October 22, 2013
Shasta Regional Transportation Agency
FY 2010-11 Sustainable Communities Planning Grant

Final Plan Report

RESOLUTION

RESOLUTION NUMBER:	**13-12**
SUBJECT:	**Resolution Adopting and Certifying as Accurate the Shasta Regional Transportation Agency's FY 2010-11 Proposition 84 Sustainable Communities Strategy Planning Grant (Contract Number 3010-538) Final Plan Report**

WHEREAS, the Shasta Regional Transportation Agency (SRTA) was awarded a FY 2010-11 Proposition 84 Sustainable Communities Strategy Planning Grant in the amount of $300,000; and

WHEREAS, SRTA executed a grant contract (#3010-538) with the California Department of Conservation, Division of Land Resource Protection; and

WHEREAS, pursuant to the grant contract, a Final Plan Report is required before closing the grant contract and receiving reimbursement for the 15% withholding on all invoices to date; and

WHEREAS, the SRTA Board of Directors has received and reviewed the Final Plan Report.

NOW, THEREFORE, BE IT RESOLVED that the Shasta Regional Transportation Agency hereby adopts the Final Plan Report and certifies it as complete and accurate.

PASSED AND ADOPTED this 22nd day of October, 2013, by the Shasta Regional Transportation Agency.

Greg Watkins, Chair
Shasta Regional Transportation Agency

California Sustainable Communities Planning Grants and Incentives Program FINAL PLAN REPORT 2013

Department of Conservation/ Division of Land Resource Protection/Strategic Growth Council

Progress Report #_____**Final Report**___

Grantee:___**Shasta Regional Transportation Agency**_____ Grant No.__ **3010-538** ____

Project Title:___**Beta SCS and Regional GIS Platform**____

Prepared by: Daniel Wayne

Daniel Wayne, Senior Planner

1. Objectives of the project:

Project objectives are to develop a locally accepted beta version of the region's SCS plan and to implement a regional GIS platform for tracking and reporting progress toward the regions GHG target. Several supporting tasks are included in the scope of work, including: development of a non-motorized transportation network for the purpose of travel demand modeling/performance measures; and the exploration of technology-based VMT reduction solutions via the ITS Planning & Integration Study (partially funded through Prop 84).

2. Summary of work completed:

The grant-funded portions of SRTA's SCS efforts are complete. Task-by-task overview is provided below:

- **Urban spatial analysis tools (Task #1) were used successfully to engage local agencies in the creation of a first-cut Sustainable Communities Strategy. When SB 375 came about there was considerable local agency concern that state values would be forced on local agencies and infringe upon their land use authority. Spatial analysis tools were used successfully to provide an objective common ground between regional and local stakeholders. Outputs from these tools – while useful at the regional scale – required ground-truthing by local agency planning staff to be useful for detailed planning and project-level analysis.**

- **The Exurban Growth Tool (Task #2) is being used to engage county planning in the identification of prospective rural town centers and corridors for increased growth and development. The county is beginning its general plan update and the results of this analysis will be provided to the county for their use. Exurban Growth Tool results were of more practical use than the spatial analysis tools described in Task #1. The data needed to perform the analysis is readily available and the basic approach – i.e. using wildfire risk and emergency response time as a proxy to identify**

development potential and transportation efficiency across the region – was useful, intuitively understood by stakeholders, and easily transferable to other rural regions.

- **Complete Streets/Data/Network Integration (Task #3). GIS data for the region was acquired and networked for modeling purposes for the City of Redding. Work is currently underway to add City of Shasta Lake and Anderson. The network will be used in ongoing SCS planning, performance measure development, and the Shasta Regional Bicycle and Pedestrian Plan (currently under development). SRTA partnered with the City of Redding in the development of draft complete streets policies and non-motorized level of service analysis for incorporation into the 2015 RTP. City of Redding recently adopted a complete streets policy and was well-equipped to support SRTA in this effort. Concurrent with this effort was development of the region's new activity-based travel demand model. In the coming months, the new non-motorized network will be added to the model and SCS scenarios tested.**

- **A diverse technical advisory/steering committee representing public agencies from multiple regions, Shasta College, and private sector GIS industry guided the development of FarNorCalGIS (Task #4). An MOU between SRTA and Shasta College was executed, wherein the college purchased and hosts the server hardware and SRTA provides ongoing licensing, data management, and administrative functions. FarNorCalGIS Policies & Procedures were developed, establishing data consistency standards and responsibilities for accepting and publishing new data. An online portal was developed: www.farnorcalgis.org. A parcel-based regional greenhouse gas emissions map viewer has been created and will be made public shortly. This effort was extraordinarily successful; it was truly a joint effort with in-kind contributions of time and effort far beyond initially expected from project partners. FarNorCalGIS is a project that will continue to expand and provide diverse benefits beyond the grant and SCS planning effort. As we hoped it would be, FarNorCalGIS has become a common ground for interagency coordination and consensus building.**

- **The intelligent transportation systems (ITS) planning and integration study (Task #5) is complete. Specific ITS needs and associated costs were identified. Implementation of the full system is not practical at this time, but will be phased in over time as part of new projects and as resources allow. In addition, we now have a plan of specific ITS improvements that can be model-tested for VMT and GHG emissions for the SCS planning process. The study will also be used by SRTA and Caltrans District 2 when seeking funding for ITS improvements.**

- **SRTA provided rural county technical assistance (Task #6) upon request and as a routine portion of the North State Super Region meetings and communications. Data and methods were shared directly and/or uploaded to the FarNorCalGIS server.**

3. What success stories can you report?

SRTA worked successfully with local agencies to identify strategic growth areas, identified opportunities for infill and redevelopment therein, and modeled three growth and development scenarios to test the elasticity of VMT (dependent variable) as a factor of density (independent variable). Travel demand and emissions modeling was successfully performed for the City of Redding. Inputs and assumptions for other jurisdictions are being finalized prior to modeling the combined regional SCS. Without the grant, critical opportunities for coordination and consensus building with local agencies would not have been possible. Non-land use VMT/GHG reduction strategies available to the region would not have been identified and modeled without the grant. For example: 1) the ability to accurately assess mode choice without the development and integration of the non-motorized network into the travel demand model; and 2) an up-to-date list of ITS infrastructure improvements for travel demand modeling.

The FarNorCalGIS platform was particularly successful. Much of this success can be attributed to ongoing contributions from the Far Northern Regional GIS Council, Shasta College, local agency GIS staff, VESTRA Resources, and other key community partners. The FarNorCalGIS project will carry on well beyond the grant scope/duration, and will be expanded to include additional data from Shasta County and across the North State. A map viewer with comprehensive transportation and economic data generated via the North State Transportation for Economic Development Study (funded via a State Planning & Research grant) will be uploaded the internet portal shortly. Other such data and plans will be added over time and for a variety of purposes.

4. What challenges and opportunities have you encountered in accomplishing this portion of your Scope of Work?

Late in the grant cycle, DOC's fiscal administration/oversight of the grant increased exponentially. The number of hours required by SRTA to respond to DOC's request exceeded the (substantial) budget allowance for project/fiscal management and impacted SRTA's ability to carry out the scope of work effectively and efficiently. Examples include budget amendments required due to a routine change in staff by a sub-consultant that did not affect contract amount, resubmitting requests for reimbursement because a consultant *under* billed 34 cents for mileage, and grant-specific/non-industry standard financial accounting requests. Of greater concern, however, is that such oversight is focused neither on the success of the project nor the grant program (i.e. project deliverables and grant program goals as outlined by the SGC).

TASK #1: GEOGRAPHIC INFORMATION SYSTEMS (GIS)-BASED URBAN ANALYSIS TOOLS

Objective: Develop an objective first draft sustainable communities strategy (SCS) and engage local agencies in the planning process.

Key Deliverables:

- Neighborhood Dynamic Scale (NeDS), a geographic measure of economic activity and receptivity to growth and development
- Mobility Assessment Tool (MAT), a geographic measure of regional mobility and accessibility
- Community Health Index (CMI), a geographic measure of factors influencing public health

Shasta County

Neighborhood Dynamic Scale

Produced for:
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001

June 18, 2013

Version 1.0

Produced by:

VESTRA Resources, Inc.
5300 Aviation Drive
Redding, CA 96002
(530) 223-2585

Project Understanding

Neighborhood Dynamic Scale (NeDS) is a GIS-based spatial analysis tool which measures the movement of people and investment in or out of neighborhoods. The output is intended to facilitate the general categorization of neighborhoods into those that are:

- More dynamic and receptive to change;
- Well-established and have reached a point of stasis; or
- Functional and of strategic value to the region, but are threatened by rapid change.

