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Growing Communities through Education: an analysis of future locations for community gardens in Tacoma, WA

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Growing Communities through Education: an analysis of future locations for community gardens in Tacoma, WA

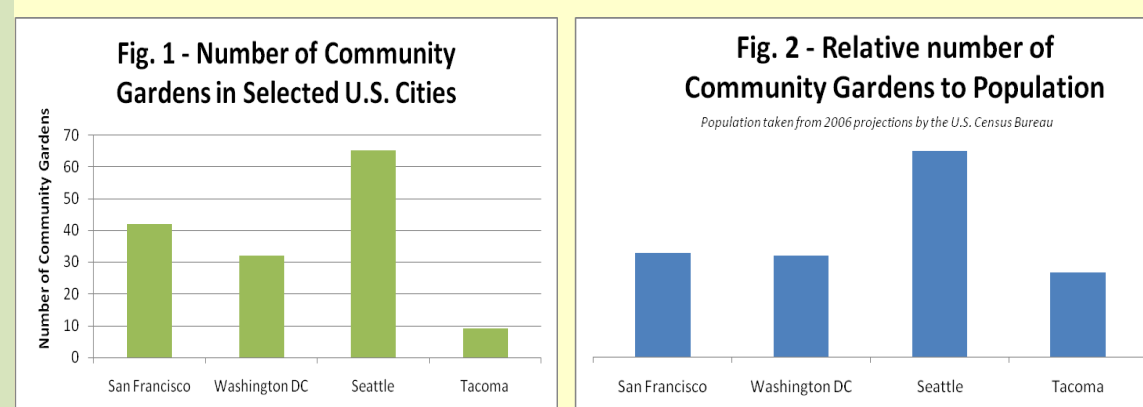Christopher M. Thomas – Interdisciplinary Arts and Sciences, University of Washington - Tacoma

Introduction

Community gardens have become an integral part of most major U.S. cities. From Washington DC to Seattle, community gardens have played a role in providing quality produce in both urban and suburban areas within a supermarket-driven climate. An important utility of community gardens is not only the supply of quality food to a community, but also to educate children on the importance of a healthy and diverse diet of fruits and vegetables for them and their families (Lautenschlager & Smith 2007; McCullum, *et al.* 2005; Robinson-O'Brien, Story, and Helm 2009). School programs are effective in educating children on healthy eating habits and exposing them to healthy and diverse types of foods (Robinson-O'Brien, Story, and Helm 2009). I therefore analyzed the available land parcels within a 10-minute walk from Tacoma Schools to provide ideas for future community garden locations that could best serve students and their communities. I conducted an analysis of available parcels for future community gardens by using the ArcGIS software to create an index of desirability for eligible parcels. The variables used were grade of slope, concentration of arsenic in the soil, proximity to Tacoma schools, and location of a city park.
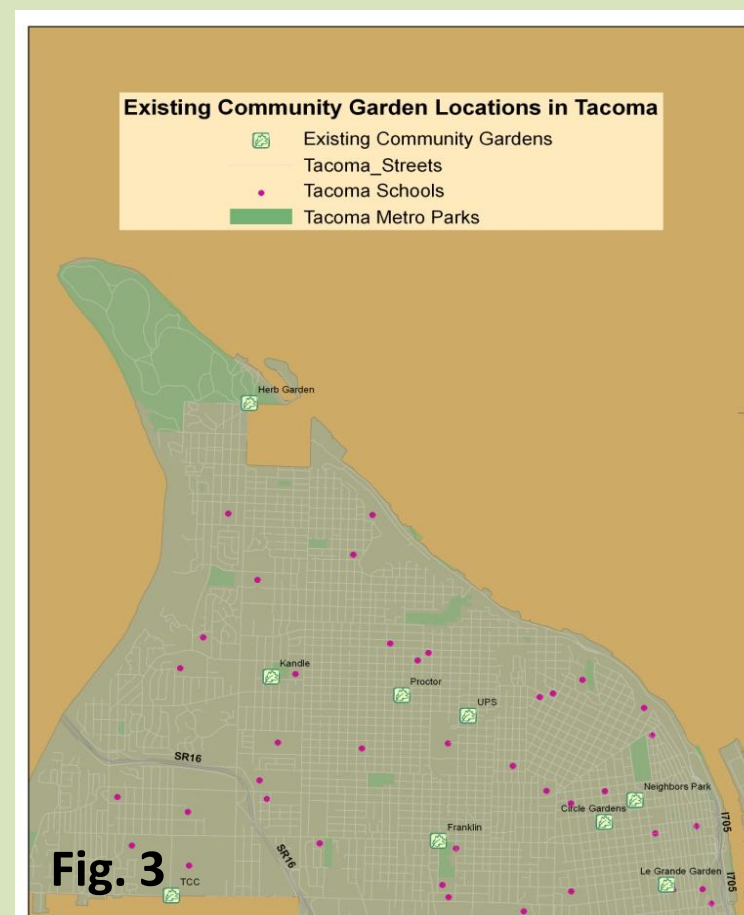
When analyzing community gardens in Tacoma, Seattle, San Francisco, and Washington DC, the number of community gardens in Tacoma fell far short of the numbers in these other cities. Yet when normalized with population, Tacoma was not that far behind (see figures 1 and 2).

