003b). The ACS is a key element of the Census Bureau’s plans to reengineer the census for 2010. The actual decennial count of the population will be carried out using a brief census questionnaire much like the present short form. The ACS will replace the CLF in gathering detailed information about the population’s characteristics.

Achieving an adequate response rate is a paramount concern in any survey. Those who have examined the ACS believe that response rates for the ACS will be generally comparable to that of the CLF. Hough and Swanson have been evaluating the ACS since testing started in Multnomah County, Oregon, in 1996 and conclude that ''the mail return rates of the 1996 ACS to the 1990 mail return rates of the CLF...are virtually the same'' (1998, p. 295). Data released by the Census Bureau for their ACS test sites reveal that overall they achieved an average response rate of 96.5% in testing conducted from 2000 to 2002 (U.S. Census Bureau, 2003b). In addition, by virtue of its use of permanent trained interviewers and a different nonresponse follow-up strategy, the ACS may be more effective in retrieving information from respondents who do not mail their surveys back. According to Salvo and Lobo in an evaluation of the ACS test in Bronx County, New York, ''Sampling variability issues notwithstanding, the higher level of data quality inherent in better ACS nonresponse follow-up represents a major advance over the increasing degradation of CLF census response'' (2002, p. 11). Decoupling the long form from the decennial census should improve the population enumeration (Spar, 2003) and the ACS ''should provide better intercensal measures of communities' characteristics'' (Gordon & Chase-Lansdale, 2001, p. 314). In other words, introducing a greater division of labor in census-taking may result in improved efficiency and accuracy for both enumeration and detailed information gathering.

However, the ACS sampling strategy may be problematic for small population areas and rural America as a whole. The cumulative ACS annual sample will be 3 million housing units, which is approximately one-seventh the size of the CLF sample. Multiple years of ACS data will be needed to achieve a reliable sample for areas with smaller populations, and consequently less populous areas will begin to receive ACS data later than their more populous counterparts (i.e., if full ACS implementation begins in 2006, most rural/nonmetropolitan communities would not receive their initial ACS data until 2011, whereas larger places would receive 2006 data in 2007).

Nonmetropolitan demographic trends

While not the first time this had occurred in U.S. history, the rural renaissance is the most celebrated example of a migration process in which population is redistributed from urban to rural areas, and urban populations move from larger to smaller places (Berry & Gillard, 1977; Dahms & McComb, 1999). This migration pattern, termed ''counterurbanization,'' represents the social transformation of rural areas, as changing demographics bring new residents with different conceptions of place to the community (Hammer & Winkler, 2006). Further, population growth in rural areas tends to produce commercial and residential development. Termed ''exurbanization,'' such development signifies the physical transformation of rural places into low-density nebulous zones (Marx, 1964), which are not urban or suburban, but are no longer truly rural either (Hammer & Winkler 2006; Hammer, Radeloff, Stewart, Winkler, & Voss, 2004).

The rural population turnaround of the 1970s was short-lived. The 1980s ushered in another period of population stagnation and decline for many nonmetropolitan counties, as a recession and major farm crisis took its toll on communities (Johnson, 2003). Many farming-dependent areas lost population during this period, while the growth of other places tapered off significantly (Johnson, 2003).

Rural America experienced another population turnaround in the 1990s. The nonmetropolitan population was 56 million in 2000, up 10.3% from 1990. Sixty-seven percent of this growth was due to in-migration, as the nation once again experienced population deconcentration (Johnson, 2003). Increasing commuting time and loss of goods and service provision to regional consumption centers caused the countryside and city to further knit together and the distinction between rural and urban to become increasingly fuzzy.

Restructuring has resulted in extensive variation amongst rural counties themselves, as industrial growth and decline have been uneven across space and time. For example, adjacent counties grew by over 12% in the 1990s and continue to experience growth as they are incorporated into metropolitan economies. Counties rich in natural amenities are particularly fast growing, led by the 190 ‘‘retirement-destination’’ counties,[1] which grew by nearly 30% in the last decade, and the 327 ‘‘recreational counties,’’ which grew by 17% (Johnson, 2003).[2] Growth in both cases was virtually all due to migration. Other types of counties are not benefiting from the latest rural turnaround, however. Farming-dependent counties grew by only 6.6% in the 1990s, while some counties experienced population loss (Johnson, 2003).

These demographic changes have important implications for rural U.S. communities. While places lacking natural amenities find themselves struggling to grow their economies and populations, areas endowed with natural amenities (‘‘amenity communities’’) are increasingly the sites of intense development pressure. Amenity-led development can impose costs to local community, culture, and environment. Rural gentrification and environmental degradation are common concerns in amenity communities. It is often assumed that people seek to escape modernity by retreating to seasonal homes or making trips to places like Vilas County and Flathead Lake, which offer ‘‘a sense of place, rootedness, identity, and authenticity’’ (Williams & Kaltenborn, 1998, p. 214). Development patterns, however, seem to reflect a desire to extend modernity to such places, which become new settings to engage in the types of consumer activities enjoyed elsewhere. The popular press has referred to this process as ‘‘Aspenization’’ (e.g., Janofsky, 1999). Nature becomes the backdrop, supplying the scenery for activities such as golf and shopping. In short, amenity-led development complicates planning for social, economic, and ecological sustainability, and can create social conflict (Hammer & Winkler, 2006).