Outputs will help guide planners to locations most appropriate for growth actions, maintenance actions, or safeguarding actions.

The methodology used to develop the NeDS consisted primarily of Esri's ArcGIS for Desktop geoprocessing tools to perform the analysis. Existing data sets were used as inputs to the NeDS; no primary data collection was completed.

Data Sources

Existing datasets from the Shasta County Assessor's office and the City of Redding were used in conjunction with the Traffic Analysis Zones (TAZs) developed for the Shasta Regional Transportation Agency's travel demand model to develop NeDS.

Methodology and Assumptions

The confluence of following factors indicates areas that are potentially better suited to future growth and development.

- Economic Activity – Areas within the City of Redding with a high number of new businesses starting between 2005 and 2010. Areas with more new business start-ups tend to be the places in which market forces are favorable for business growth.
- Dynamic Scale – Areas within the south-central urbanized region that may be open to change, either residential or commercial. In areas that are homogenous (commercial or residential) it is assumed that residents would be less open to change in the form of new, mixed-use, mixed-density development. In areas that are already more diverse, it is assumed that residents would be more open to change in the form of new, mixed-use, mixed-density development.
- Vacant and Underutilized Property – Parcels within the south-central urbanized region that are vacant or underutilized. It is assumed that private sector investment is attracted to vacant and underutilized property/real estate where adjacent parcels are valued significantly higher and the surrounding community is economically strong.

Assumptions / Notes:

The area of Interest for development of the NeDS is the South Central Region (SCR), which includes the City of Shasta Lake, City of Redding, and City of Anderson and surrounding unincorporated areas of Shasta County. Analysis within the City of Redding was performed separate from the rest of the study area on account of additional data availability and subsequent quality of analysis.

Economic Activity (New Business Licenses):

Business license data from the City of Redding was used to analysis the economic activity from 2005 through 2010 within the City of Redding. Similar data was not available from the other cities (Shasta Lake and Anderson) or the County.

IN REDDING:

- Use 2005 through 2010 Business License data for Redding:
    - Find Business License records in 2010 not in 2005 based on Business Name values. Single parcels can still have multiple businesses.
    - Remove duplicate APNs, and save a count of total Business Licenses for each parcel (in this case 2 or more for each APN).
    - Remove businesses that are in residential zoning districts (Single Family and Multi Family from the Z_Class field in COR_Zoning feature class).
    - Summarize results into TAZs.
    - Generate statistics (Sum, Mean, STD, and Range).

Vacant and Underutilized Parcels:

Vacant and underutilized parcels were calculated differently for parcels in the City of Redding, and the remaining SCR area. Existing data from the City of Redding and Shasta County Assessor was used in the analysis.

VACANT LAND:

IN SCR:

The feature class *Parcels_New_SCR_Assessor_TC601_All_poly_GP* was used to calculate vacant parcels within the SCR, but outside the City of Redding.

- Used Assessor Lien Date Roll Data, 10/17/2011
- Join Assessor Table TC601 to Shasta County Parcels feature class:
- Add a “Vacant” field to the Parcels fc.
- Select the following parcels for inclusion into the Vac_7000_Priv_LU field.
    - Vacant Commercial (VC):
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Commercial High'

        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Commercial Low'
    - Vacant Industrial (VI):
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Industrial'
    - Vacant Residential (VR):
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Residential High'
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Residential Medium'
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Residential Low'
    - Vacant Mixed Use (VM) - not used in analysis:
        - "CurrentStructuralImprValue" <7000 AND "Own_Class" = 'Private' AND "UPlan_LU_Name" = 'Mixed Use'

In Redding:

- Parcel data from the City of Redding GIS office was used to calculate vacant parcels in Redding. The *COR_Parcels_w_LUGROUP_UI_UC_UR* feature class was used.
    - Create field: NeDS_LUGROUP. Code all parcels with EMPRV_VALUE < $7,000 to "Vacant". All other parcels, copy values from LUGROUP field.

UNDERUTILIZED PARCELS:

- Feature Class: Parcels_New_SCR_Assessor_TC601_All_poly_GP
- Used Assessor Lien Date Roll Data, 10/17/2011, - from Dan Wayne
- Join Assessor Table TC601 to Shasta County Parcels feature class:
- Determine improvement/land value ratio (I/L). If improvement value is less than the land value (I/L value <1), the parcel is considered underutilized.
    - IL_Ratio = CurrentStructureImprValue / CurrentMarketLandValue
- Classify resulting underutilized parcels based on 2007 UPlan Land Use categories into Residential/Commercial/Industrial.
- Select Underutilized parcels based on the following criteria and put into Vac_UU_Parcels field:
    - Underutilized Commercial (UC):
        - "UPlan_LU_Name" = 'Commercial High' AND "IL_Ratio" <1.0 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000
        - "UPlan_LU_Name" = 'Commercial Low' AND "IL_Ratio" <1.0 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000
    - Underutilized Industrial (UI):
        - "UPlan_LU_Name" = 'Industrial' AND "IL_Ratio" <1.0 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000

- Underutilized Residential (UR):
  - "UPlan_LU_Name" = 'Residential High' AND "IL_Ratio" <1.0 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000
  - "UPlan_LU_Name" = 'Residential Medium' AND "IL_Ratio" <0.75 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000
  - "UPlan_LU_Name" = 'Residential Low' AND "IL_Ratio" <0.75 AND "Own_Class" = 'Private' AND "CurrentStructuralImprValue" >7000

Dynamic Scale:

The Dynamic Scale is an attempt to quantify how open a TAZ (neighborhood) may be to change, either residential or commercial.

- Feature Class: TAZ_20060926_LU_DBF_SCR
- Use TAZ_20060926_LU_DBF_SCR feature class from SCRTPA as the source for the analysis.
- Field: Dynamic2
- Calculate total number of employees (Emp) to total Dwelling Unit (DU) ratio for each TAZ.
  - TotEmp_TotDU = total Employees to total DU ratio
- Calculate total DUs per Acre for each TAZ.
  - TotDU_Acres = total DU to Acres ratio
- Calculate total Employees per Acre for each TAZ.
  - TotEmp_Acres = total Employees to Acres ratio
- Dynamic_Scale:
  - Dynamic (neighborhood is assumed to be open to change/growth):
    - TotEmp_Arcre >= 10.0 or TotEmp_TotDU > 4.0 and TotDU_Acre < 0.5
  - Stable Community assumed to not be open to change/growth):
    - All TAZs that are not dynamic

Land use Homogeneity:

Homogeneity is an attempt to quantify how homogeneous a TAZ (neighborhood) may be.

- Feature Class: TAZ_20060926_LU_DBF_SCR
- Field: Homogeneity
  - Residential:
    - Total Emp is zero, or there are twice as many DUs as Employees
    - TotDU_TotEmp > 2
  - DIV – Diverse:
    - Total DU to Total Emp is between 0.5 and 2, inclusive of 0.5 and 2.
    - 0.5 < TotDU_TotEmp > 2
  - COM – Commercial:
    - Total DU is zero, or there are twice as many Employees as DUs
    - TotDU_TotEmp < 0.5
  - VAC – Vacant:

- Both the Total DU and the Total Employees are zero.

Heat Map Classification

Drawing from the analysis of each neighborhood's vacant and underutilized parcels, number of businesses, and the openness of a neighborhood to change and growth (employee to dwelling unit ratio, dwelling units per acre, and employees per acre). The Neighborhood Dynamic Scale groups all neighborhoods into broad types and detailed sub-types.