Existing Community Garden Locations in Tacoma
Fig. 3

Fig. 1 - Number of Community Gardens in Selected U.S. Cities
Fig. 2 - Relative number of Community Gardens to Population
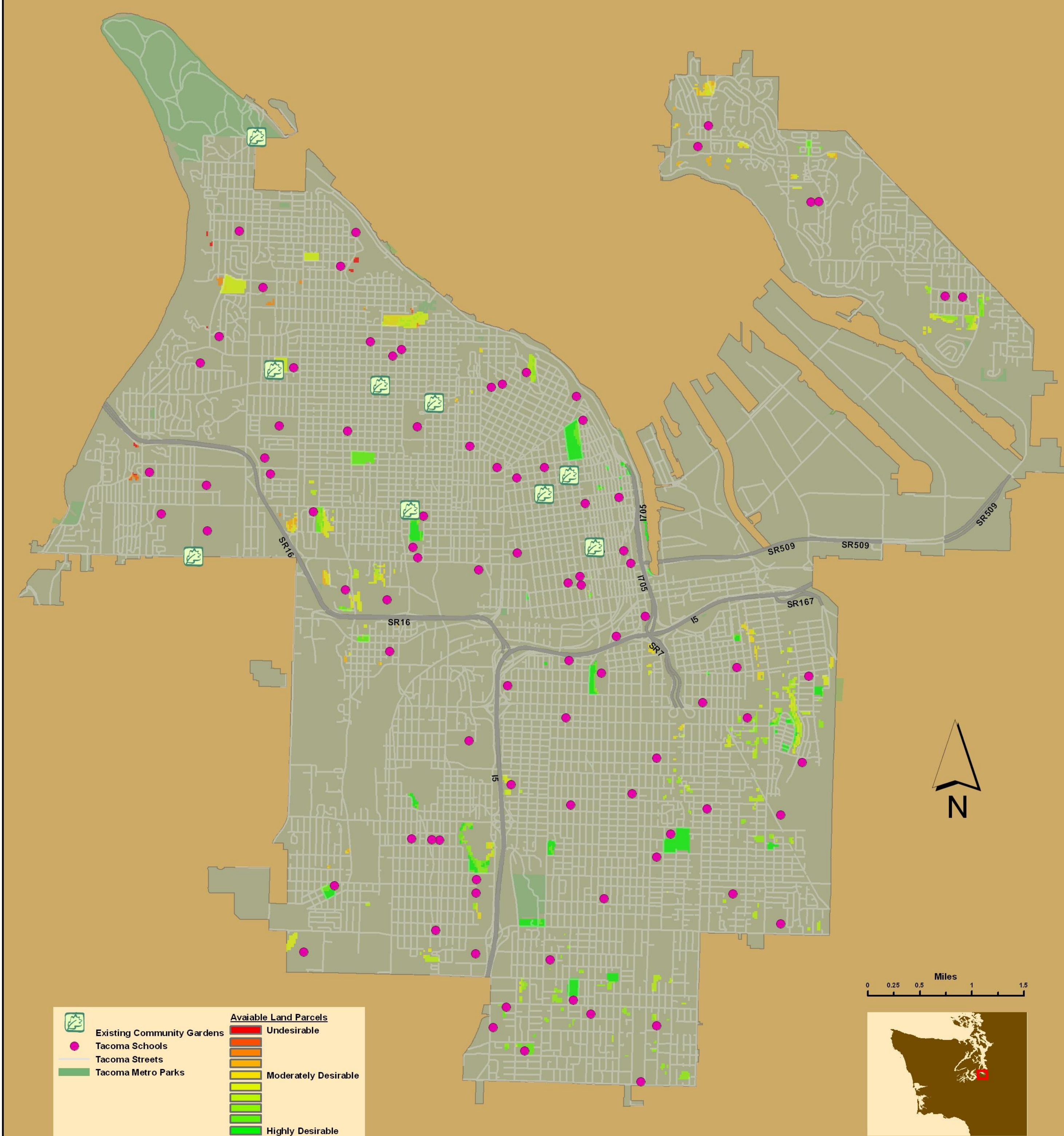
Data