Study area

We analyzed four amenity counties that exemplify some of the trends and implications discussed in the preceding section. Our primary objective is to understand how ACS estimates of demographic characteristics based on 36 pooled monthly samples encompassing the period from 1999 to 2001 compare with the corresponding

[1] Retirement counties experienced 15% or more in-migration of people age 60 and older in the 1990s (ERS, 2004b).

[2] The U.S. Department of Agriculture’s Economic Research Service (ERS) classifies counties as such using a combination of various factors, such as share of employment or earnings in recreation-related industries in 1999 and percentage of seasonal or occasional use housing units in 2000 (ERS, 2004b).

2000 CLF estimates. Based on this comparison, we wish to render a statistically informed answer to the question of whether it appears that the ACS will be a reasonably sound alternative to the CLF in providing estimates of population characteristics for northern nonmetropolitan high-amenity counties.

Vilas and Oneida counties are situated in Wisconsin's ''Northwoods.'' Rich in environmental amenities such as forests and lakes, the counties have been tourist destinations for vacationers from metropolitan areas to the south—Madison, Milwaukee, and Chicago—and west—Minneapolis/St. Paul—since the 1920s. In the latter two decades of the 19th century and early 20th century these counties shared the fate of most of the upper Great Lakes region as they were heavily logged. As the timber companies moved west in the first quarter of the 20th century and farming failed to find a strong foothold, the region entered a period of economic stagnation and population decline. Oneida and Vilas counties witnessed slow growth during the first half of the century and then saw rapid population expansion in the late 1960s and into the 1970s.

Since the first documented encounter with Europeans in 1745 and earlier, the Lac du Flambeau Band of Lake Superior Chippewa Indians has lived on the land that now partially comprises the Lac du Flambeau Indian Reservation, the majority of which is in southwestern Vilas County, adding to the unique character of the region (Great Lakes Intertribal Council, 2003). Native Americans constituted approximately 10% of the Vilas County population in 2000.

Today Vilas and Oneida Counties remain predominantly rural in character. Oneida County grew 16% in the 1990s, resulting in a population of 36,776, with a density of 33 persons per square mile. The population of Vilas County grew 19% in the 1990s, reaching 21,033 in 2000, with a population density of 24 persons per square mile (U.S. Census Bureau, 2003a, d). Rhinelander, the Oneida County Seat, with a population of 7,735, is the largest community in either county. Both counties continue to grow at rates higher than the state average, primarily due to migration. In fact, Vilas County's growth during the 1990s was entirely due to migration, and its increase was nearly triple that of the 1980s (State of Wisconsin Department of Workforce Development, 2003). Both counties experience large seasonal fluctuations as summer residents swell the population. According to the 2000 census, vacant units intended for seasonal occupancy comprise 56.7% of all housing units in Vilas County and 39.1% of housing units in Oneida County (U.S. Census Bureau, 2003a). Although a certain proportion of occupied units may be intended for seasonal use, that designation is not determined by the census. The counties also have relatively older population structures. Both are considered retirement-destination counties and are characterized today by economies geared largely to retail trade and services. This older population structure is due in part to a significant inmigration of retirees to seasonal lakefront property in recent years (Shields, Deller, & Stallman, 1998). Oneida County, in fact, became a retirement destination in the 2004 ERS county typology, which updated and revised the previous edition done in 1989 in which Oneida County was not classified as such (ERS, 2004c).

Improved infrastructure, such as a four-lane highway connecting Chicago to Wausau that is now only 20 miles short of the Hazelhurst/Minocqua/Woodruff area straddling the Oneida/Vilas border, has helped increase tourism, recreation, and development (Wirtz, 2002). Consistent with this, both counties are now considered recreation counties by the ERS (2004a). Real estate buying pressure in the area has also grown steadily, despite the downturn in the economy, and prices continue to rise, causing a shortage of affordable housing. This trend may eventually slow the migration of retirement-age individuals to the area.

Flathead and Lake Counties, Montana

Flathead and Lake Counties, located in northwest Montana, have also traditionally functioned as vacation and retirement destinations. Flathead Lake—the largest freshwater lake in the Western U.S.—greatly enhances the area's natural amenities. In addition, approximately 94% of Flathead County's 5,098 square miles is national or state forest, wilderness, agricultural, and corporate timber land. Flathead County includes much of Glacier National Park and the Bob Marshall/Scapegoat/Great Bear wilderness complex, the largest roadless area in the contiguous 48 states. There are also a number of major recreational amenities, including two downhill ski resorts, eight golf courses, and Hungry Horse Reservoir. With the abundance of recreational opportunities and aesthetic values, Flathead County is among the fastest growing in Montana. It is the state's fourth most populous county and its most populous non-metropolitan county, yet it has a density of only 15 persons per square mile (U.S. Census Bureau, 2003a).

