

**NEVADA DEMOGRAPHIC SURVEY INFORMATION ON
LOW-INCOME AND MINORITY POPULATIONS IN THE
VICINITY OF YUCCA MOUNTAIN, NEVADA**

Prepared for

**U.S. Nuclear Regulatory Commission
Contract NRC-02-07-006**

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October 2007

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ACKNOWLEDGMENTS

This report was prepared to document work performed by the Center for Nuclear Waste Regulatory Analyses (CNWRA) and its contractors for the U.S. Nuclear Regulatory Commission (NRC) under Contract No. NRC-02-07-006. The activities reported here were performed on behalf of the NRC Office of Nuclear Material Safety and Safeguards, Division of High-Level Waste Repository Safety. The report is an independent product of CNWRA and does not necessarily reflect the views or regulatory position of NRC.

The authors would like to thank Pat Mackin and Wesley Patrick for their thoughtful reviews and Lee Selvey and Lauren Mulverhill for excellent word processing and technical editing support.

QUALITY OF DATA, ANALYSES, AND CODE DEVELOPMENT

DATA: The data presented in this report are taken from U.S. Census Bureau data files. Some mathematical calculations have been performed to derive percentages using Microsoft® Excel 2000 (Microsoft Corporation, 2000). The raw data as taken from the U.S. Census Bureau are included in an attached CD. All CNWRA-generated data contained in this report meet quality assurance requirements described in the Geosciences and Engineering Division Quality Assurance Manual. Sources of other data should be consulted for determining the level of quality of those data. No original data are generated in this report.

ANALYSES AND CODES: ArcView® Version 9.1 (Environmental Systems Research Institute, 2005) was used by the University of Alabama Cartography Laboratory, under the direction of C. Hobson Bryan, to generate the display maps contained in this report.

References

Environmental Systems Research Institute. "ArcView GIS." Version 9.1. Redlands, California: Environmental Systems Research Institute. 2005.

Microsoft Corporation. "Microsoft® Excel 2000." Redmond, Washington: Microsoft Corporation. 2000.

1 INTRODUCTION

1.1 Regulatory Background

The U.S. Department of Energy (DOE) is the lead agency responsible for preparing the final environmental impact statement (EIS) for the construction, operation, and closure of a potential geologic repository for high-level nuclear waste at Yucca Mountain, Nevada. As part of the site recommendation for Yucca Mountain, DOE developed a final EIS in February 2002 (DOE, 2002). In October 2006, DOE published a notice of intent in the Federal Register (DOE, 2006a) to prepare a supplemental EIS to update the 2002 final EIS. This supplement is intended to be completed in May 2008, in time to support a DOE high-level nuclear waste repository license application to be submitted to NRC in June 2008 (DOE, 2006b).

In accordance with Section 114(f) of the Nuclear Waste Policy Act, the U.S. Nuclear Regulatory Commission (NRC) will adopt the DOE final EIS to the extent practicable. The criteria for this adoption are set forth in 10 CFR 51.109(c). These criteria require that NRC find it practicable to adopt the DOE EIS unless

- The action proposed to be taken by the Commission differs from the action proposed in the license application submitted by the Secretary of Energy; and the difference may significantly affect the quality of the human environment; or
- Significant and substantial new information or new considerations render such EIS inadequate.

As practiced in accordance with the National Environmental Policy Act (NEPA), environmental impact assessment has long included consideration of potential social and economic impacts (40 CFR 1508.8 and 1508.14). The socioeconomic aspects of the affected environment are described to establish a baseline condition as it relates to the proposed action; the significance of potential socioeconomic impacts is then evaluated with respect to the context and intensity of the proposed action. Expanding on the early practice of socioeconomic impact assessment, President Clinton, in 1994, issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. A main purpose of this executive order is to use the existing laws, including NEPA, to evaluate the potential for “disproportionately high and adverse” environmental impacts to minority and low-income communities resulting from federal actions and mitigate these impacts as appropriate. As identified in several guidance documents (Council on Environmental Quality, 1998; EPA, 1998; NRC, 2003, Appendix C; DOE, 2006c), a key aspect of an environmental justice analysis is determining the distribution of minority and low-income populations. As a starting point, the decadal census conducted by the U.S. Census Bureau can be used to provide this information at the block or block group level (NRC, 2003, Appendix C).

1.2 Objectives

The principal objective of this report is to provide information to support a review of the socioeconomic and environmental justice assessments contained in the DOE Yucca Mountain EIS and any supplements. To meet this objective, public information from the year 2000 decadal census gathered by the U.S. Census Bureau has been used to identify the current population, ethnic group distributions, and socioeconomic demographics in the vicinity of

Yucca Mountain. To a limited extent, decadal census information over a period of time is used to assess demographic trends in the region of influence.

2 STUDY METHODOLOGY

For display purposes, base mapping was created from TIGER Line Files generated by the U.S. Census Bureau using ArcGIS® Version 9.1 software. Demographic data were downloaded from Summary Tape File 3 of the 2000 Census of Population and Housing (www.census.gov). Data from the 1990 census were gathered in a like manner. Data from the 1980 census required manual extraction from hardcopy census publications found in the Government Documents division of the Gorgas Library at the University of Alabama.

Census block groups were selected as an appropriate level of geography, given the large differential in population dispersion over the study area. The U.S. Census Bureau defines a block group's population as generally containing between 600 and 3,000 people, with an optimum size of 1,500 people. While the population of a block group can vary significantly, it is reasonable to assume that the smaller the spatial extent of the block group, the greater the population density found within it.

A circle centered on the Yucca Mountain site was constructed to delineate a study area with a radius of 200 km [125 mi]. When the circle "splits" a block group, the entire block group is included in the study. Demographic data are classified by quintiles to generate quantitative mapping. Dot map construction generates randomly placed dots based upon an assigned value within the block groups. For example, a dot may be assigned a value of 25 people and randomly placed within the boundaries of the given block group. Specific ethnic population subgroups (e.g., White, Hispanic, Black or African American, Native American) were considered in the study, but the multi-racial category (i.e., two or more races) introduced with the Year 2000 census was not considered. The Appendix includes the raw data tables from which the maps are generated.

3 STUDY RESULTS

The analyses encompass a 200-km [125-mi] radius from the Yucca Mountain site and include data from Esmeralda, Nye, Lincoln, and Clark Counties in the State of Nevada and Mono, Inyo, Tulare, Kern, and San Bernardino Counties in the State of California (Figure 1). The total population living within the study area is 1.4 million people (Table 1). Hispanics comprise 21.5 percent of the total, followed by Native Americans (0.9 percent) and African Americans (8.9 percent). Thirty-six percent of the population is either under 18 in age or 65 or older.