INPUT DATA:

- Vacant and underutilized parcels: NeDS_Vacant_UnderUtilized_SCUR_Parcels (Parcel based)
- Number of businesses: TAZ_20060926_SCR_BusinessLicense_2010_2005_APN_cnt_NoResZone_SpJoin_dissolve (TAZ based)
- Oppennes of a neighborhood to chance and growth: TAZ_20060926_Dynamic_LU_DBF_SCR (TAZ based)

PROCESS:

- Union tool was used to combine features
  - Join Attributes - All
  - Gaps - Not Allowed
- Select by attribute where FID of the union features is not -1 (gaps)
  - This basically "clips" the study area to only features that exist in all inputs (parcels and TAZ)
- Clipped unioned data to the SCR boundary
- Gave the following weights:
  - Dynamic Weight
    - Dynamic = 3
    - Stable = 0
  - Business License Weight
    - 26 to 52 = 4
    - 16 to 25 = 2
    - 6 to 15 = 1
    - 0 to 5 = 0
  - Vacant/Underutilized Parcel Weight
    - Vacant = 3
    - Underutilized = 2
    - Not Vacant or Underutilized = 0
- Summed the weights for the 3 fields
- This summed weight was used for the Kernel Density

KERNAL DENSITY CREATION

- Created Point feature for NeDS_Datasets_Union_MinusGaps (feature to point) (Inside)

- Kernel_NeDS
    - Input: NeDS_Data_Union_MinusGaps_POINT
    - Population field: Sum_Weight
    - Output: Kernel_NeDS
    - Output cell size: same as Co_Shasta\RTPA_MAT_41003\Prototype\Data\Centrality_Final.gdb\Kernel_IntersectionDensity (20)
    - Search Radius: 300
    - Area Units: Square Kilometers

Findings

Results of the NeDS analysis were reviewed by the planning departments at the three cities and Shasta County. It was determined through the vetting process that the NeDS tool was more useful in considering prospective locations for growth and transportation-efficient development at the regional scale. At a finer scale, the value was limited when compared to local agency staff's extensive knowledge and familiarity with each parcel and its development history. Furthermore, NeDS is not meant to be used on its own; rather, it is intended to be layered with other analysis performed under the grant scope of work, including geographic measures of mobility, accessibility, and public health.

When combined, these layers helped local and regional planners identify and consider a broader range of prospective 'strategic growth areas' (focus areas for implementing the 5 Ds (Density, Design, Destination accessibility, Distance to transit, Diversity of land use)). As a result of these analysis, 'strategic growth areas' have been identified and are being analyzed for vehicle miles traveled and greenhouse gas emissions using the region's travel demand model and EMFAC post-processing.

New Business Licenses
City of Redding

Legend

- SCR Boundary
- COR City Limit
- Highways
- Roads

TAZs

Number of Business Licenses

- 0 - 5
- 6 - 15
- 16 - 25
- 26 - 52

0 0.5 1

Miles

VESTRA

April 13, 2012

Land Use Homogeneity

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads
- Parcels

Homogeneity

- Diverse
- Commercial
- Residential
- Vacant

VESTRA

January 25, 2012

0 1 2

Miles

Notes:

Diverse --> TAZs in which the Total DU to Total Employees ratio is greater than 0.5 and less than 2.0.

Commercial --> TAZs in which the Total DUs to Total Employees ratio is less than 0.5.

Residential --> TAZs in which the Total DUs to Total Employees ratio is greater than 2.

Vacant --> TAZs in which the No DUs or Employees in the TAZ.

Land Use Homogeneity
City of Anderson

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Homogeneity

- Diverse
- Commercial
- Residential
- Vacant

0 1,000 2,000
Feet

VESTRA

April 13, 2012

Notes:

Diverse --> TAZs in which the Total DU to Total Employees ratio is greater than 0.5 and less than 2.0.

Commercial --> TAZs in which the Total DUs to Total Employees ratio is less than 0.5.

Residential --> TAZs in which the Total DUs to Total Employees ratio is greater than 2.

Vacant --> TAZs in which the No DUs or Employees in the TAZ.

Land Use Homogeneity
City of Redding

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Homogeneity

- Diverse
- Commercial
- Residential
- Vacant

0 1 2
Miles

VESTRA

April 13, 2012

Notes:

Diverse --> TAZs in which the Total DU to Total Employees ratio is greater than 0.5 and less than 2.0.

Commercial --> TAZs in which the Total DUs to Total Employees ratio is less than 0.5.

Residential --> TAZs in which the Total DUs to Total Employees ratio is greater than 2.

Vacant --> TAZs in which the No DUs or Employees in the TAZ.

Land Use Homogeneity
City of Shasta Lake

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Homogeneity

- Diverse
- Commercial
- Residential
- Vacant

0 1,000 2,000
Feet

VESTRA
April 13, 2012

Notes:

Diverse --> TAZs in which the Total DU to Total Employees ratio is greater than 0.5 and less than 2.0.

Commercial --> TAZs in which the Total DUs to Total Employees ratio is less than 0.5.

Residential --> TAZs in which the Total DUs to Total Employees ratio is greater than 2.

Vacant --> TAZs in which the No DUs or Employees in the TAZ.

Neighborhood Dynamic Scale

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads
- Parcels

Neighborhood Scale

- Dynamic
- Stable

VESTRA

January 31, 2012

0 1 2

Miles

Notes:

Dynamic --> TAZs in which the total Employees per acre is greater than 10 or the Total Employees to Total DU ratio is greater than 4.0 and the Total DU per acre is less than 0.5

Stable --> TAZs that are not dynamic.

Neighborhood Dynamic Scale
City of Anderson

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Neighborhood Scale

- Dynamic
- Stable

0 1,000 2,000
Feet

VESTRA

April 13, 2012

Notes:

Dynamic --> TAZs in which the total Employees per acre is greater than 10 or the Total Employees to Total DU ratio is greater than 4.0 and the Total DU per acre is less than 0.5

Stable --> TAZs that are not dynamic.

Neighborhood Dynamic Scale

City of Redding

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Neighborhood Scale

- Dynamic
- Stable

0 0.5 1

Miles

VESTRA

April 13, 2012

Notes:

Dynamic --> TAZs in which the total Employees per acre is greater than 10 or the Total Employees to Total DU ratio is greater than 4.0 and the Total DU per acre is less than 0.5

Stable --> TAZs that are not dynamic.

Neighborhood Dynamic Scale
City of Shasta Lake

Legend

- SCR Boundary
- City Boundary
- Highways
- Roads

Neighborhood Scale

- Dynamic
- Stable

0 1,000 2,000
Feet

VESTRA
April 13, 2012

Notes:

Dynamic --> TAZs in which the total Employees per acre is greater than 10 or the Total Employees to Total DU ratio is greater than 4.0 and the Total DU per acre is less than 0.5

Stable --> TAZs that are not dynamic.