Kalispell, the county seat, is the largest municipality in Flathead County, with a population of 14,223 (U.S. Census Bureau, 2003a). Countywide, the population increased from 59,218 in 1990 to 74,471 in 2000, a 26% increase in a decade (U.S. Census Bureau, 2003a, d). Attraction development, such as water parks and helicopter tours, has greatly increased in recent years contributing to the influx of visitors and further shifting the economic base towards recreation and tourism (Flathead County Planning and Zoning Office, 2002). Due to its amenities, Flathead County's population typically increases substantially during the months of June, July, and August (Flathead County Planning and Zoning Office, 2002), and it is considered both a retirement destination and a recreation county by the ERS (2004a). Despite its small population, development pressure and limited zoning and planning have resulted in rural sprawl in Flathead County, particularly around Kalispell, which grew by more than 19% in the 1990s (U.S. Census Bureau, 2003c). Among other things, this has resulted in the ERS asserting that Flathead County exhibits "housing stress" (ERS, 2004a).[3]

Lake County contains the majority of Flathead Lake, the National Bison Range, the historic St. Ignatius Mission, and part of the Mission Mountains Wilderness. The county is also home to the Confederated Salish and Kootenai Tribes of the Flathead Nation and the associated Flathead Indian Reservation, lending yet another similarity of the Montana study area to the Wisconsin study area. Lake County is Montana's ninth most populous, with 26,507 residents (U.S. Census Bureau, 2003a). Very rural in character, it has a population density of 18 persons per square mile. Polson, the county seat, is the state's 18th largest city with a 2000 population of 4,041(U.S. Census Bureau, 2003a). Lake County grew by almost 20% in the 1990s (U.S. Census Bureau, 2003a, d), and Polson has grown approximately 20% in each of the last two decades, despite being more than an hour's drive from the regional centers of Kalispell to the north and Missoula to the south (Wirtz, 2002). Nearly 20%

[3] This means that 30% or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30% or more for owner costs or rent, or had more than one person per room (ERS, 2004b).

of Lake County’s housing units are considered seasonal (U.S. Census Bureau, 2003a), and the ERS considers Lake County to exhibit housing stress (ERS, 2004a). Interestingly, while Lake County was considered a retirement destination county in 1989, it was not considered as such in the 2004 update of the ERS county typology (ERS, 2004a, c).

Hypotheses

The analysis of the attribute data from the 2000 CLF and 3-year average ACS is framed around a primary hypothesis: the ACS will capture a portion of the seasonal population in the four counties that is missed in the April 1 point-in-time census enumeration. The 2-month residency rule of the monthly ACS survey makes it more likely that a population that is important to these areas but generally excluded from the census will now be at least partly included in the ACS sample. Most seasonal residents would not have been counted as residents of these counties by the census on April 1, as they would not have considered their summer homes as their usual residences.

The retirement-age populations of these counties is partially seasonal, which the ACS should reflect. The ACS will demonstrate this retirement seasonality by estimating populations that are older and wealthier with smaller households and a larger proportion of households with retirement income (Table 1). The ACS will also include more occupied housing units and owner-occupied units, fewer seasonal housing units, and higher median owner-occupied housing values indicative of the seasonal retiree population and the seasonal nonretiree population as well. Of course some summer seasonal retirees have stays of less than 2 months and, thus, would be excluded from the ACS sample. While the nonretiree seasonal population is important in these counties, the ACS will generally fail to capture this population due to their shorter lengths of stay. All other things being equal, the ACS should also reveal a larger overall population, except that the 1999–2001 population estimates are controlled to Census 2000 counts and corresponding population estimates.

The Wisconsin and Montana counties are similar in numerous ways, most notably having extensive rural areas, natural amenities, seasonal populations, and Native

Table 1 Comparisons of ACS and Census Long Form (CLF)

ACS higher than CLF
Population 62 and over
Median age
Householders 65 years and over
Occupied housing units
Owner-occupied housing units
Not in labor force
Population with retirement income
Median housing value
ACS lower than CLF
Average household size
Unemployment (percent unemployed)
Difference uncertain
Education (percent bachelor’s degree or higher)
Median household income

American populations. Because the Wisconsin counties have significantly higher rates of seasonal housing, however, we anticipate that the ACS will demonstrate seasonality to a greater degree in Wisconsin, especially Vilas County (with 57% seasonal housing), and to a lesser degree in Montana, especially Flathead County (with only 11% seasonal housing).

Finally, while our focus is on rural amenity communities with large seasonal populations, a secondary goal of the research is to examine the extent to which the ACS can produce statistically reliable estimates of population characteristics for very small municipalities and minor civil divisions (MCDs), that is, with populations of 1,000 persons or less. These four counties provide the opportunity to assess the suitability of the ACS as a replacement for the CLF in terms of both counties with seasonal populations and other smaller, nonmetropolitan counties and municipalities.