Census block group units are the basis for analyses. Interpretative challenges include skewing of results because

- Some block group units cover large geographic areas but have low population density
- The 200-km [125-mi] radius includes only minimal portions of some counties (e.g., the California counties of Mono, Tulare, and Kern)

- The City of Las Vegas, located in Clark County and spilling over into Nye County, concentrates and contains most of the population growth and economic activity in the study area
- Military bases and other government facilities in the study area concentrate populations

Year 2000 census figures show the largest populations in Clark and the southern part of Nye Counties, reflecting the rapidly expanding Las Vegas area population (Figures 2 and 3). Other factors should be considered in data interpretation because the uninhabited Desert National Wildlife Range is located just northwest of Las Vegas. Further to the northwest, but immediately adjacent to the Range are activities associated with the Nellis Air Force and Bombing Range. West of Las Vegas, Highway 95 is a main transportation corridor, and along each side of the California–Nevada border are populations associated with the activities of Death Valley National Park. Another area of population concentration at the bottom of the circle and due south of Yucca Mountain is the Fort Irwin Military Reservation. Finally, at the northern part of the circle, the large area of the census block group translates to a map depiction that indicates more population than the surrounding smaller units.

Figures 4, 5, and 6 depict Year 2000 census data for numbers and percentages by block group of the total White population. Figures 7, 8, and 9 depict numbers and percentages of the Hispanic population in the study area. Again, dispersion patterns of Hispanics approximate those of other population groups in the study area. In addition to the numerical depictions of population, percentage-based data allow interpretation of minority population dispersion. Figure 2 compares these depictions with population data as a whole and reveals that the Hispanic population distribution is similar to the larger population. Figures 10, 11, and 12 depict numbers and percentages of the total Black or African American population by block group in the study area. The total Black population is relatively small in the region of influence. In addition to the numerical depictions of population, percentage-based data allow interpretation of minority population dispersion. Comparison of these depictions with population data as a whole in Figure 2 reveals only minor differences in the Black population density and distribution as compared to the overall population as a whole.

Similarly, Figures 13, 14, and 15 depict numbers and percentages by block group of the Native American population in the study area. The small numbers of Native Americans range from four or fewer in block group areas north and due east of the Yucca Mountain site to as many as 165 in the more populated areas largely south and west of the site (Figures 13 and 14). Dispersion patterns of Native Americans approximate those of other population groups in the study area.

According to the DOE Environmental Justice Strategy (DOE, 2006c), the Agency is to “address demographics and socioeconomic factors unique to health-related issues, multiple contamination sources, multiple exposure possibilities, unique risk scenarios, and unique use of fish and wildlife by specific communities for subsistence consumption or for religious observances, as appropriate, in the impact analyses.” In a similar manner, NRC guidance (NRC, 2004) identifies consideration of communities that have unique characteristics that might lead to otherwise unrecognized impacts. On the basis of this guidance, the under-18 segment of the population may represent a specific demographic for consideration by DOE within the context of environmental justice. Figures 16 and 17 indicate disproportionate concentration in this age group, particularly to the south of the Yucca Mountain site. This concentration may be associated with the younger, child-bearing families housed at China Lake Naval Weapons Center and Fort Irwin Military Reservation facilities.

According to the U.S. Environmental Protection Agency (EPA), a low-income population exists when the low-income population percentage in the area of interest is meaningfully greater than the low-income population in the general population or when a low-income population is greater than 50 percent of the general population in the area of interest (EPA, 1998). Figure 18 indicates the percentage of U.S. median income by census block group. Figure 19 indicates median household income by census block group. With regard to the former, median incomes comprising 75.6 percent or less of the U.S. median and median household incomes of \$31,750 or less fall mostly in areas immediately to the north of the Yucca Mountain site and to somewhat smaller areas southwest and south southeast of the site. These are located in low population areas of the radius.

Table 2 presents census data on population, population dispersion, and median household income by nation, state, and county for White, Hispanic, Black, and Native American populations for census years 1980, 1990, and 2000. Additionally, median household income data are compared to the United States and state income base. These data provide a historical context for analyses. Most noteworthy in terms of population growth are Las Vegas and surrounding Clark County and adjacent Nye County. Clark County grew by 912,698 people during the period—a 297-percent increase that represents the largest increase in total county population in the region of influence. Slightly more than 68.5 percent of Nevada population growth occurred in Clark County in 2000 and 57.8 percent in 1980. Nye County had an even higher growth rate, 359 percent, but a smaller total population than Clark County. The remainder of the study area counties had virtually static populations.

Both Nevada and California have percentages of Hispanics above the national average of 12.55 percent—19.72 and 32.38 percent, respectively. Only San Bernardino County, California, and Clark County, Nevada, exceed their state's overall percentages. Similar to general national trends, these counties and their respective states show significant Hispanic population growth since the 1980 census with a regional rate of growth greater than the nation as a whole. All three California counties and two of four Nevada counties in the study area have a percentage of Native Americans above state and national percentages over the 20-year period. For the African American population, one of three counties in California and one of four Nevada counties had greater than the state percentages. Clark County growth and income levels skew Nevada figures. Clark is the only county having a median household income over the state average during the 20-year period. Remaining counties show declining real incomes from 1980–2000.

4 SUMMARY AND CONCLUSIONS

These populations represent in total only 12.5 percent of the area population and are dispersed in rough proportion to the general population. Census block group analyses within a 200-km [125-mi] radius from the Yucca Mountain site reveal no units meeting NRC guidelines for environmental justice concerns for Hispanic, Black, or Native American populations.

The area population includes 36 percent either under age 18 or 65 or older. The Fort Irwin Military Reservation houses a disproportionately large under age 18 population. This under-18 segment of the population may indicate an environmental justice consideration. All counties in the study area outside the Las Vegas area of influence have median incomes less than the U.S. median and show declining real incomes over the 20-year period from 1980–2000. Without the skewing effects of Las Vegas, Nevada, areas immediately to the north of Yucca Mountain and smaller areas southwest and south southeast of the site have median household incomes 75.6 percent of the U.S. median, with median incomes of \$31,750 or less.

These latter areas correspond to low population areas of the 200-km [125-mi] radius, and may indicate an environmental justice concern with regard to isolated communities.

5 REFERENCES

Council on Environmental Quality. "Guidance for Addressing Environmental Justice Under the National Environmental Policy Act (NEPA)." Washington, DC: Council on Environmental Quality. March 1998.

DOE. "Supplement to the Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada." *Federal Register*. Vol. 71. pp. 60490–60494. 2006a.

———. "Quarterly Progress Report to Congress, U.S. Department of Energy Office of Civilian Radioactive Waste Management, July 1–September 30, 2006. Washington, DC: DOE. <http://www.ocrwm.doe.gov/info_library/program_docs/quarterly_reports/Quarterly_Progress_Report_to_Congress_-_Final.pdf> (21 November 2006). 2006b.

———. DOE/EIS–0385, "Final Environmental Impact Statement for Site Selection for the Expansion of the Nation's Strategic Petroleum Reserve— Appendix J: Environmental Justice Populations." Available at <http://www.fossil.energy.gov/programs/reserves/spr/publications/2006_EIS_Vol_2/App_J.pdf> (1 March 2007). 2006c.

———. DOE/EIS–0250F, "Final Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada." North Las Vegas, Nevada: DOE, Office of Civilian Radioactive Waste Management. 2002.

EPA. "Final Guidance For Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses." Washington, DC: EPA. 1998.