DIGGER BAY
SHASTA DAM ACCESS
KENNETT
STATE HWY-151
TUNNEL
SCENIC TAIL
BASS
TROUT
MULE DEER
FLINTSTONE
WONDERLAND
FISH HILL
MONIQUE
LE-CLAIRE
PEPPERNUT
HOLIDAY
LEE-VIEW
RED BUD
TARGA
HOMER
LINDA VISTA
MASON
DUVAL
SHASTA DAM
MONTEGO
SACRAMENTO
ROSE
PINE
SPRING
PIT
TOYON
LENT
BUCKEYE
HANKINS
HARE
FIG
BEACON
PALM
FERN
HASSEN
SPRUCE
HEISKELL
SHASTA
RANCHERA
FOUR SQUARE
BERRANE
OLD CHATTERTON
NELLIE BELL
HILL
SLOW SEASON
CARPET CREEK
HUCKLEBERRY
FLANAGAN
LATIGO
KOKANEE
MORGASON
BUCKEYE DUMP
YELLOW PINE
BELT LINE
WALKER MINE
FARGO
DEE JAY
CHALLENGE
BLOOMS MOUNTAIN
ELK CREEK
CITY VIEW
SPIKE
TERRA ROSA
SHARTER
WAVERLY
NEWTOWN
JOHNSTON
SHARON
WESTERN
VENAMSON
RODNEY
PINE CONE
TIP TOE
BAILEY
CHARLIE
BLOCK
MACS
PINE VIEW
PETTY
FOREST VIEW
MACS
ROCK
IRISH
PETERSON
MELWOOD
ADELE
LAKE
PARMROSE
SHAVER
DEAN
SUTTON
UZERN
RIBBITS
IRONHORSE
SHASTA GATEWAY
IRON
BRONZE
HOLLY
SECOND
THIRD
GRAPE
ORANGE
OAK
FIRST
FOURTH
FIFTH
SIXTH
KENNETH
RICHARD
SHASTA PARK
LINDA
WHITE
ANDER
TWIN LAKE
LAKEVIEW
VISTA
CREEKSIDE
OAK HILL
FOREST
OLIVER
CENTRAL
JOG
LAUREL
CEDAR
WILLOWS
CYPRESS
POPLAR
PARK
HAZEL
OURAY
ALTUS
CONCHAS
PANCAKE HILL
OLIVE
GIVAN
NORTH
PINE FLAT
RED
BLACK CANYON
WALKER
BOCA
ARROWROCK
JOHNSON
GRAY PINE
LOCUST
TEMPLE
HARDENBROOK
SHOREHAM
PENSACOLA
RED BLUFF
GRAND RIVER
WASHINGTON
MUSSEL SHOALS
KOCH
TANYA
NICHOLE
EUGENE
KEVIN
DYKE
MOON SHADOW
CHICO
GRAND
MAIN
FRONT
NELL ORR
MERIAN
MCCONNELL
SOUTHERN PACIFIC RAILROAD
BELLE VISTA
FELLOWSHIP
FINDER
ANTONIO
LYNDA LYN
UNION SCHOOL
DALYN
OBBULHA
ROXIE
RAMBLING OAK
PHAEDRA
NATALIE
PALA MESA
PIERRA OAKS
RHONDA
MONTANA
RIO MONTE
BURSELL
WHITING
CHURCH
LOS FLORES
ASHBY
SAN GORGONIO
FLOWER
LOS GATOS
LA MESA
EL CAJON
MESQUITE
WILLAMETTE
BONNEVILLE
MEADE
SABEGO
SHASTA
VALLECITO
ELDEN
PARKER
FORT PECK
OREGON
BOULDER
MORNING STAR
JOSEPH
ROSAMOND
ELIZABETH
ELLIOTT
PARASOL
CRANBERRY LEE
PERRY
KENSINGTON
BURLINGHAM
HILLINGTON
TRINITY
WINDSWORTH
PEMBROKE
WESTMINSTER
EPPING
BUTTERFLY
IMPRESSION
SIBLEY
CRYSTAL
WEST
MULBERRY
HUMBOLDT
WIN VIEW
POPPY
ALPINE
PARKIN
RAINTREE
WEBSTER
MIRROW
MIRROW PARK
JESSIE
AKRICH
SMITH
KESSLER
RISSTAY
LOCH
ORKNEY
PERTH
DEER CREEK
GOFFAGE
FELL
SPRING
VIA
LENNOX
VIRGINIA
MORNING DOVE
COVEY
SAN VINCENTE
REDWING
MOODY CREEK
PALERMO
CROOKED OAK
OLD OREGON
MANZANITAS
INDIAN GUNNERY
COOL BREEZE
PLEASANT HILL
BECOY
LUCCA
MAIN LOOP
MID DRIVE
OASIS
BAKER
SANSTONE
CENTURY
GINGER
REDWAY
COUNTRY
MITCH
MARTIN
ELAINE
OGDEN
CINDER
THELMA
TOLEN
BRONZE
IRON
SHASTA GATEWAY
WASSAR
WELLINGTON
BLOOMSBURY
CRAFTSMAN
WOODLAWN
ARLENE
WALTON
COEUR D'ALENE
DOWELL
PAGE
PLUMAS
FARM TRL
CANAL
KLAMATH
OHIO
INDIAN
RIDDLE
CASCADE
ARROWHEAD
MOHAWK
WINNEMUCCA
AUTUMN HARVEST
STRATFORD
ARLINGTON
QUEBEC
ASCOT
NEWBURY
HENDLTON
DARTFORD
GREENWICH
TAPESTRY
DARTMOOR

Vacant and Undertutilized Parcels in Redding

Legend

- City Boundary
- Highways
- Roads
- Parcels

NeDS_LUGROUP

- Underutilized-Commercial
- Underutilized-Industrial
- Underutilized-Residential
- Vacant-Commercial (<$7,000)
- Vacant-Industrial (< $7,000)
- Vacant-Residential (< $7,000)

0 0.5 1 2

Miles

February 7, 2012

VESTRA

Vacant and Undertutilized Parcels
City of Anderson

Legend

- City Boundary
- Highways
- Roads
- Parcels

Parcels

- Underutilized-Commercial
- Underutilized-Industrial
- Underutilized-Residential
- Vacant-Commercial (<$7,000)
- Vacant-Industrial (< $7,000)
- Vacant-Residential (< $7,000)

0 1,000 2,000 4,000

Feet

April 13, 2012

VESTRA

Vacant and Undertutilized Parcels in Redding

Legend

- City Boundary
- Highways
- Roads
- Parcels

NeDS_LUGROUP

- Underutilized-Commercial
- Underutilized-Industrial
- Underutilized-Residential
- Vacant-Commercial (<$7,000)
- Vacant-Industrial (< $7,000)
- Vacant-Residential (< $7,000)

0 0.5 1 2

Miles

April 13, 2012

VESTRA

Vacant and Undertutilized Parcels
City of Shasta Lake

Legend

- City Boundary
- Highways
- Roads
- Parcels

Parcels

- Underutilized-Commercial
- Underutilized-Industrial
- Underutilized-Residential
- Vacant-Commercial (<$7,000)
- Vacant-Industrial (< $7,000)
- Vacant-Residential (< $7,000)

0 1,000 2,000 4,000
Feet

April 13, 2012

VESTRA

Shasta County

Mobility Assessment Tool II

Produced for:
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001

July 18, 2013

Version 1.0

Produced by:

VESTRA Resources, Inc.
5300 Aviation Drive
Redding, CA 96002
(530) 223-2585

Project Understanding

The Mobility Assessment Tool (MAT) is a GIS-based spatial analysis tool which measures the relative degree of vehicular mobility across a region. In the second phase of MAT (MATII), multimodal network mobility has been added. The non-motorized network was incorporated into the road network. The MAT was used to develop heat maps illustrating the concepts of closeness centrality, betweeness centrality, straightness centrality and intersection densities.

Data Sources

Network Dataset

The county-wide road network for Shasta County provided by Marcus Harner (IT/GIS Analyst for Shasta County) on 06/08/2012 was updated to include proposed roads. The network was rebuilt using the updated roads and created in a shapefile format for use in the Urban Network Analysis tool.

Intersection Points with Weights

Intersection points with weighting were created using the Junction Weighting Model and the following data: sidewalk polylines, trail polylines, bike path polylines, and the network dataset junctions (clipped to the South Central Urban Region (SCUR)). The Junction Weighting Model identifies the intersections and records the frequency of each data source within a specified buffer distance. After the model was run, an extensive QC process was performed on the frequency results. The frequency counts had the potential to be miscalculated where road intersections were close together. The QC process included reviewing the frequency results for the sidewalks, trails, and bike paths where the road intersection buffers overlapped and adjusting as necessary. Once the frequencies were verified and/or corrected, a total road intersection frequency was calculated from the sum of the sidewalk, trail, and bike path frequencies. These weighted intersections were then used as the “buildings” in the MIT Urban Network Analysis tool.

Methodology

Urban Network Analysis

Urban Network Analysis is an ArcGIS toolbox developed at the City Form Research Group at MIT. The toolbox can be used to compute five types of network centrality measures on spatial networks: Reach; Gravity Index; Betweenness; Closeness; and Straightness. Unlike previous network centrality tools that operate with two network elements (nodes and edges), the UNA tools include a third network element – buildings – that can be used as the spatial units of analysis for all measures. Two neighboring buildings on the same street segment can therefore obtain different accessibility results. The UNA tools also allow buildings to be weighted according to their particular characteristics – more voluminous, more populated, or otherwise more important buildings can be specified to have a proportionately stronger effect on the analysis outcomes, yielding more accurate and reliable results to any of the specified

measures. The toolbox is built for easy scaling – it can operate on small-scale and detailed networks of dense urban areas, as well as large-scale regional networks (Sevtsuk and Mekonnen 2011).