Sampling

Early in the design of the ACS, it was the stated intention of the Census Bureau to follow something akin to the 2000 CLF strategy for oversampling small population areas and population subgroups. In 2000, the CLF was mailed out using differential sampling rates depending on precensus estimates of occupied housing units for various geographic and statistical entities, such as places, MCDs (in 12 states only), school districts, and so on. Housing unit sampling rates used were 1-in-8, 1-in-6, 1-in-4, and 1-in-2, designed for an overall average of approximately 1-in-6 (U.S. Census Bureau, 2005, 8–3).

When the pooled 1999 to 2001 ACS data were released for our four counties, however, it was apparent that such a strategy could not have been employed (Table 2). The pooled data for the ACS sample were to be not too much smaller that the CLF sample, yet the ACS sample sizes were substantially below the 2000 CLF sample sizes in each of our counties. For Vilas County, the average sample rate for housing units in 2000 was 37.1%; for the ACS the rate was 8.9%.

These differences are due to the manner in which the oversampling was applied in the ACS. Apparently, for Wisconsin, MCD size was not the criterion that triggered the application of a higher sampling rate. Instead, census tract size was used as the ‘‘sampling entity.’’ Because census tracts generally are much larger than MCDs in Vilas and Oneida counties, a smaller oversample rate was applied. This discrepancy would have affected the Montana counties to a much lesser extent, as MCDs are not ‘‘sampling entities’’ in Montana. However, another problem occurred: census counts of total housing units were used to set the oversample rates rather than occupied housing units as intended. This difference should (and did) have a serious consequence

Table 2 CLF and ACS (99–01) sample sizes

County	Population			Housing		
	CLF (%)	ACS (%)	Ratio	CLF (%)	ACS (%)	Ratio
Oneida	22.3	11.6	1.9	26.0	9.1	2.9
Vilas	36.7	14.1	2.6	37.1	8.9	4.2
Flathead	21.2	12.8	1.7	21.7	12.2	1.8
Lake	21.6	14.4	1.5	21.9	13.8	1.6

Table 3 Differences in designated sample sizes in Vilas and Oneida Counties

County	Sampling rate based on occupied housing units		
	ACS sample addresses	Census sample addresses	ACS sample size/ census sample size (%)
Vilas	6,361	8,588	74
Oneida	6,403	8,275	77
Lake	2,427	3,205	76
Flathead	5,705	7,735	74

for Vilas County, where the difference between total housing and occupied (at the time of the census) housing is very large. The first of these problems was corrected beginning with the ACS sample in 2002. It is the Bureau's intention to correct the second issue beginning with the 2006 sample. This will result in much improved ACS data at the time of the 2010 Census. For purposes of our 2000 comparison analysis, the two differences conspired to render the comparisons almost meaningless.

While the sampling strategy (Table 3) should produce improved samples in the future, reason for concern remains. The predicted size of the ACS sample for Oneida and Vilas Counties would be 77% and 74% of the CLF sample, respectively. According to the Census Bureau, these sample sizes would be in line with the rate anticipated nationally. The ACS will select roughly 2.5% of the "initial sample addresses," or about 12.5% over 5 years, compared to 16.7% in the 2000 CLF (Hubble, 2003). In terms of initial sample addresses, therefore, the Census Bureau expects the ACS to achieve a sample that is about 75% of the CLF sample. Since only one in three nonrespondents to the mail survey and telephone follow-up will be contacted for personal interviews, the overall ACS "interviewed" sample size is expected to be only 56% of the CLF.

Standard errors

An important consideration in this discussion of whether the ACS is an adequate replacement for the CLF is data quality as reflected in the ACS standard errors compared to that of the CLF. The standard errors for the ACS are expected to be uniformly higher than the CLF due to the sampling differences discussed previously. The Census Bureau estimates that standard errors for attributes in the ACS data would be roughly one-third higher than those of the CLF, a ratio of 1.33:1. At the county level, we compared the attribute standard errors for the 2000 CLF and ACS 3-year averages (attributes for which the standard error in either the long form or ACS was not provided were not included in the estimated standard error ratio calculations) and found that in three of the four subject counties the ratios were roughly equivalent or slightly lower than that predicted by the Census Bureau (Fig. 1).

Given the differences in sample size, this finding came as a surprise. But there is a reason for this incongruous result. Control totals for the 2000 CLF sample were applied at the census tract level. This improved the precision at the tract level. Control totals for the 1999–2001 ACS estimates were applied at the county level, thus improving precision of the county estimates. We conclude, therefore, that comparisons made at the county level are not altogether meaningful, as the standard

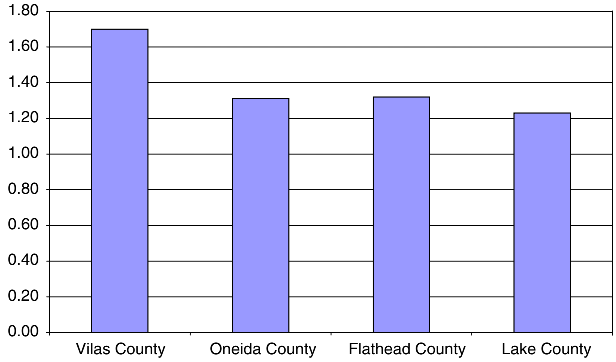

Fig. 1 Average attribute standard error ratios (3-yr avg. ACS standard errors/2000 long form standard errors)

errors of the estimates are artificially small in the ACS, a consequence of the controlling strategy.