NRC. "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions." *Federal Register*. Vol. 69. pp. 52040–52048. 2004.

———. NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." Washington, DC: NRC. August 2003.

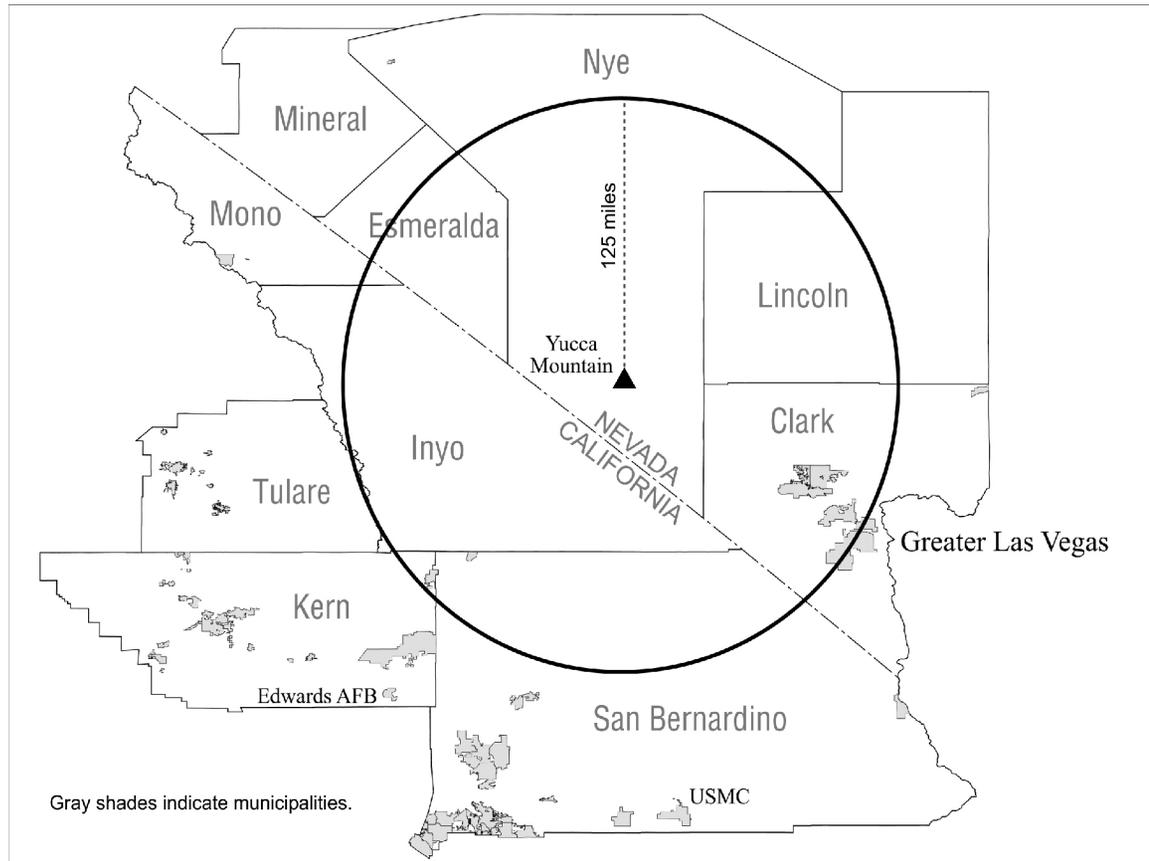


Figure 1. Yucca Mountain 200-km [125-mi] Radius Study Area

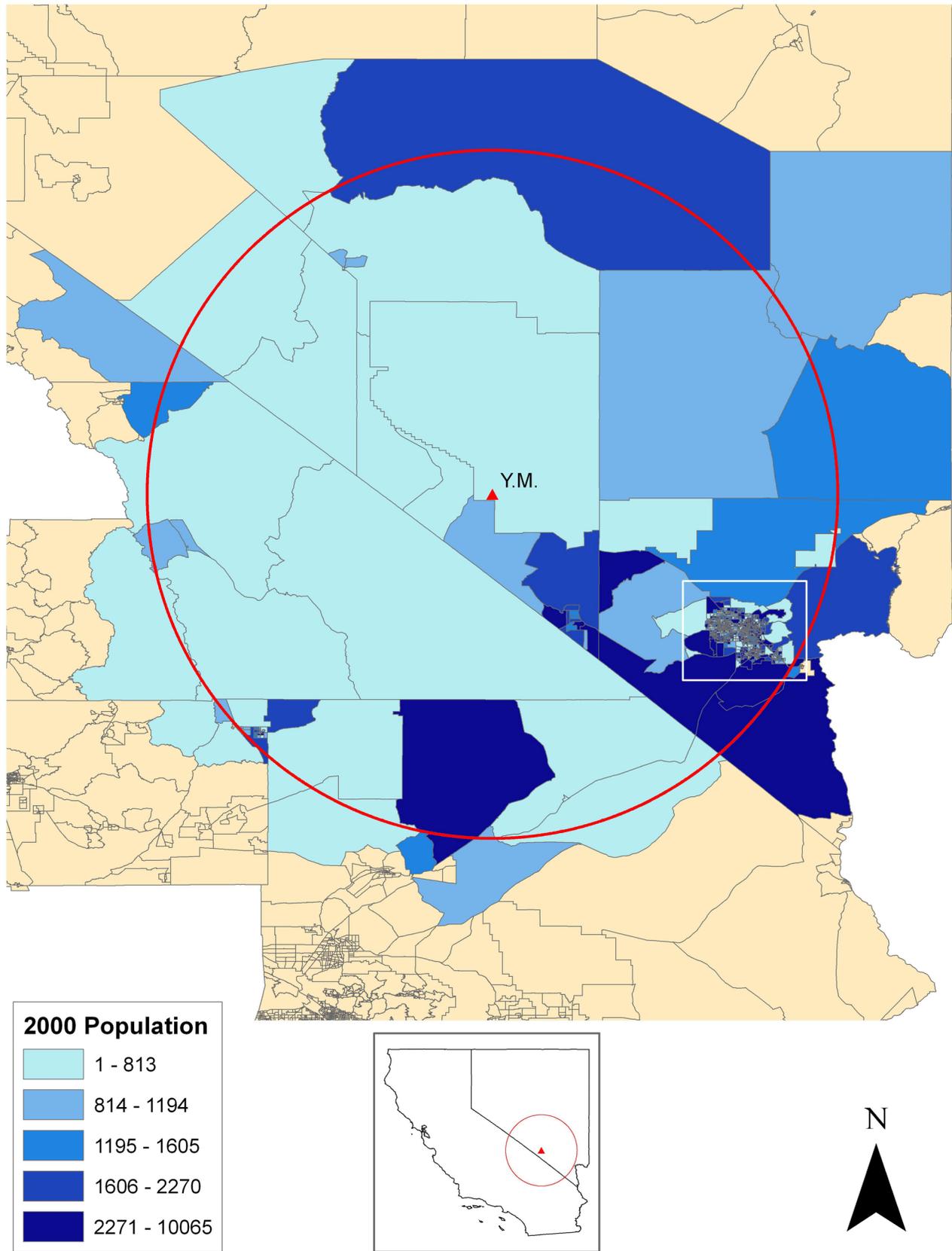