Initial datasets used were largely retrieved from three online sources: Pierce and King County tax parcels, land use, base maps, schools, parks, and orthophoto imagery were retrieved from WAGDA (wagda.lib.washington.edu); impervious surface and slope data were retrieved from the USGS (www.usgs.gov), and census blocks, as well as unused socio-economic by block group data, were retrieved from the US census (www.census.gov). Arsenic plume data was conducted by the Department of Ecology and was used with permission from Dr. Matthew Kelley, University of Washington, Tacoma. Existing community garden data was geocoded, by me, through acquired garden locations from Tacoma Metro Parks (www.metroparkstacoma.org) and street data from WAGDA.

Fig. 5

Fig. 6
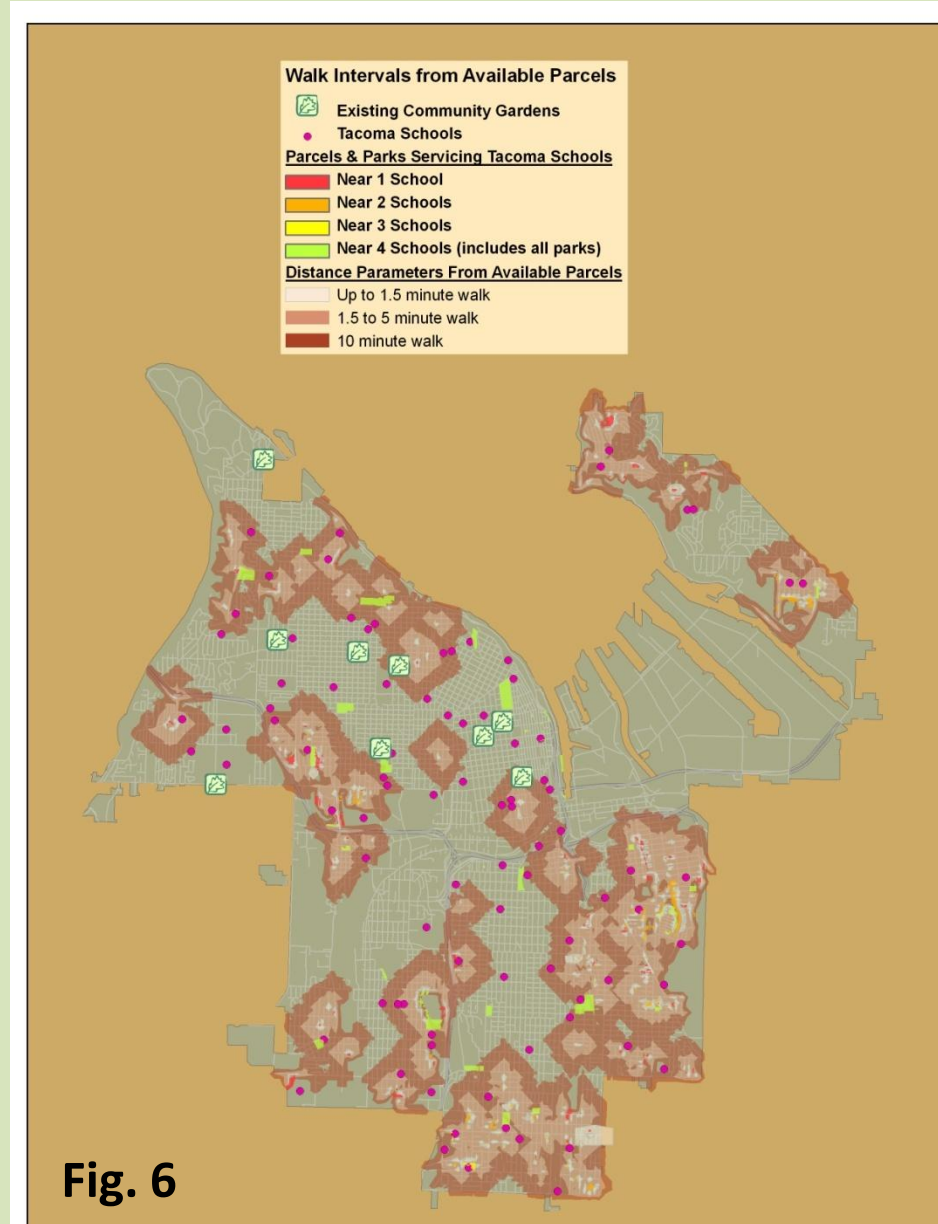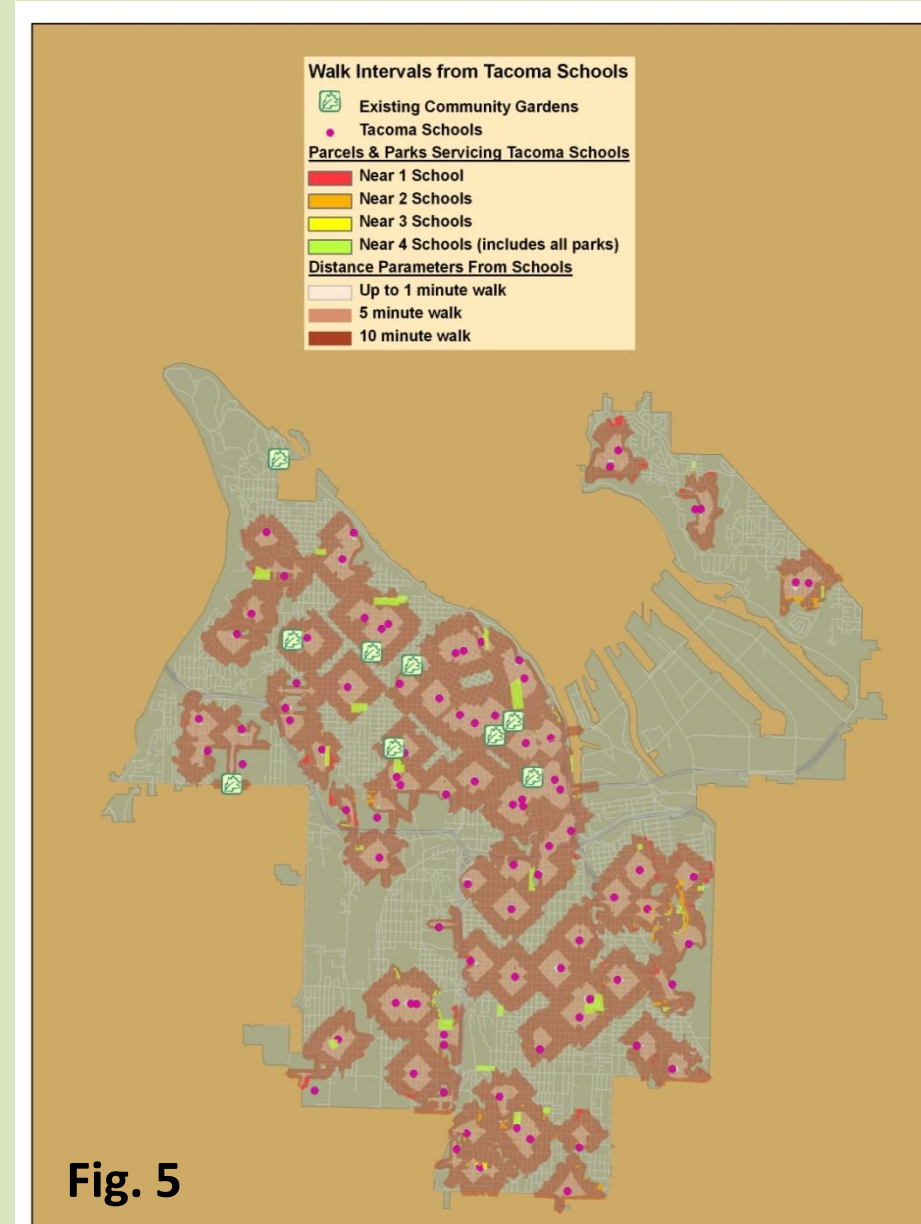
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Fig. 9
Desirability of Land Parcels for Future Community Gardens in Tacoma, WA