Despite its relatively small population, Lake County had the lowest overall standard error ratio, 1.23, of any county in the study. The 1999–2001 ACS sample size more closely matched the 2000 CLF sample in Lake County than in the other three counties, which partly will account for the lower standard error ratio. While the standard error ratio exceeded the level predicted by the Census Bureau for many attributes in Oneida County, the overall ratio was 1.31. Flathead County had a distribution of standard error ratios similar to that of Oneida County. This favorable performance by the ACS estimates partly derives from the statistical controls applied at the county level. With an average attribute standard error ratio of 1.7, Vilas County did not achieve the same performance standard as the other three counties. This was not surprising given the small ACS sample compared to the 2000 CLF in Vilas County, as well as the strategy for controlling the ACS estimates.

The variation in standard errors in Vilas County is particularly apparent at the tract level (Fig. 2). Again, this finding is not surprising given the differences between the CLF and ACS estimates in terms of the geographic level at which controls were applied to the estimates. This impacts the interpretation of the relatively large number of differences between ACS and CLF data in Vilas County. The average

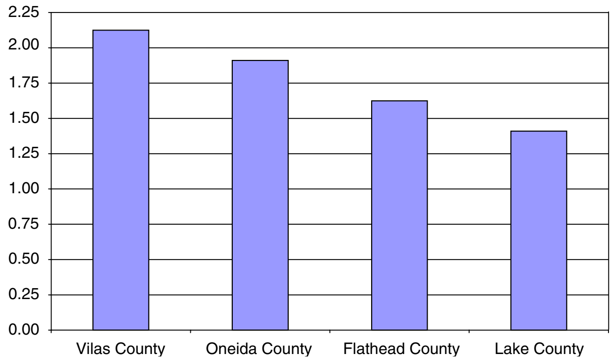

Fig. 2 Census tract average attribute standard error ratios (3-yr avg. ACS standard errors/2000 long form standard errors)

attribute standard errors in Oneida County census tracts exceeded the expected 1.33 ratio quite substantially. Average attribute standard errors also exceeded the expected 1.33 ratio substantially in most Flathead County census tracts. Unlike the other counties in the study, Lake County maintained a relatively low standard error ratio even at the census tract level.

Attributes

We compared the ACS 3-year average and 2000 CLF data for 364 attributes (Fig. 3). The Wisconsin counties have more attributes demonstrating a significant difference between the ACS and 2000 CLF than the Montana counties, although Oneida County was only marginally higher than the Montana counties. In Vilas County, 24.5% of the attribute data were significantly different, while in Lake County—the county with the most agreement between the ACS and long form—13.2% of the attribute data were significantly different. These results are consistent with our hypotheses, as the number of meaningful differences appears to correspond with the percentage of seasonal housing in the county.

In order to explore meaningful attribute value differences at the county level as these pertain to our hypotheses between the pooled 1999–2001 ACS and the 2000 CLF, we selected 12 particularly relevant variables (Table 1). For most of these attributes, we anticipated that the ACS estimates would be larger than the CLF estimate, while for two others we anticipated a lower estimate in the ACS. These expectations were based on the implications of amenity-led development—such as an influx of seasonal retirees resulting in older population age structures and higher median housing values—as discussed previously. For the final two attributes we were uncertain as to an expected direction of the difference. Vilas County, with its high proportion of seasonal housing units, exhibited the greatest number of statistically significant differences in the selected attributes, and all but one of those differences were in the expected direction. Contrary to the anticipated direction of difference, the unemployment rate in Vilas County was higher in the ACS than in the CLF, although the difference was significant only at the $p \leq 0.1$ level. The unemployment

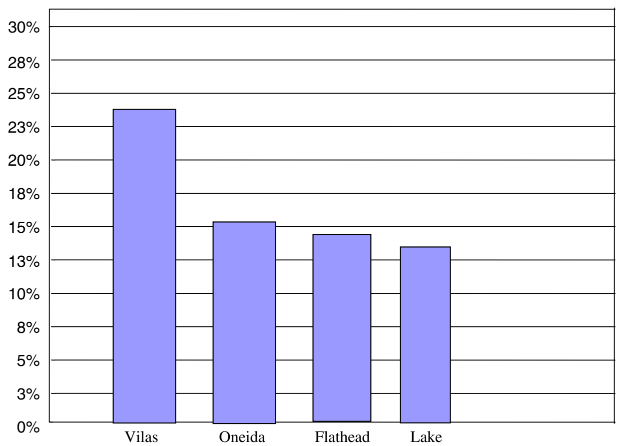

Fig. 3 Attributes with statistically significant differences by profile with 90% confidence or higher

rate in the other three counties was not significantly different in the two samples. The percentage of the population age 25 and over with a 4-year college degree, one of the two attributes for which a hypothesized direction of difference was not stated, was significantly higher in Vilas County in the ACS than in the CLF. Vilas County was the only county in which median housing value was significantly higher in the ACS compared to the CLF.