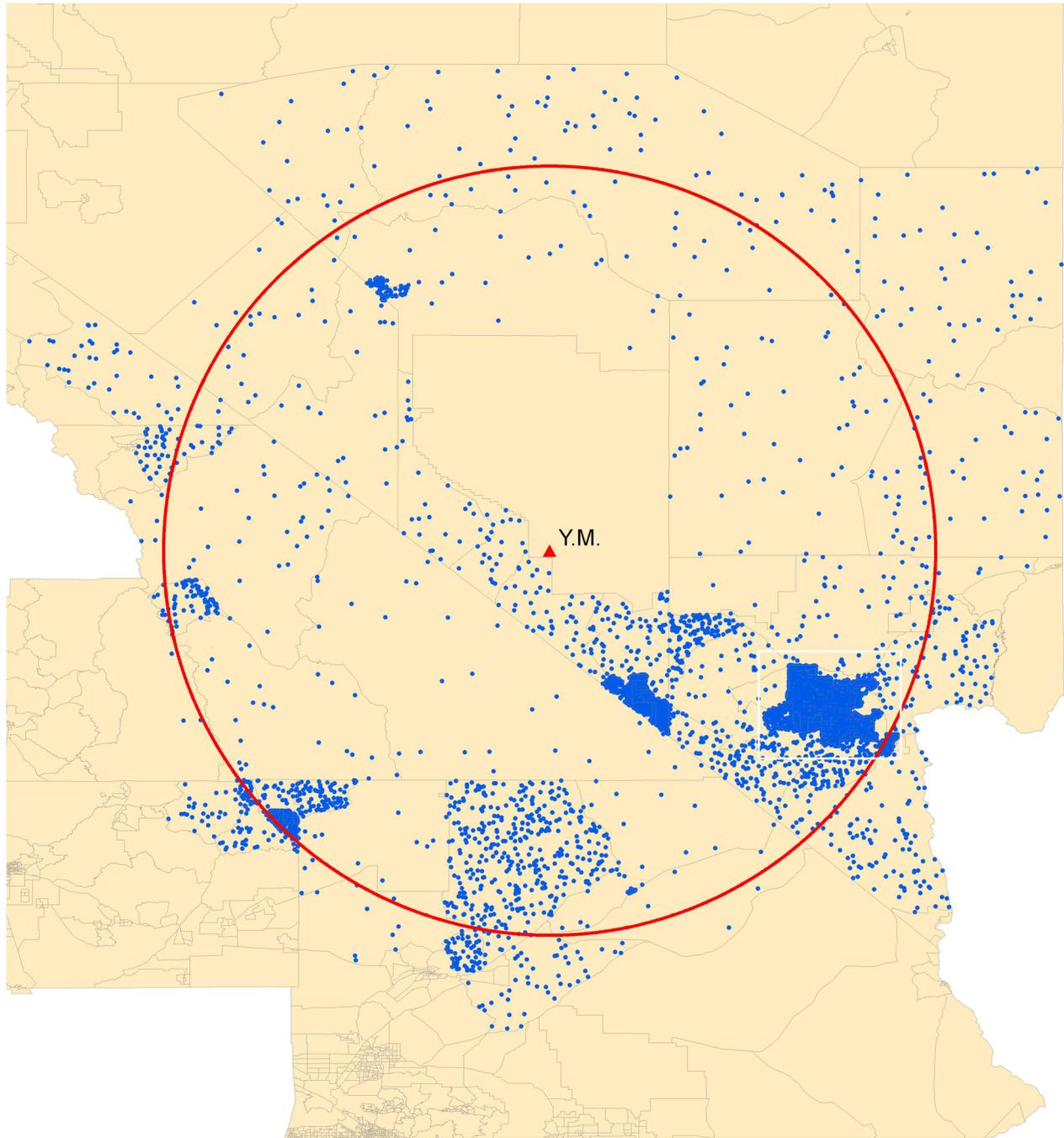


Figure 2. Color-Coded Map of Yucca Mountain Area 200-km [125-mi] Radius Total Population by Block Group. Darker Blues Indicate Higher Total Population.



1 Dot = 25 people

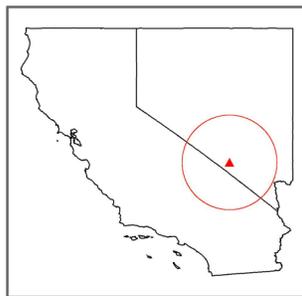


Figure 3. A Dot Map of the Yucca Mountain Area 200-km [125-mi] Radius Total Population by Block Group