For MAT II, Intersection points with a frequency weight were used as the "buildings" in the Urban Network Analysis tool. The Urban Network Analysis tool was used to compute three types of network centrality: Closeness, Betweenness, and Straightness.

For the purposes of MAT II, degree centrality was equivalent to the weight of the intersection, determined in the Junction Weighting Model and subsequent QA/QC .

Degree

The *Degree* of an intersection is the count of how many edges extend out from this node (how many direct neighbors this node has). As stated above, for the purposes of MAT II, degree centrality was equivalent to the weight of the intersection, determined in the Junction Weighting Model and subsequent QA/QC .

Closeness

The *Closeness* of a building is defined as the inverse of distance required to reach from that building to all other buildings in the system that fall within the Search Radius along the shortest paths (Sabidussi 1966). Whereas the *Betweenness* measure indicates the potential traffic passing a location, the *Closeness* measure indicates how close a building is to all other surrounding buildings within a given distance threshold. If no Search Radius is provided, then the index is calculated to all other nodes in system. The Closeness measure is defined as follows:

$$C^r[i] = \frac{1}{\sum_{j \in G-\{i\}, d[i,j] \leq r} (d[i,j] \cdot W[j])}$$

Where *Cr[i]* is the Closeness of building *i* within the Search Radius *r* (specified in the *Search Radius* box), *dij* is the shortest path distance between buildings *i* and *j*, and *W[j]* is the weight of building *j*. If no weights are chosen, then *W[j]* =1 (Sevtsuk and Mekonnen 2011).

Betweenness

The *Betweenness* of a building *i* is defined as the fraction of shortest paths between pairs of other buildings in the network that pass by building (Freeman 1977). If more than one shortest path is found between two nodes, as is frequently the case in a rectangular grid of streets, then each of the equidistant paths is given equal weight such that the weights sum to unity. The *Betweenness* measure is defined as follows:

$$B^r[i] = \sum_{j,k \in G-\{i\}, d[j,k] \leq r} \frac{n_{jk}[i]}{n_{jk}} \cdot W[j]$$

Where n_{jk} is the number of shortest paths from building *j* to building *k* in *G*, and $n_{jk}[i]$ is the number of shortest paths from *j* to *k* that pass through *i*, with *j* and *k* lying within the network radius *r* from *i*. *W[j]* represents the weight of building *j* (Sevtsuk and Mekonnen 2011).

Straightness

The straightness metric (Vragovic, Louis, et al. 2005) illustrates the extent to which the shortest paths from a node of interest to all other nodes in the system resemble straight Euclidian paths. Put alternatively, the straightness metric captures the positive deviations in travel distances that result from the geometry of the road network in comparison to ideal straight-line distances in a featureless plane. The straightness measure is defined by (Porta, Crucitti et al. 2005) as:

$$S^r[i] = \sum_{j \in G - \{i\}, d[i,j] \leq r} \frac{\delta[i,j]}{d[i,j]}$$

Where *Sr[i]* is the Straightness of building *i* within the Search Radius *r* (specified in the *Search Radius* box),δ[i,j] is the straight-line Euclidian distance between nodes *i* and *j*, and *d[i,j]* is the shortest network distance between the same nodes. The Straightness index illustrates how much the shortest network paths from a building to the surrounding building *j* deviate from the as-a-crow-flies distance. Naturally, as the distances between nodes get longer, differences between the network distance and as-a-crow-flies distance start diminishing (Sevtsuk and Mekonnen 2011).

MATII MIT UNA Tool Inputs

Search Radius: none specified

The *Search Radius* input defines the buffer radius used for computing the specified measures.
For each Input Building, only the other points, whose shortest network distance from the given Input Point is less than the *Search Radius,* are considered in the analysis. If no Search Radius is specified by the user, then the default infinite (n) radius is used to reach all parts of the graph.
The units for *Search Radius* are the same as the Impedance Attribute units of your Network Dataset: if your network Impedance Attribute is in meters, then the Search Radius is in meters etc (Sevtsuk and Mekonnen 2011).

Max Neighbor Separation: 5

The *Max Neighbor Separation* input defines the maximum distance that the adjacency matrix uses to search for neighboring buildings. On urban street networks there are rarely buildings that are located further than 600 meters from their closest neighbors, which is the default value in the toolbox. In regional networks, or other large-scale networks, however, buildings or other network instances can be

much further from each other, in which case this radius should be increased according to the data (Sevtsuk and Mekonnen 2011).

Normalize Results: Yes

The output of each measure is normalized by the total number of neighboring buildings within the given *Search Radius*. If no Search Radius is used, the results are normalized by the total number of Input Points in the graph. For *Betweenness* and *Straightness* measures, normalized results (without weights) will always produce resulting values that fall between zero and one. Note that the nature of the *Closeness* measure, however, does not guarantee normalized values between zero and one. If weights are used in the analysis, then normalization is performed with the sum of weights instead of the sum of buildings (Sevtsuk and Mekonnen 2011).

Data Organization

1. Created MATII_Data.gdb
   - Imported RoadJunctions_SCR_20120801.shp to MATII_Data.gdb
   - Created Point feature class: Centrality from intersections
     - Field mapped: Cb, Cc, Cs, Cd
     - Added field: C_avg
     - Added aliases

KERNAL DENSITY CREATION

From the four centrality measures (Cb, Cc, Cs, Cd), four heat maps were created using a kernel density based on the intersection points.

- Input: Centrality
- Population field: Cb, Cs, Cc, or Cd
- Output: Kernel_Betweenness, Kernel_Straightness, Kernel_Closeness, or Kernel_Degree
- Output cell size: 6
- Search Radius: 400
- Area Units: Square Kilometers

Findings

The individual centralities (Cb, Cc, Cs, Cd) measure the importance of a weighted intersection to all other intersections. They are an accurate analysis of distance and angularity between two places. Visually they layers can be used to study the spatial configurations of the region and the effect of the multi-modal network on the configuration. Further changes to the symbology of the heat maps could bring focus to those areas with the highest centrality calculations. The average centrality (C_avg) serves no

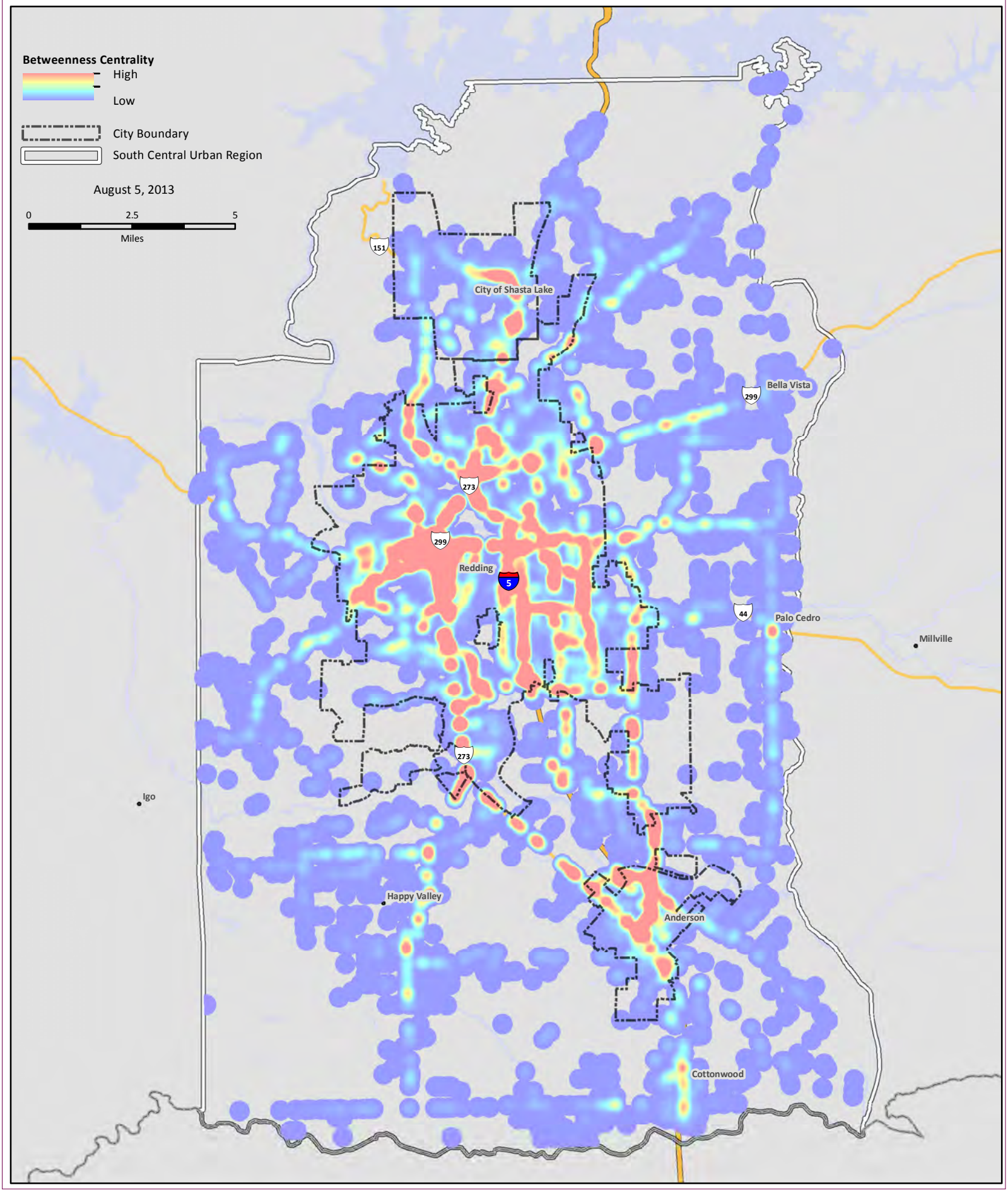
purpose, because the individual centralities are on vastly different scales even though they were normalized.