The number of occupied housing units and the proportion of households with retirement income were significantly higher and the mean family size was significantly smaller in the ACS compared to the CLF in both the Wisconsin counties, but these attributes were not significantly different in the Montana counties. However, in both the Montana counties, the number of owner-occupied housing units was significantly higher in the ACS, but the difference was not significant in the Wisconsin counties. We expected a statistically significant difference in the median age and the size of the retirement-age population in these counties in the ACS compared to the CLF, due to their designation as retirement-destination counties (ERS, 2004a), but this was not the case. This discrepancy is perhaps partially due to the ACS being controlled to the census population or census-based population estimates (Table 4).

Conclusions

The comparison of the selected attributes from the 2000 CLF and 3-year average ACS largely confirms our primary hypothesis: the ACS will capture some of the

Table 4 Results of hypotheses

Indicator	Vilas	Oneida	Flathead	Lake
Pop 62+ (H)	–	–	–	–
Med Age (H)	–	–	–	–
HH65+ (H)	–	–	–	H***
Mn Fam Size (L)	L***	L***	–	–
Occ HU (H)	H***	H***	–	–
Own-Occ HU (H)	–	–	H**	H**
% 4-yr Deg (U)	H***	–	–	–
Unemp Rate (L)	H*	–	–	–
Not In Lab For (H)	–	–	–	–
Med HH Inc (U)	H*		–	H***
With Ret Inc (H)	H**	H*	–	–
Med HU Val (H)	H***	–	–	–

Legend: Attribute Abbreviations: Pop 62+ = Population 62 and over; Med Age = Median age; HH65 = Householders 65 years and over; Avg HH Size = Average household size; Occ HU = Occupied housing units; Own-Occ HU = Owner-occupied housing units; % Bach Deg = -Percent bachelor's degree or higher; Unemp Rate = Unemployment rate (Percent unemployed); Not In Lab For = Not in labor force; Med HH Inc = Median household income; With Ret Inc = -With retirement income; Med Hsng Val = Median housing value

H = Higher, L = Lower, U = Uncertain: Refers to the difference in the attribute (Census minus ACS); H, L, or U in parenthesis indicates the expected direction

Significant at $p \leq 0.01$ level = ***

Significant at $p \leq 0.05$ level = **

Significant at $p \leq 0.1$ level = *

No significant difference = –

Note: All analysis is based on proportions unless otherwise indicated as being averages or medians seasonal population in the four counties that is not enumerated by the decennial census. Estimating seasonal populations is notoriously difficult (Happel & Hogan, 2002). The ACS, however, did not produce a larger proportion of persons of retirement age in the four counties, which may be a result of controlling the ACS population estimates to the census counts or Census Bureau estimates by age, as previously noted. The ACS did result in other meaningful differences in all four counties but did so to a greater extent in the Wisconsin counties and especially Vilas County.

The very high percentage of seasonal housing in Vilas County at least partially accounts for the greater number of statistically significant differences in the selected attributes between the CLF and ACS. Due to important differences between the sampling designs for the two programs, there was a sizable difference between the CLF and 3-year ACS samples in each county, and Vilas County had the lowest housing unit sampling rate of the four counties and high standard error ratios, clouding our interpretation to a great degree. The fact that most of the differences at the county were in the expected direction, however, seems to indicate that these are actual differences, supporting our hypothesis. In Oneida County, the analysis suggests that the ACS successfully captures characteristics of seasonality and supports the primary hypothesis to a certain degree, but less so than in Vilas County. Given that Oneida County has less seasonal housing than Vilas County and features the largest city in the region, Rhinelander, this was to be expected. As with Vilas County, while the number of differences supports our hypotheses, the level of sampling error, especially in the ACS, undermines confidence that these differences are real. As we expected, the ACS does not appear to capture seasonality of population in the Montana counties or support the primary hypothesis to a great extent. Flathead County had the least number of significant differences in the relevant attributes. Flathead County is more urban than the other three counties—featuring the largest city in the study (Kalispell)—and has the lowest percentage of seasonal housing. Thus, the fact that the ACS data show fewer differences there is consistent with the general notions underlying our hypotheses. The ACS sample rate in the Montana counties was closer to that achieved for the 2000 CLF than in the Wisconsin counties, and that may also be a contributing factor to our analysis revealing fewer significant differences.

In order to evaluate the full range of differences in population characteristics between the CLF and ACS samples and the seasonality of the population, researchers will eventually need access to uncontrolled estimates from the ACS, particularly in counties where differences in residency rules apply to very different population totals. For the present research, access to uncontrolled estimates was not granted. Furthermore, given the monthly sample for the ACS, some type of seasonal (quarterly or monthly) population estimates should eventually be released at least on a limited basis in order to more fully understand seasonal population shifts.