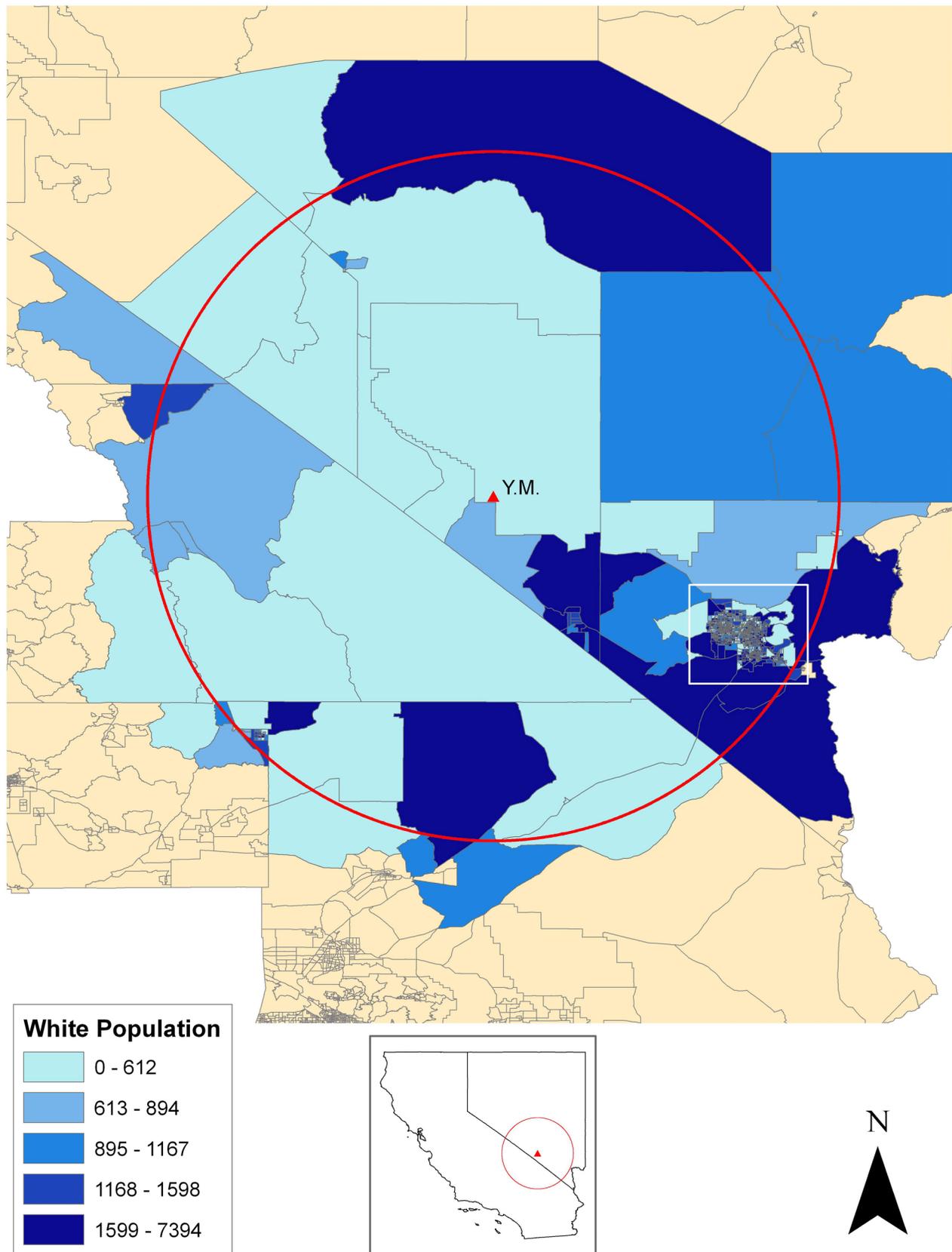
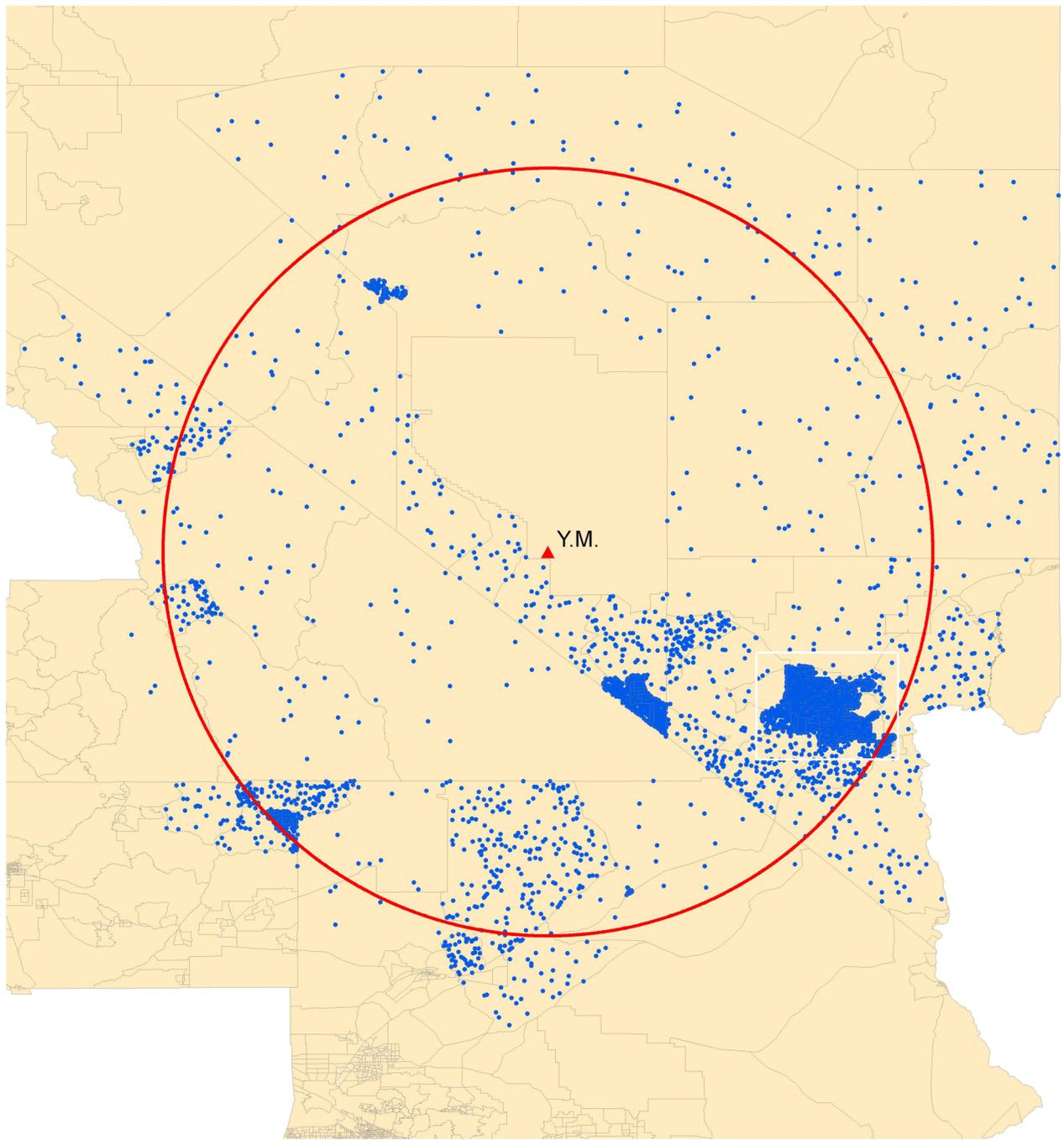


Figure 4. Yucca Mountain Area 200-km [125-mi] Radius White Population by Block Group. Darker Blues Indicate Higher Total Population.



1 Dot = 25 people

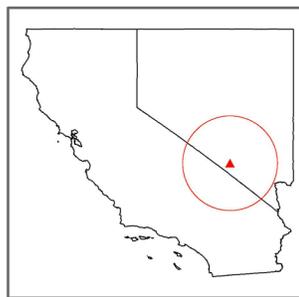


Figure 5. A Dot Map of the Yucca Mountain Area 200-km [125-mi] Radius White Population by Block Group