Methods

Tacoma's open and vacant parcels with impervious surfaces 20% or less were combined with Tacoma Metro Parks; Since some current community gardens are part of larger park parcels, the Metro Park parcels were treated as eligible. All Tacoma schools (both public and private) were included in the school layer.

A network analysis using all Tacoma school locations as center points created a selection of eligible parcels within a 10-minute walk on city streets (see figure 5). Another network analysis from the center points of the new, eligible parcels instead of the school locations revealed the count schools within a 10-minute walk from each parcel (see figure 6) resulting in a ranking of parcels based on how many schools were serviced by each parcel (e.g. a high parcel rank for three schools per parcel serviced and a lower parcel rank for only one school serviced by that individual parcel). City park parcels were given the same rank as those individual parcels in the proximity of four schools—the highest rank (see figure 4).

Soil depth measurements between 0-12 inches were averaged and classified into 5 ranks standard deviation of arsenic levels. The background level of arsenic in the soil is 20 parts per million (ppm) and was classified based on this level (Lee and Kissel 1995). Arsenic levels were then interpolated to model a continuous surface of soil arsenic levels across Tacoma (see figure 7).

Fig. 4

Gradient of slope was ranked into three slope-grade categories: flat=0-6.9%, moderate=7-14.9% and steep=15-100% (see figure 8). Each layer's numerical ranking was then added together creating a new parcel layer with a desirability ranking from 2-10: 2 being undesirable and 10 being highly desirable (see figure 9).