For states like Wisconsin, in which MCDs are functioning governmental units, the provision of ACS information for MCDs, regardless of population size, will be essential to the success of the ACS program. For the ACS to meet its declared goals, the survey must provide statistically acceptable estimates of population and housing characteristics for such communities. Wisconsin MCDs have elected officials and taxing and spending authority. Government officials in these MCDs would expect that data from the ACS would be comparable to what they historically have received from the CLF. Sadly, for this research initiative, the necessary ACS data, with which to make comparisons against the 2000 CLF at the MCD level, were not made available by the Census Bureau. MCD level data are critical to providing meaningful data for small places and rural areas. Census tract data were provided for this research. However, in areas like Vilas County—with Eagle River (2000 census population 1,448) its sole incorporated community—data for census tracts are meaningless to local data users. They are simply too large. In Vilas County, one of the five census tracts encompassed portions of nine different governmental units.

In addition to our hypotheses regarding the likelihood that the sampling design of the ACS would bring portions of the seasonal population into the ACS estimates, our larger objective was to evaluate the adequacy of the ACS as a replacement for the CLF in counties such as these four. Based on the 1991–2001 ACS data and the analyses that we performed, we are unable to answer this question affirmatively at this juncture. Due to the misapplication of the intended sampling design, the ACS samples for the two Wisconsin counties included in this analysis are substantially smaller than those in the 2000 Census sample, thus yielding estimates with higher standard errors. This meant that differences between the two estimates could not be meaningfully assessed. This was particularly the case for Vilas County. One of the goals of the ACS as presently designed is to provide standard errors for ACS attribute estimates that exceed 2000 CLF standard errors by no more than 33% at all levels of census geography. Our analysis simply cannot address the success of that goal other than to assert that it was not achieved for the 1999–2001 set of estimates for the four counties examined.

We recognize that these concerns can be and perhaps already have been addressed by the Census Bureau. The ACS appears to have the potential to not only be an adequate replacement of the CLF, but in fact, to be an improvement. County and municipal leaders in counties like those examined herein have long complained that an April-based census fails to properly reflect the actual population of their counties and communities. If the concerns we have addressed are corrected, the ACS should, in fact, be a fairer portrayal of the true population in these counties, as the results of the analysis of the attribute data suggest.

However, our optimism is tempered by one aspect of our intended research goal that, due to data restrictions, could not be addressed in this analysis. One crucial aspect surrounding the issue of whether the ACS can be an adequate replacement for the traditional CLF sample is whether or not it can provide statistically reliable estimates for the smallest units of geography in the census geographic hierarchy. For the Wisconsin counties in this analysis, this crucial test would have been the statistical quality of the population and housing characteristics estimates for the several small governmental units, many of which have populations below 1,000 persons. Apparently because of concerns about data disclosure, ACS estimates for MCDs were not provided to us for this analysis. We did undertake a comparison of the census tract estimates, and, as discussed above, were simply unable to make meaningful comparisons because of the sampling mis-execution and the consequently large statistical sampling errors attached to the tract-level ACS estimates. Even if the errors in sampling execution are repaired (and we have been assured that, effective with the 2006 ACS, both issues will have been addressed), we continue to worry about the statistical precision that will surround ACS estimates for very small governmental units. Until appropriate data are released that can make such comparisons possible, this worry will unfortunately not go away.

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References

Alexander, C. (2002). Still rolling: Leslie Kish's ''rolling samples'' and the American Community Survey. *Survey Methodology, 28*(1), 35–41.

Bench, K. (2003). *Census 2000 sample data and ACS 3-year averages quality measures comparison documentation. Planning, research, and evaluation division document*. Washington DC: U.S. Census Bureau.

Berry, B. J. L., & Gillard, Q. (1977). *The changing shape of metropolitan America: Commuting patterns, urban fields, and decentralization processes, 1960–1970*. Cambridge MA: Ballinger.

Dahms, F. A., & McComb, J. (1999). 'Counterurbanization,' interaction and functional change in a rural amenity—a Canadian sample. *Journal of Rural Studies, 15*, 129–146.

Flathead County Planning and Zoning Office. (2002). About the Flathead Valley; last revised August 28, 2002. Available at: http://www.co.flathead.mt.us/frdo/bckgrd.html.

Frankel, M., & King, B. (1996). A conversation with Leslie Kish. *Statistical Science, 11*(1), 65–87.

Gallup, G. (1951). The Gallup Poll and the 1950 election. *The Public Opinion Quarterly, 15*(1), 16–22.

Gordon, R. A., & Chase-Lansdale, P. L. (2001). Availability of child care in the United States: A description and analysis of data sources. *Demography, 38*(2), 299–316.

Great Lakes Intertribal Council. (2003). Lac du Flambeau Band of Lake Superior Chippewa. Available at: http://glitc.bfm.org/tribes/lac_du_flambeau/default.php (September 15, 2003).

Hammer, R., Radeloff, V. C., Stewart, S., Winkler, R., & Voss, P. (2004). Characterizing spatial and temporal residential density patterns across the Midwest, 1940–1990. *Landscape and Urban Planning, 69*(2–3), 183–199.