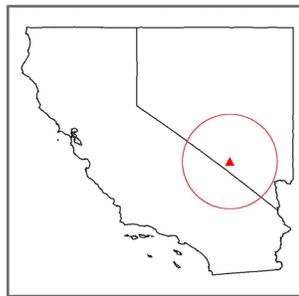
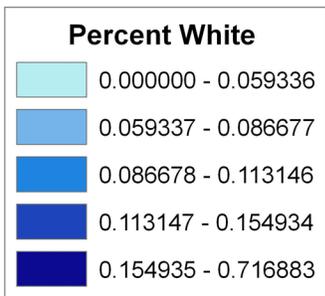
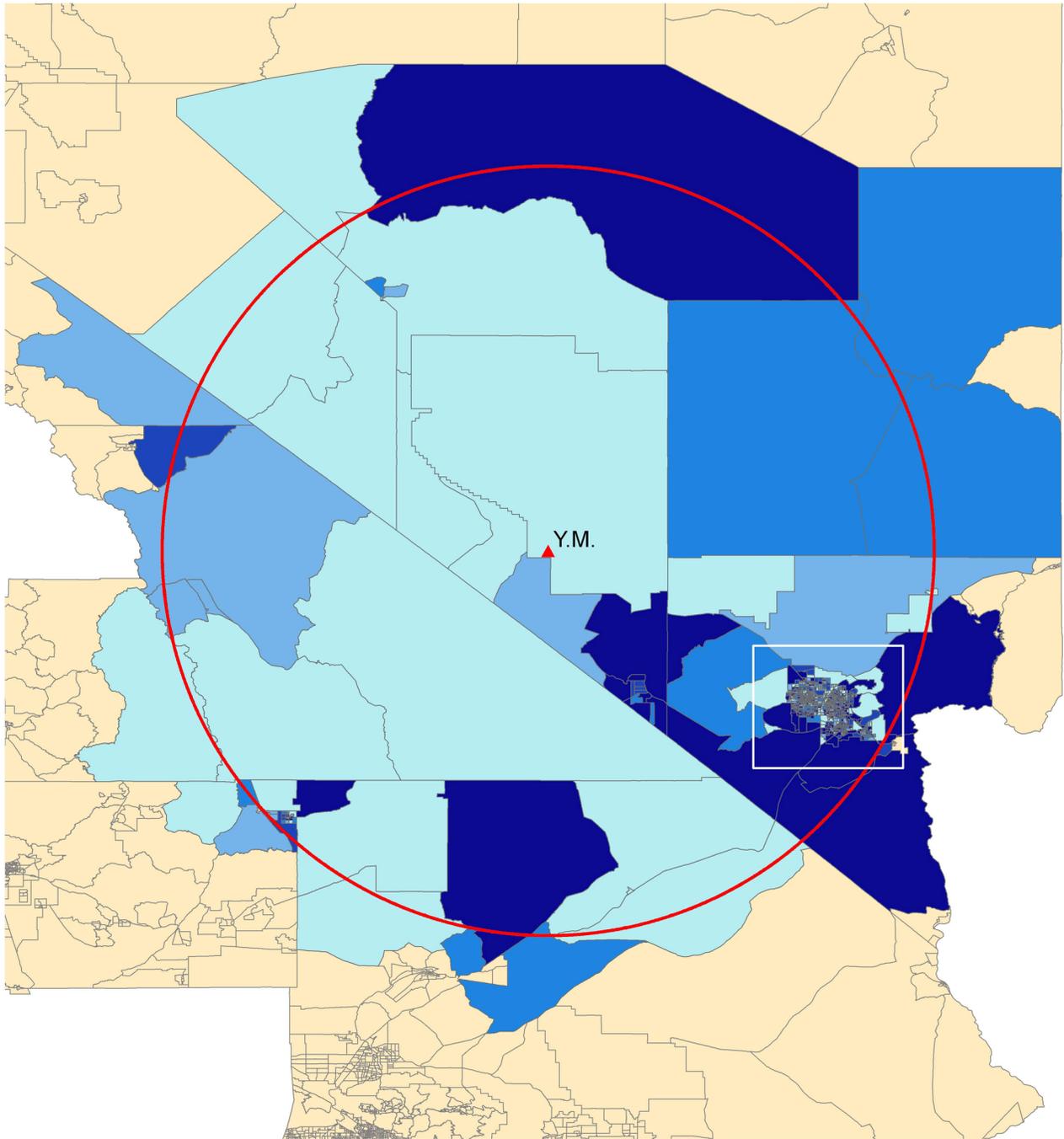


Figure 6. Percentage White of Total White Population for the Yucca Mountain Area 200-km [125-mi] Radius by Block Group

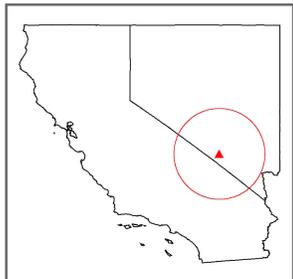
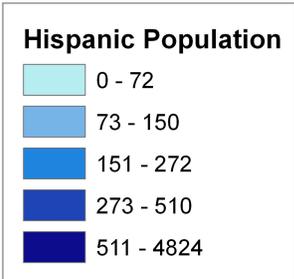
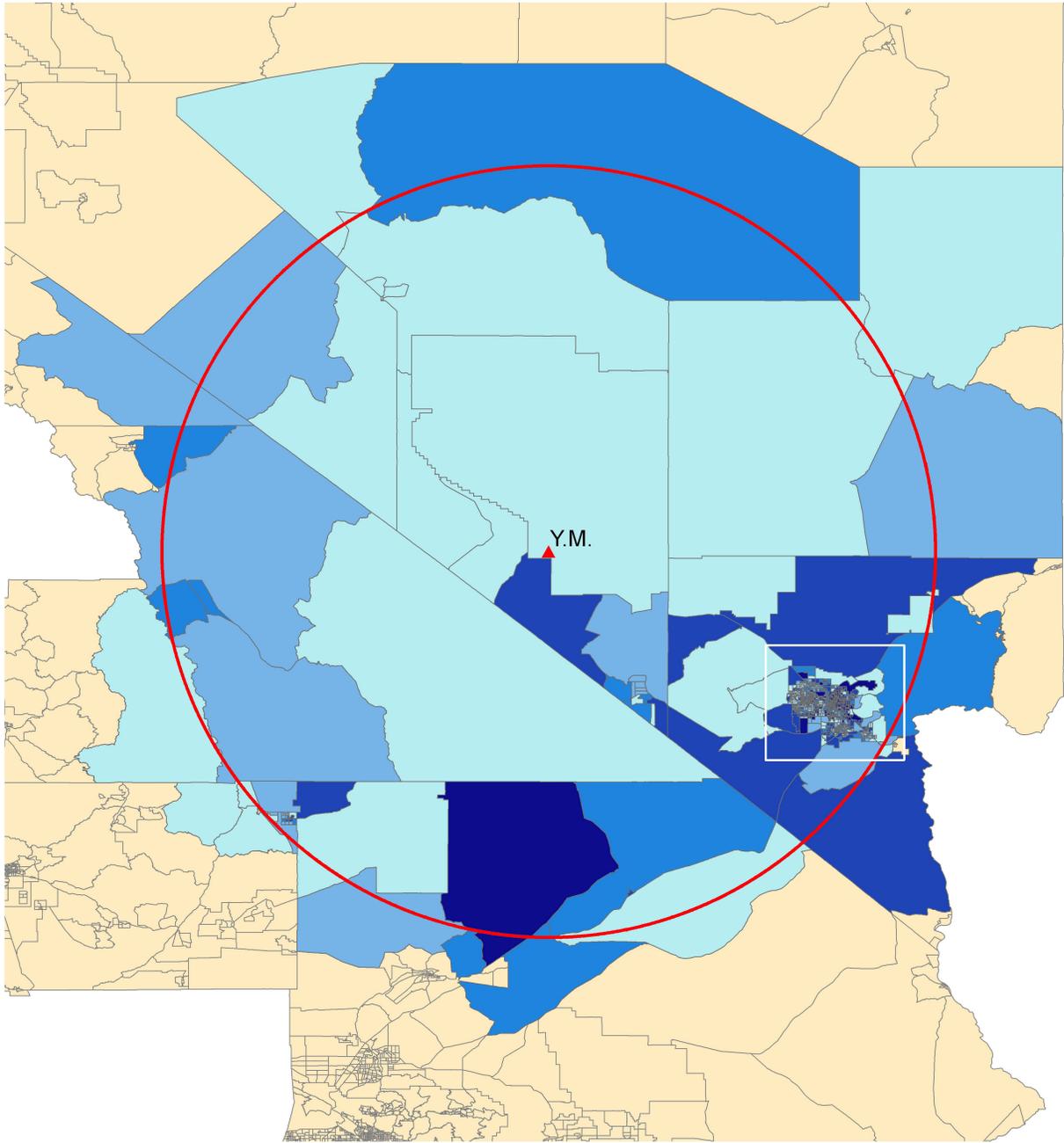