MAT II is one of several spatial analysis that, when combined, served to inform regional and local planners with regard to potential 'strategic growth areas' (focus areas for implementing the 5 Ds (Density, Design, Destination accessibility, Distance to transit, Diversity of land use)). Results of the NeDS analysis were reviewed by the planning departments at the three cities and Shasta County. Utilizing these analysis, 'strategic growth areas' have been identified and are being analyzed for vehicle miles traveled and greenhouse gas emissions using the region's travel demand model and EMFAC post-processing.

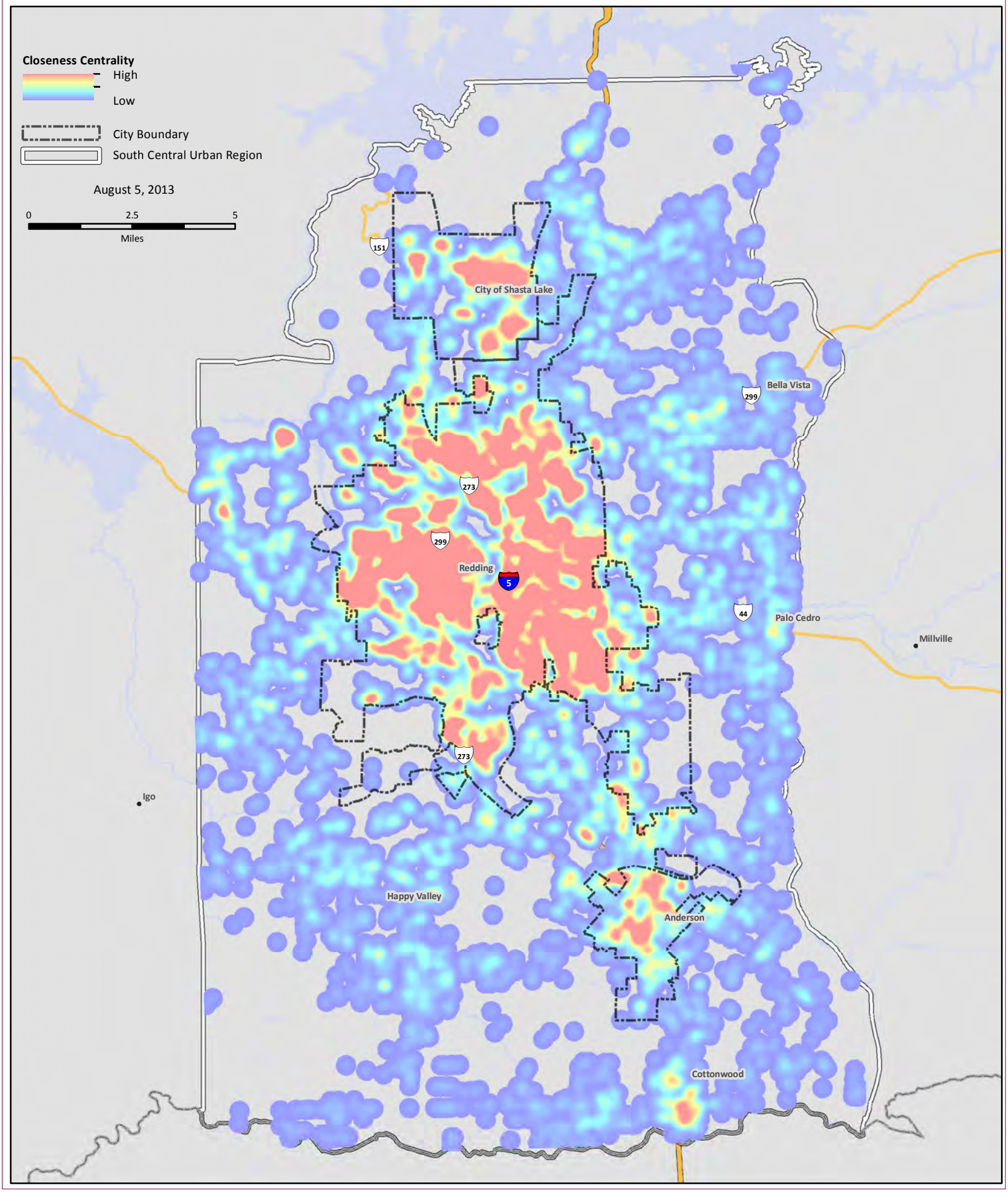
Reference

Sevtsuk, Andres; Michael Mekonnen (2011). Urban Network Analysis A toolbox for ArcGIS, Help. Cambridge, MA: MIT City Form Research Group.