Hammer, R., & Winkler, R. (2006). Housing affordability and population change in the North Woods of Minnesota, Wisconsin, and Michigan. In W. A. Kandel, & D. L. Brown (Eds.), *Population change and rural society* (pp. 293–309). Dordrecht, the Netherlands: Springer.

Happel, S. K., & Hogan, T. D. (2002). Counting snowbirds: The importance of and the problems with estimating seasonal populations. *Population Research and Policy Review, 21*, 227–240.

Hauser, P. M. (1942). Proposed annual census of the population. *Journal of the American Statistical Association, 37*, 81–88.

Hough, G., & Swanson, D. (1998). Toward an assessment of continuous measurement: Comparison of returns with 1990 census returns for the Portland test site. *Journal of Economic and Social Measurement, 24*, 295–308.

Hubble, D. (2003). U.S. Census Bureau. E-mail clarifying ACS sampling plan, December 22, 2003.

Janofsky, M. (1999). Housing for poorer neighbors offends Vail's rich. *The New York Times* (Late Edition). New York: September 5, 1999.

Johnson, K. (2003). Unpredictable directions of rural population growth and migration. In D. L. Brown, & L. Swanson (Eds.), *Challenges for rural America in the 21st century*. (pp. 19–31). University Park PA: Pennsylvania State University Press.

Kish, L. (1990). Rolling samples and censuses. *Survey Methodology, 16*, 63–93.

Marx, L. (1964). *The machine in the garden: Technology and the pastoral ideal in America*. New York: Oxford University Press.

Salvo, J. J., & Lobo, A. P. (2002). The American Community Sfsurvey: Quality response by mode of data collection in the Bronx test site. Paper presented at the 2002 Joint Statistical Meetings of the American Statistical Association, New York NY.

Shields, M., Deller, S. C., & Stallman, J. I. (1998). The impact of retirees and working-age families on a small rural region: An application of the Wisconsin Economic Impact Modeling System**,** Faculty Paper Series, Faculty Paper 99-1. Prepared for presentation at the 45th North American Meetings of the Regional Science Association International, Santa Fe, NM, November 11–14.

Spar, E. The American Community Survey: Where it currently stands. Available at: http://members.aol.com/copafs/acs.htm (December 12, 2003).

State of Wisconsin Department of Workforce Development. (2003). Vilas County workforce profile; published October 2002 (revised 3/2003). Available at: http://www.dwd.state.wi.us/lmi/cp_pdf/v125cpw.pdf.

Swanson, D. (2004). Advancing methodological knowledge within state and local demography: A case study. *Population Research and Policy Review, 23*(4), 379–398.

U.S. Bureau of the Census. (2005). Summary File 3 Technical Documentation. Available at: http://www.census.gov/prod/cen2000/doc/sf3.pdf.

U.S. Census Bureau. (1996). CPS overview. Last revised May 9, 1996. Available at: http://www.bls.census.gov/cps/overmain.htm.

U.S. Census Bureau. (2003a). 2000 U.S. Census of Population and Housing Summary File 1.

U.S. Census Bureau. (2003b). Survey basics: What is the American Community Survey? Available at: http://www.census.gov/acs/www/SBasics/What/goals.htm (September 15, 2003).

U.S. Census Bureau. (2003c). 1990 Census Summary Tape File 3.

U.S. Congress. (2000). *The American Community Survey—a replacement for the census long form? Hearing before the subcommittee on the census of the committee on government reform, house of representatives, 106th Congress, second session, July 20, 2000. Serial No. 106–246*. Washington DC: U.S. Government Printing Office.

U.S. Department of Agriculture Economic Research Services [ERS]. (2004a). County typology codes. Available at: http://www.ers.usda.gov/Data/TypologyCodes/ (November 15, 2004).

U.S. Department of Agriculture Economic Research Services [ERS]. (2004b). Measuring rurality: 2004 county typology codes. Page updated August 26, 2004. Available at: http://www.ers.usda.gov/briefing/rurality/Typology/.

U.S. Department of Agriculture Economic Research Services [ERS]. (2004c). Measuring rurality: 1989 county typology codes. Page updated April 29, 2004. Available at: http://www.ers.usda.gov/Briefing/Rurality/Typology/Typology1989/.

U.S. General Accounting Office [GAO]. (2002). *2000 Census: Lessons learned for planning a more cost-effective 2010 census. Report to Congressional requesters, GAO-03-40, October 2002*. Washington DC: General Accounting Office.

Williams, D., & Kaltenborn, B. (1998). Leisure places and modernity: The use and meaning of recreational cottages in Norway and the USA. In D. Crouch (Ed.), *Leisure practices and geographic knowledge* (pp. 214–230). London, England: Routledge.

Wirtz, R. A. (2002). More than just a pretty place? *fedgazette*. Minneapolis: Federal Reserve Bank of America. Available at: http://minneapolisfed.org/pubs/edgaz/02-11/rural.cfm.