Figure 7. Yucca Mountain Area 200-km [125-mi] Radius Hispanic Population by Block Group. Darker Blues Indicate Higher Total Population.

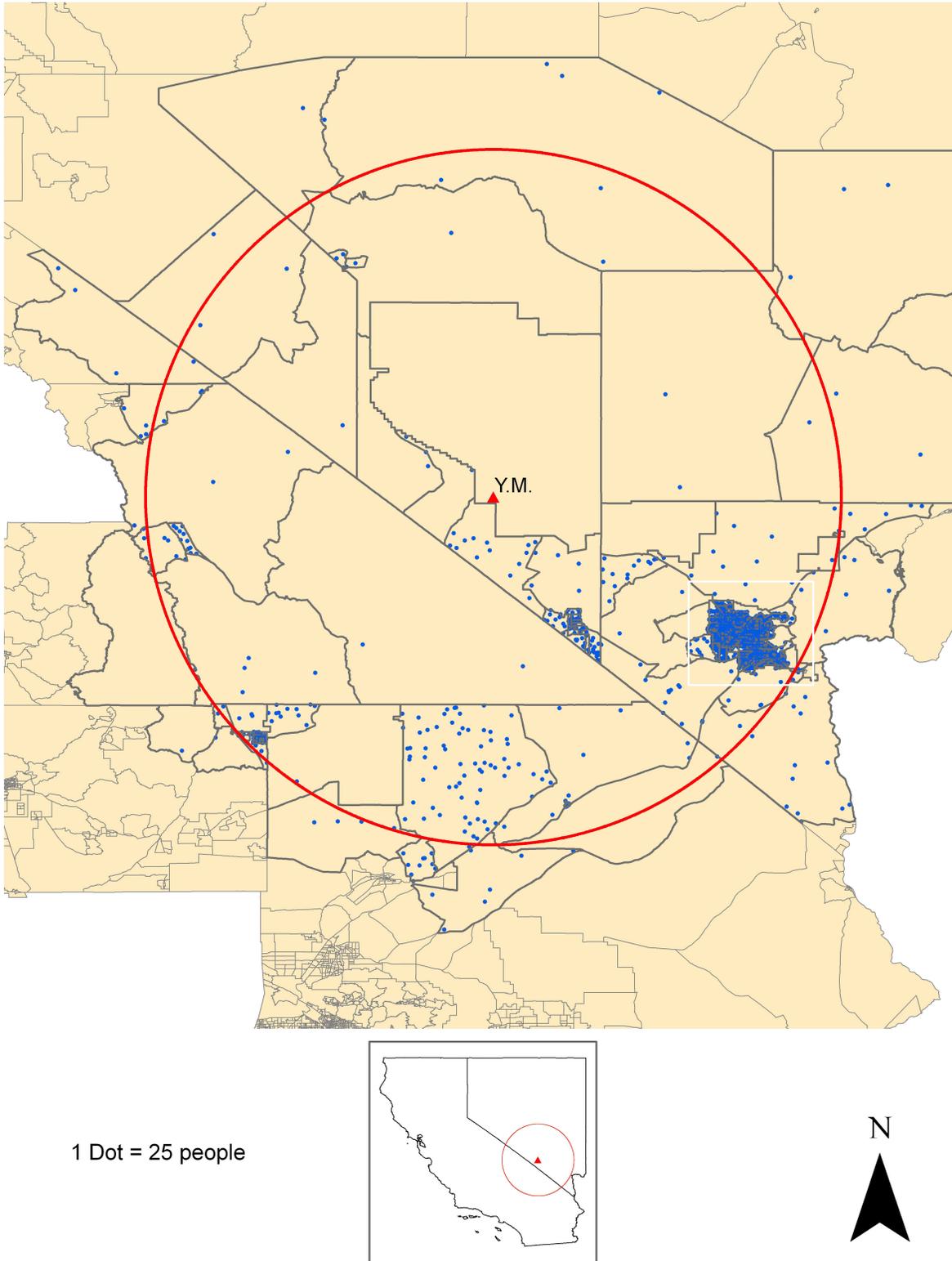


Figure 8. A Dot Map of the Yucca Mountain Area 200-km [125-mi] Radius Hispanic Population by Block Group