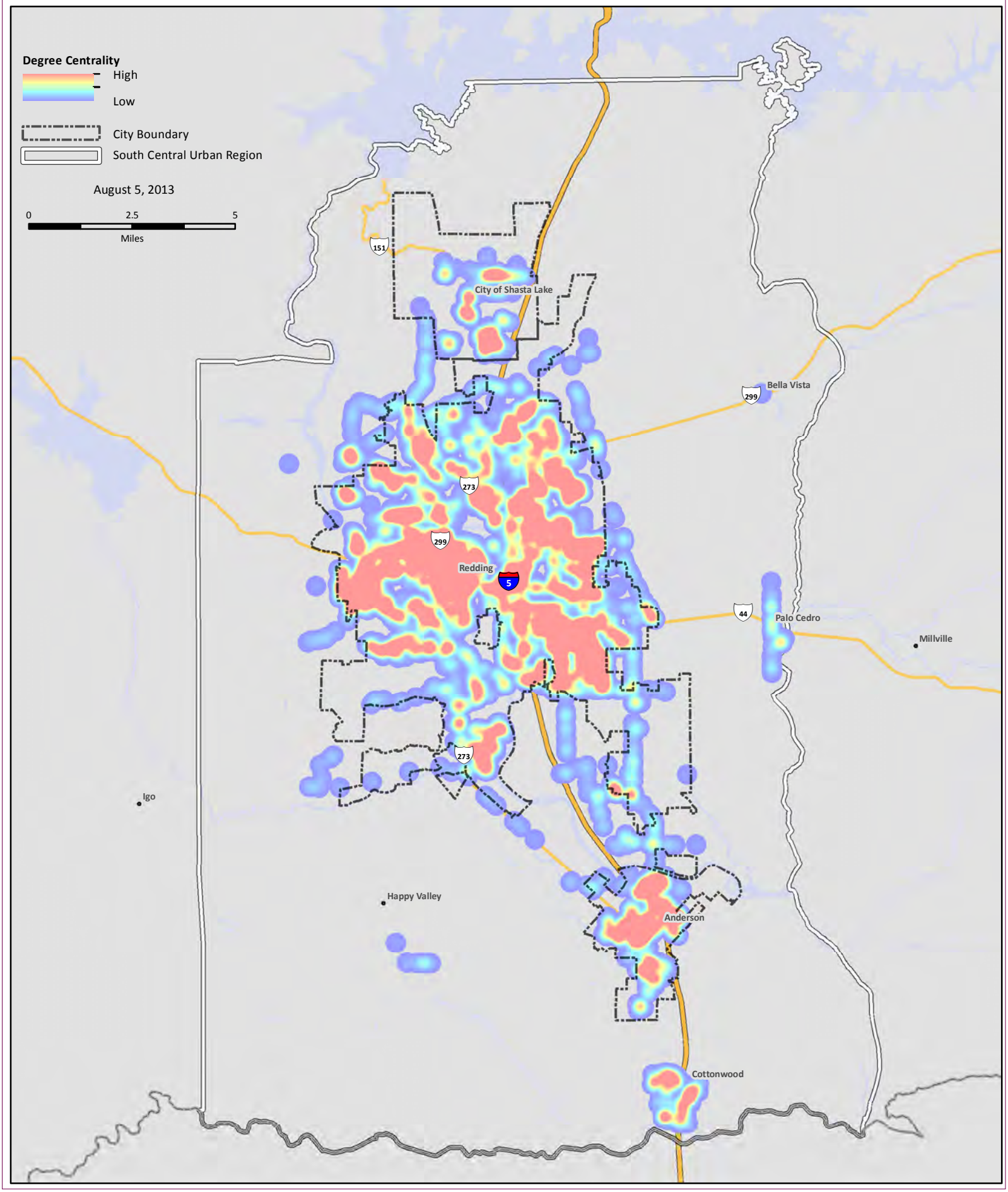
Centrality - Betweenness



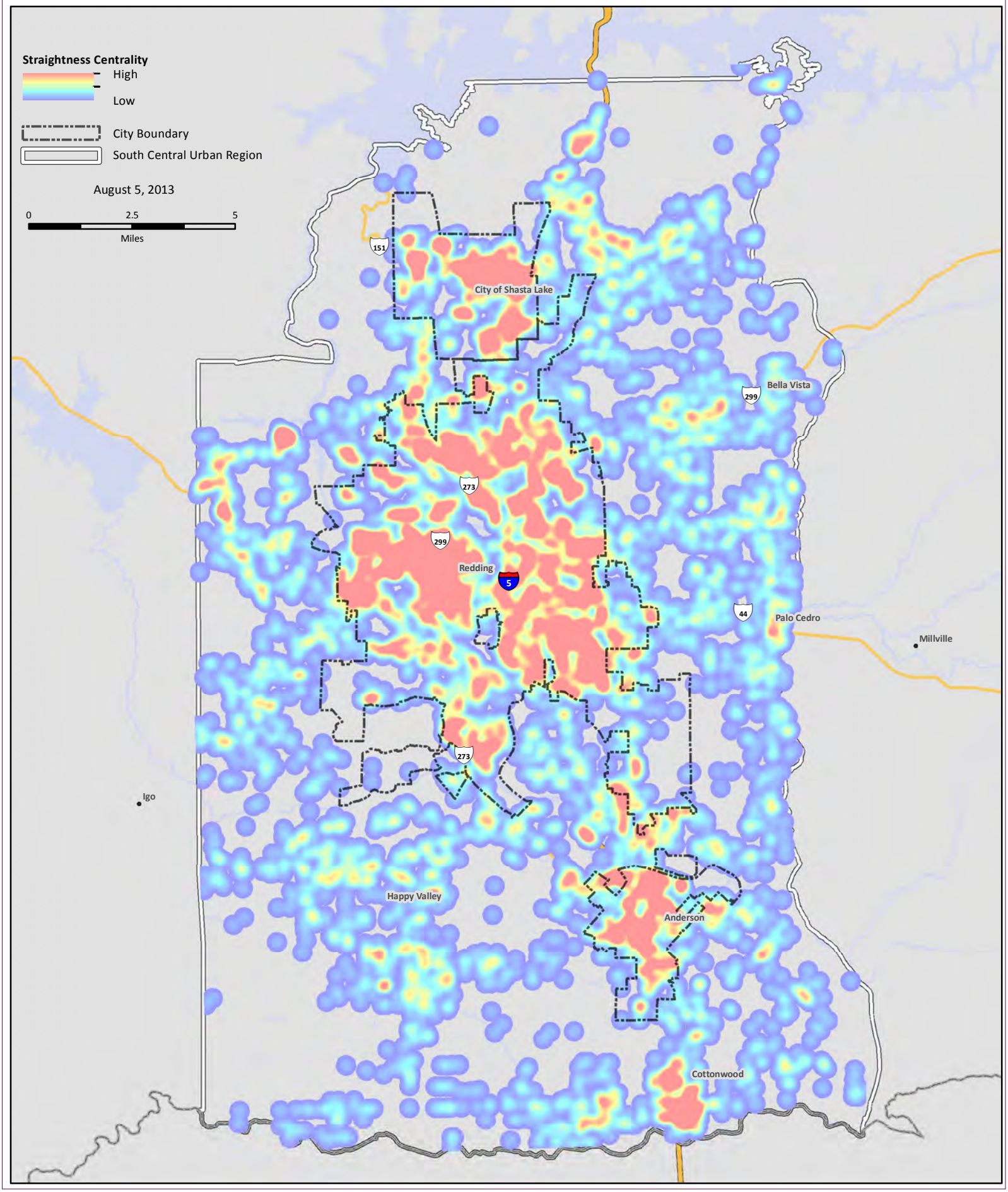
Centrality - Closeness



Centrality - Degree



Centrality - Straightness



Shasta Community Well-Being Atlas (SCWBA) Demonstration Project

Produced for:
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001

July 19, 2013

Version 1.0

Produced by:

VESTRA Resources, Inc.
5300 Aviation Drive
Redding, CA 96002
(530) 223-2585

Project Understanding

The Shasta Community Well-Being Atlas (SCWBA) Demonstration Project was designed to provide a benefit to the community through the mapping of six different health indicators, with the ultimate goal to incorporate health and well-being in future decision making processes. This project created the opportunity to partner GIS students with industry professionals resulting in valuable education and work experience. During the project student interns produced demographic and health indicator data and maps to provide access to and publish information on the well-being of communities in Shasta County, California.

Data Sources

See the Shasta Community Well-Being Atlas Demonstration Project report (SCWBA_Report.pdf).

Methodology

See the Shasta Community Well-Being Atlas Demonstration Project report (SCWBA_Report.pdf).

Meeting Coordination

The SCWBA Demonstration Project was a collaborative effort between Healthy Shasta, Shasta College, Shasta Regional Transportation Agency (SRTA), and VESTRA Resources, Inc. (VESTRA). The project team and contributors include the following:

Healthy Shasta: Amy Pendergast, Community Education Specialist
County Health and Human Services Agency: Minnie Sagar, Brandy Isola, and Jeremy Wilson
Shasta College: Dan Scollon, GIS and Geography Faculty
Shasta College student interns: Daniel Stills, Hilly Wallis, Harmony Gugino, and Alyson Stubbendick
Shasta Regional Transportation Agency: Dan Wayne, Senior Planner
VESTRA Resources: Jenn Pollom, Project Manager and Lead GIS Analyst, and Jody Tarvin, GIS Analyst

Meeting Dates

Throughout the project, team meetings were held to discuss project goals, intern learning objectives, data analysis and outcomes. Team meetings were held on the following dates:

- January 12, 2011
- February 14, 2011
- March 18, 2011
- April 15, 2011
- May 20, 2011
- September 22, 2011
- November 1, 2011
- May 15, 2012

Meeting Agendas and Minutes

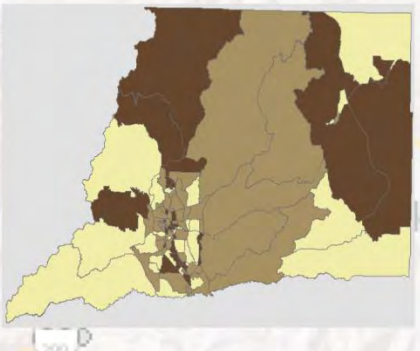
Subsequent pages contain copies of the meeting agendas and minutes. Note that no meeting minutes were delivered for the final meeting as it was a project wrap up meeting with no action items.