Fig. 7

Fig. 8
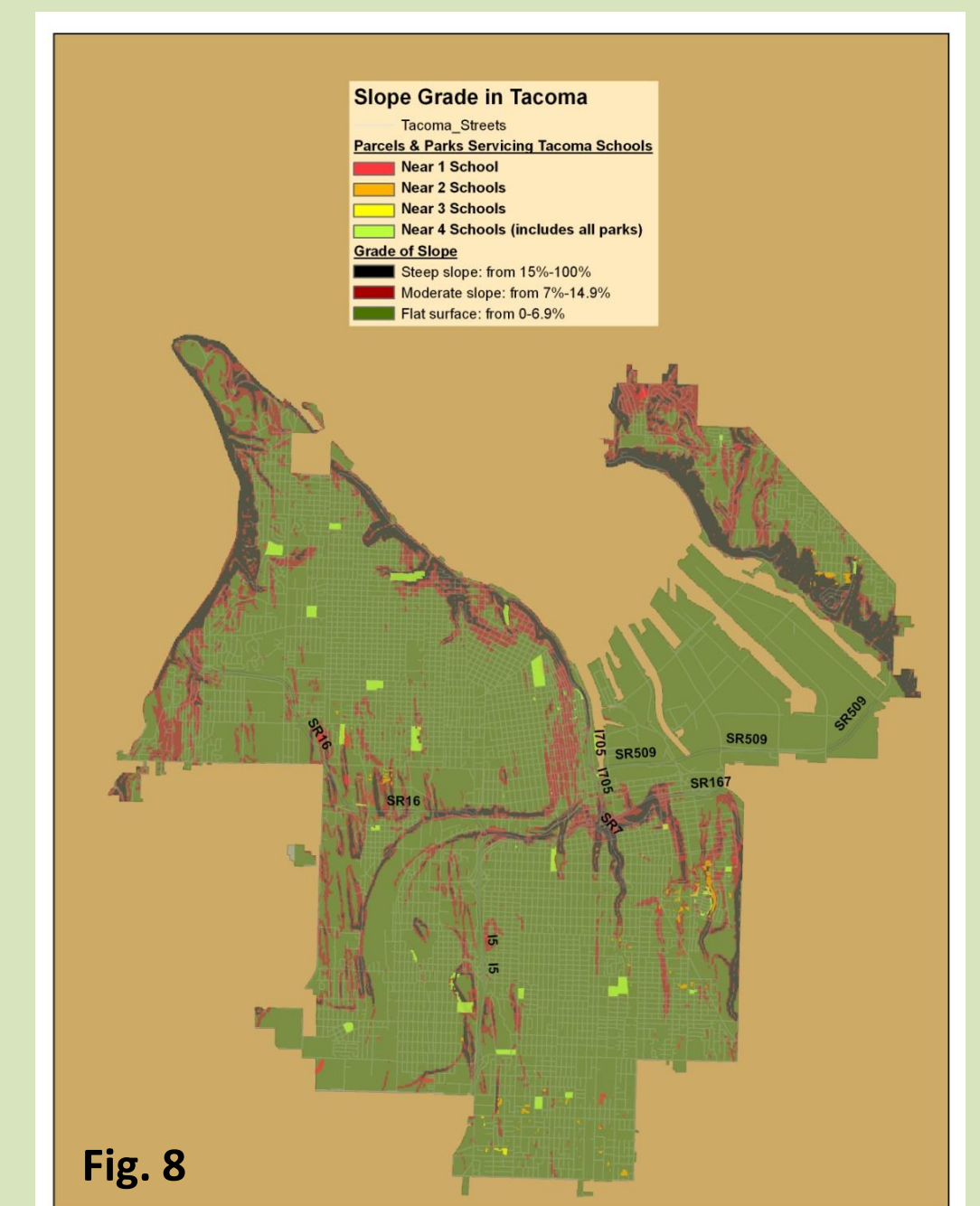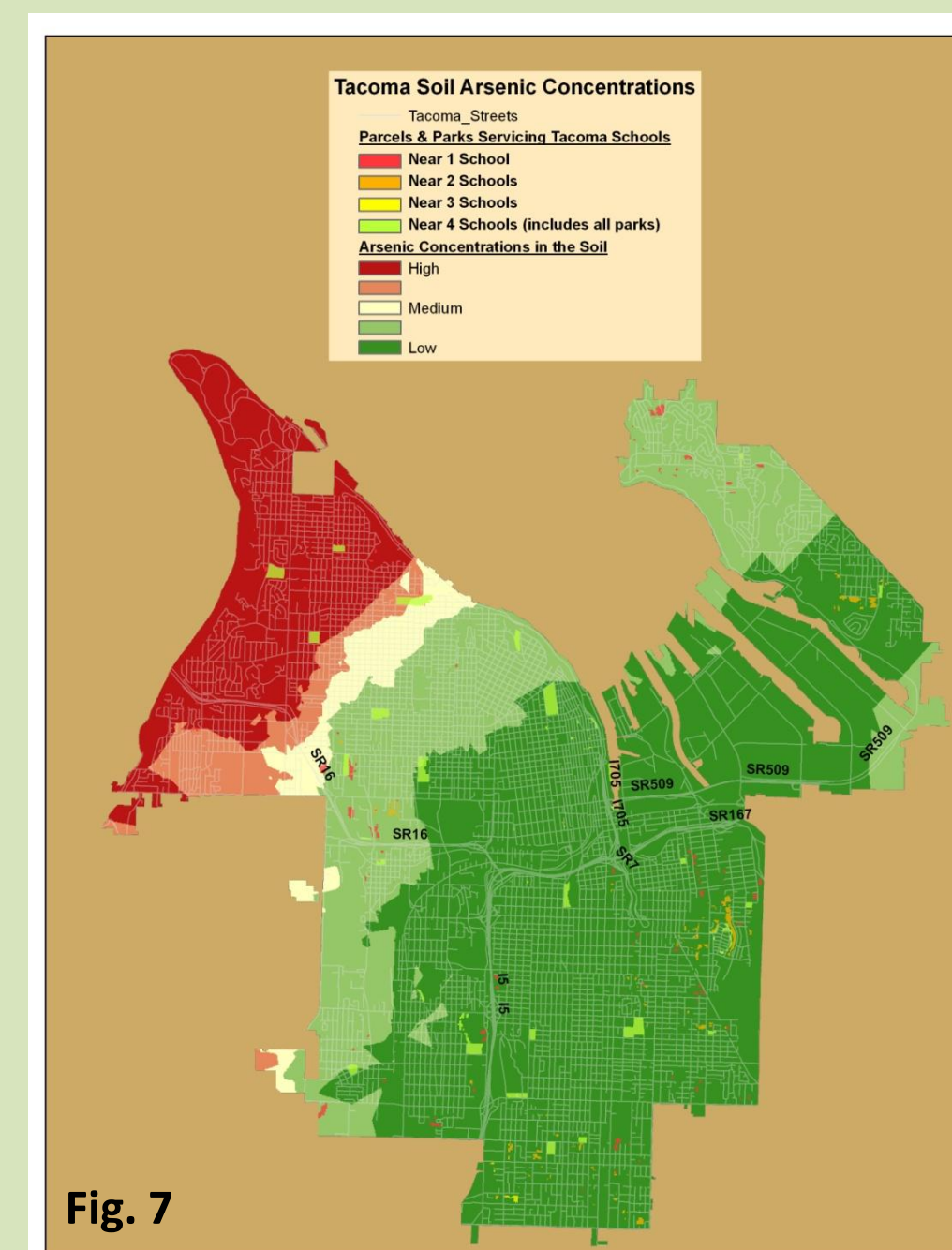