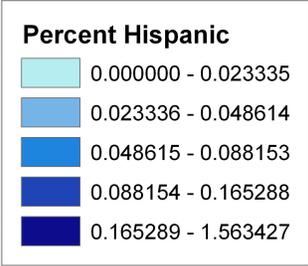
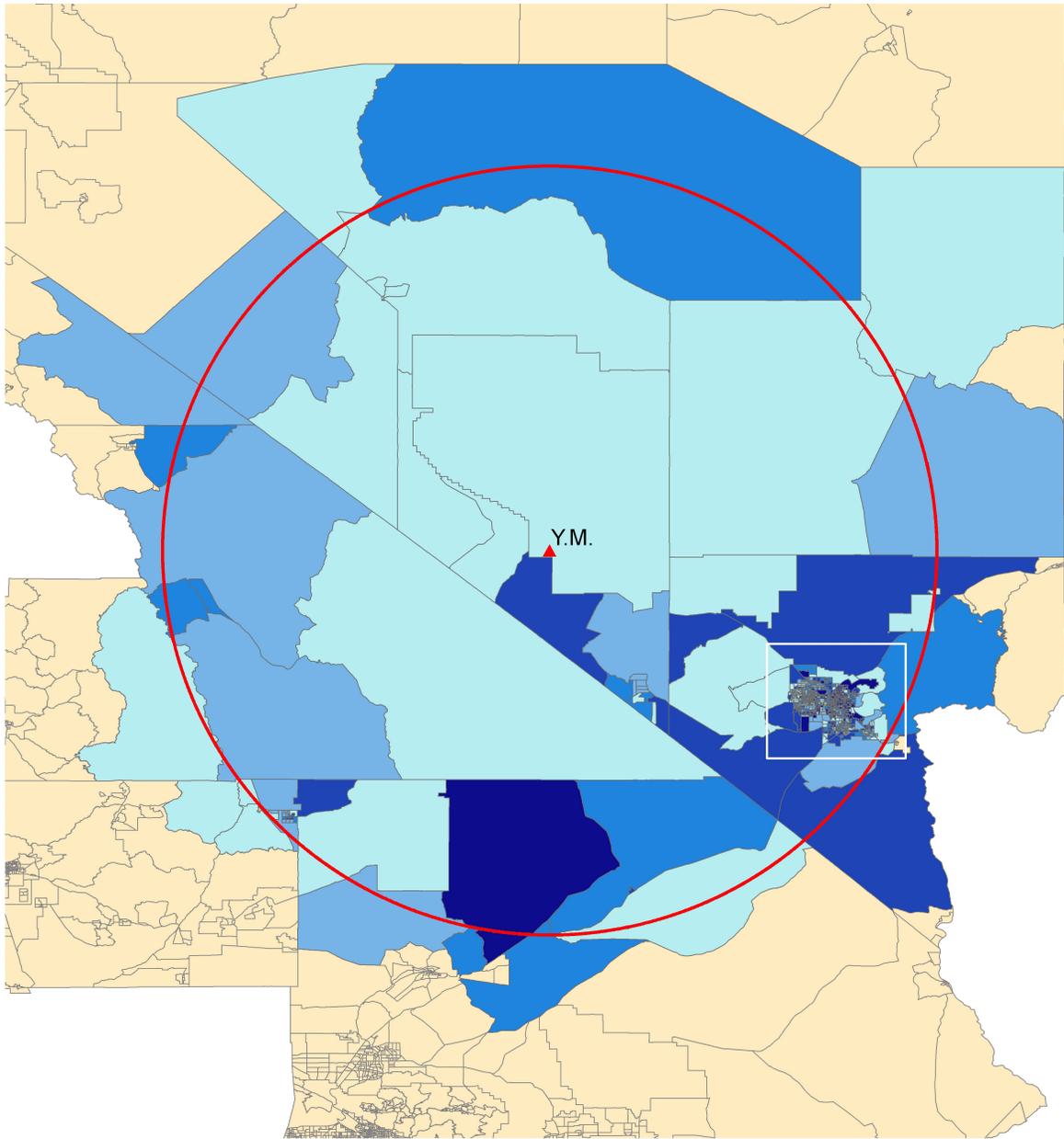


Figure 9. Percentage Hispanic of Total Hispanic Population for the Yucca Mountain Area 200-km [125-mi] Radius by Block Group

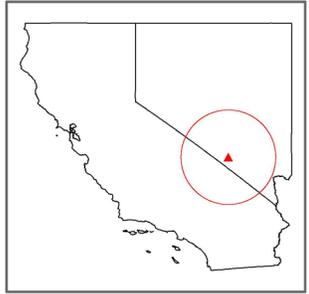
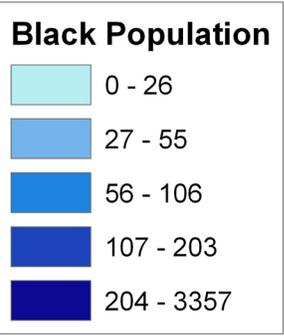
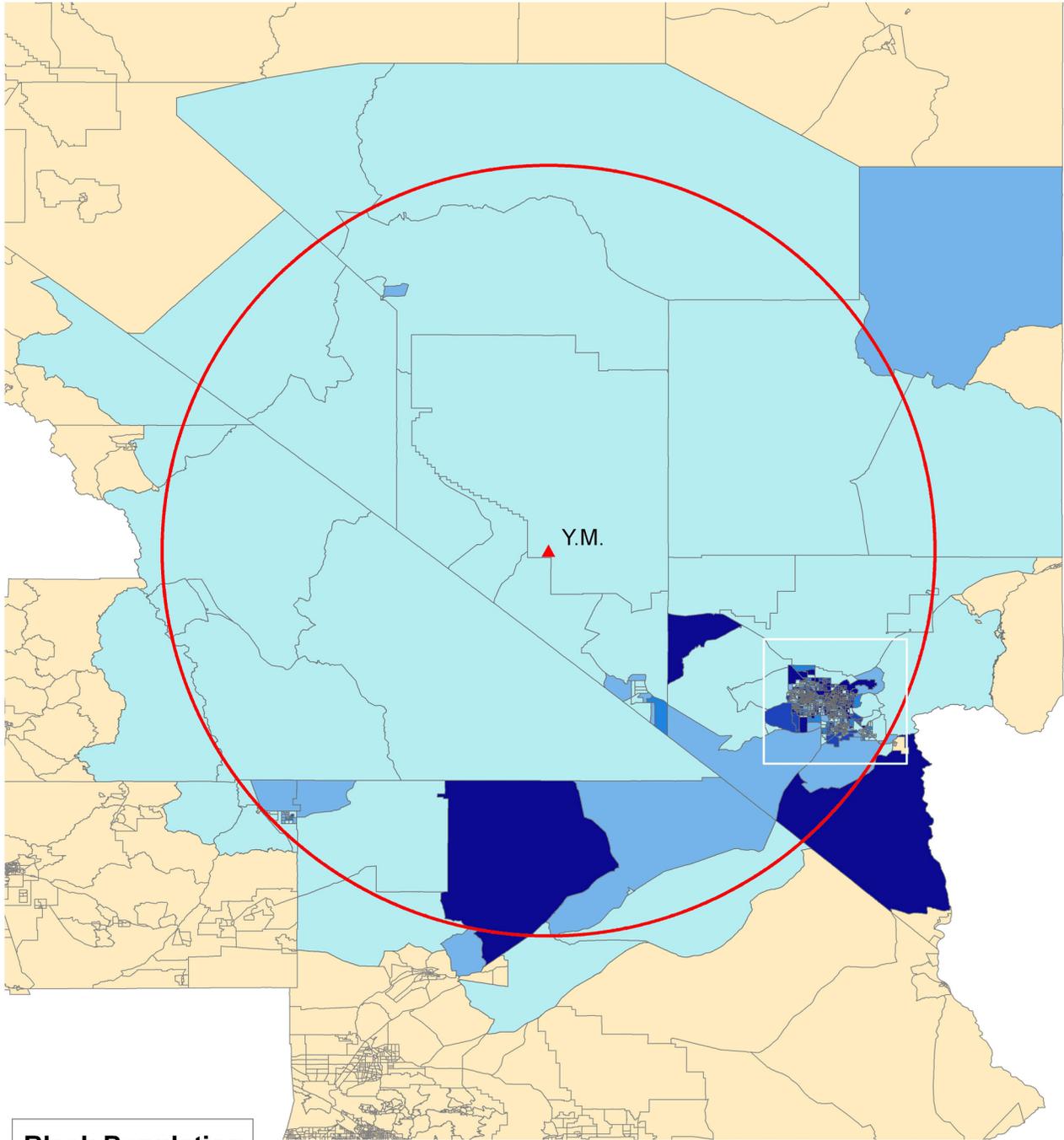


Figure 10. Yucca Mountain Area 200-km [125-mi] Radius Black Population by Block Group. Darker Blues Indicate Higher Total Population.