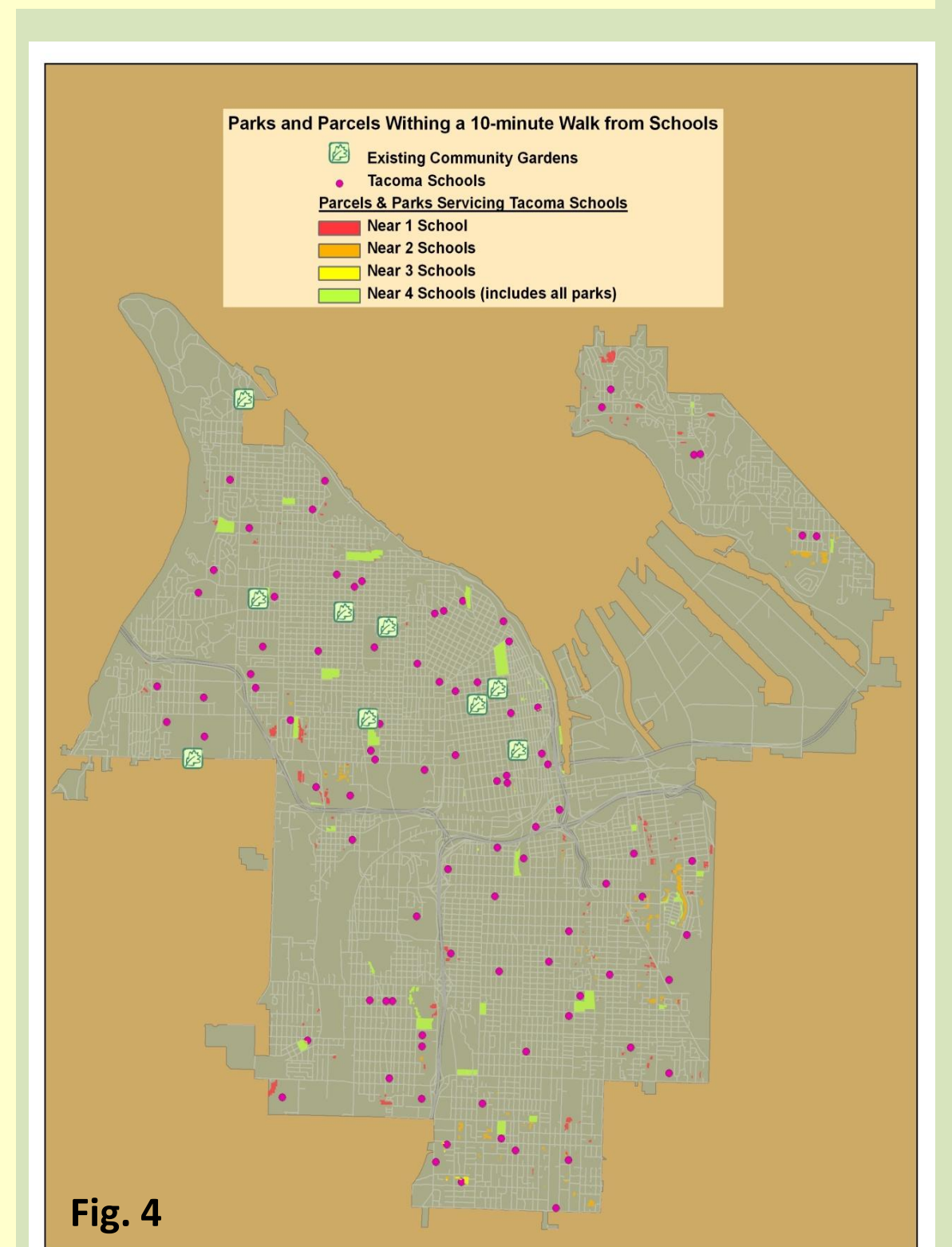
Future Research Directions

Although the criteria used are helpful in determining qualified parcels for future community gardens, there are a number of variables that should be considered. Proximity to high-volume streets is important because of noise and air pollutions, safety concerns, and the aesthetic value needed to bring (and retain) children and their families to the gardens. A closer examination of eligible parcels may also alter their eligibility. Heavy metal concentrations beyond arsenic levels should be measured. If this information is outdated or unavailable, a survey of parcel history could reveal past land use thus qualitatively measuring levels. While high concentration of heavy metals or undesirable past parcel history may not disqualify that specific parcel, it allows for greater flexibility in parcel assessment. Specific crime data may also be helpful. While high petty crime such as robbery and vandalism may not be helpful due, crimes such as child abuse, drug abuse, or child abduction may be. While petty crime can reflect the neighborhood and its needs, it may also reflect the *need* for community gardens and the benefits that these can provide. "Ground truthing" the location and availability of parcels would be vital before any decisions were made on garden placement. Discussions with residents on the use of vacant lots or empty space parcels would provide a better understanding of neighborhood dynamics which could alter parcel eligibility.

Results

After all analyses were completed, 514 parcels in Tacoma met the open space/vacant lot/metro park criteria and are within a 10-minute walk from a school. Most of these parcels (98%) lay in the "moderately desirable" to "highly desirable" categories. This offers 502 "eligible" parcels for community gardens. Based on the slope/arsenic level/distance-to-school criteria used, a couple of explanations for this high number of highly desirable parcels are supposed: Only 13 of the available parcels (0.03%) fell within the higher levels of arsenic concentration. There are 14 out of the 91 schools (15%) that fall within the higher levels of arsenic concentration, and this is 70% of all schools in North Tacoma (north of 6th Avenue). The high population density of North Tacoma is surely a large factor for the low number of parcels. In contrast, a large number of parcels (63%) fall below SR-16. The number of schools south of SR-16 is 41 (45% of total schools). In other words, 45% of all Tacoma schools and almost all of Tacoma schools south of SR-16 are nowhere near an existing community garden due to all but one current community garden is north of SR-16 (see figure 3). It would be my recommendation that a large number of future community gardens be considered south of SR-16 due to this imbalance.