Findings

See the Shasta Community Well-Being Atlas Demonstration Project report (SCWBA_Report.pdf).

Shasta Community Well-Being Atlas

Demonstration Project



Shasta County Regional Transportation Planning Agency

VESTRA

GEC Geospatial Education Collaborative
Shasta College • National Science Foundation

HEALTHY SHASTA
Better choices. Healthy changes.

Shasta Community Well-Being Atlas Demonstration Project

The team behind the development of the Shasta Community Well-Being Atlas (SCWBA) Demonstration Project is proud to announce the completion of the project and launch of the SCWBA Demonstration Project Map on the FarNorCal GIS server. The team is distributing this document to community organizations for their use, and the on-line map offers the ability for all to explore six different health indicators at the county level, as well as at a neighborhood level in Shasta County, California. The ultimate goal of this project is to provide a benefit to the community, and incorporate health and well-being in future decision making processes.

This document is intended to be informative in nature and should not be considered a policy document. Due to the nature of an internship demonstration project, the number of well-being indicators needed to be limited to six. The team understands that well-being in a community includes more factors than the six indicators analyzed and that these are well-being indicators only and should not be considered all inclusive of public health. Due to the confidential nature of the indicator data, it is important to note that the data has been analyzed and displayed at the Census block group level. This level of geographic analysis has limitations. Census block groups can range from 600 to 3,000 people and more accurately represent "neighborhoods" where populations are concentrated (in Cities for example). As areas become more rural, the size of the block group increases, and they look less like a "neighborhood". Please be aware that these limitations may affect one's ability to draw conclusions.

The SCWBA Demonstration Project developed as a collaborative effort between Healthy Shasta, Shasta College, Shasta County Regional Transportation Planning Agency (SCRTPA), and VESTRA Resources, Inc. (VESTRA). The team would like to thank the contributors from Shasta County Health and Human Services Agency, Minnie Sagar, Brandy Isola, and Jeremy Wilson, as well as Shasta College student interns Daniel Stills, Hilly Wallis, Harmony Gugino, and Alyson Stubbendick.

Thank you, and enjoy!

The Project Team

Amy Pendergast, Community Education Specialist, Healthy Shasta _____

Jennifer Pollom, Project Manager, Lead GIS Analyst, VESTRA _____

Dan Scollon, GIS and Geography Faculty, Shasta College _____

Jody Tarvin, GIS Analyst, VESTRA_____

Dan Wayne, Senior Planner, SCRTPA _____

Table of Contents

Project Team Background 1

Project Objectives and Scope 3

Community Well-Being Indicators and Mapping Methods 4

Community Well-Being Indicator Maps 7

- Shasta County Population Density 8
- Air Quality - Percent of Residential Parcels within 500 Feet of a Truck Route 9
- Education - Percent of Adults with a Bachelor's Degree or Higher 10
- Off-Sale Alcohol - Number of Off-Sale Alcohol Outlets per 1,000 People 11
- Poverty - Percent of Households Living Below Poverty 12
- WIC - Number of Retail Establishments that Accept WIC per 1,000 People 13
- YPLL - Years of Potential Life Lost per 1,000 People 14

The Future of the Shasta CWBA 15

Disclaimer 15

Project Team Background

Healthy Shasta

Healthy Shasta is a local partnership that promotes healthy and active living among north state residents. Healthy Shasta was formed out of concern over increasing rates of childhood obesity and chronic diseases such as type II diabetes. The Healthy Shasta Vision is a community where the healthy choice is the easy choice. Their initiative areas include: Healthy Schools, Food Systems, Walking/Biking, Healthy Communities/Built Environment, and Walk the Talk - encouraging environmental, policy, and organizational changes that support healthy, active lifestyles.

Amy Pendergast and Minnie Sagar served as subject matter experts in public health. Each has a Master's in Public Health, and their work incorporates ways in which the built environment impacts health outcomes. Amy is the Community Education Specialist for the Healthy Shasta partnership. She works to improve physical activity levels and healthy eating in the community, with a focus on walkability, bikability, and physical activity. At the time of her involvement in the demonstration project, Minnie Sagar's position at Shasta County Health and Human Services Agency was Public Health Program and Policy Analyst. She worked with intern Daniel Stills to research and narrow down the indicators that would ultimately be developed.

Shasta College

Shasta College's GIS Certificate Program provides students with applied training in GIS, GPS and related technologies. With the support of a grant from the National Science Foundation (NSF-ATE #1003865), Shasta College initiated the Geospatial Education Collaborative with the goal of providing benefits to students and the community through the collaboration of education, government, and private sector entities. With these objectives in mind, Shasta College undertook the Community Well-Being Atlas Demonstration Project with the following goals: develop an interactive atlas of health and well-being measures for community access and improved decision making; expose Shasta College students to the professional GIS industry by working with experts in GIS, public health, and planning; and incorporate a well-being atlas into the regional FarNorCal GIS server, housed at Shasta College.

Dan Scollon has taught Geography, Geographic Information Systems and Natural Resources at Shasta College in Redding, California since 1996. Dan is the grant facilitator, intern coordinator, and mentor for this project.

Shasta County Regional Transportation Planning Agency (SCRTPA)

The Shasta County Regional Transportation Planning Agency (SCRTPA) and Metropolitan Planning Organization (MPO) is a transportation policy-making organization made up of representatives from local government and transportation authorities. MPO's were created by Congress in order to ensure that existing and future expenditures in transportation projects are based on a continuing, cooperative, and comprehensive planning process.

Dan Wayne is a Senior Planner at SCRTPA. He is responsible for coordinating project activities relative to SCRTPA's Sustainable Communities Strategy and was the SCRTPA Project Manager for Shasta*FORWARD*>>. Partial funding for the demonstration project was provided through SCRTPA's Proposition 84 grant for a Sustainable Communities Strategy (SCS).

VESTRA Resources Inc. (VESTRA)

VESTRA is an employee-owned corporation founded in 1988. They specialize in providing environmental consulting, planning, engineering, and geospatial information technology-based solutions. VESTRA provided project management services as well as intern supervision and training for this project. VESTRA performed the feasibility study and implemented the FarNorCal GIS platform.

Jennifer Pollom is a project manager and lead GIS analyst at VESTRA. She became involved in GIS centric community projects with her work at the California Center for Rural Policy. Jody Tarvin is a GIS analyst at VESTRA. As a recent graduate of the Shasta College GIS certificate program, Jody provided valuable insight into the intern learning process. Jennifer and Jody worked closely with the student interns to provide training and mentoring as well as coordinating project tasks.

Project Objectives and Scope

The Shasta Community Well-Being Atlas (SCWBA) Demonstration Project is designed to provide a benefit to the community through the mapping of six different health indicators, with the ultimate goal to incorporate health and well-being in future decision making processes. This project has created the opportunity to partner GIS students with industry professionals resulting in valuable education and work experience. During the project student interns produced demographic and health indicator data and maps to provide access to and publish information on the well-being of communities in Shasta County, California.

The World Health Organization defines health as: "…not only the absence of infirmity and disease but also a state of physical, mental, and social well-being."

The project objectives were designed to:

- Better incorporate health and well-being in decision making processes
- Develop GIS data that would be available to all collaborative parties
- Develop a tool that consists of different health measures that can be spatially analyzed, relevant at a neighborhood level and tracked over time
- Use GIS technology to make data available to both agencies and the general public
- Create opportunities for Shasta College students to gain GIS experience through worksite learning internships
- Facilitate active participation by students in primary data collection and processing
- Expose Shasta College students to community projects and working with both data experts and technology experts
- Expose Shasta College students to ArcGIS server technology

The Community Well-Being Atlas Demonstration Project will serve to inform Shasta County's Sustainable Community Strategy (SCS), incorporating public health into the transportation planning process. Public health professionals and community organizations may also utilize the maps to communicate and/or evaluate the community's needs.

A map service has been created and published to the FarNorCal GIS server to display health indicators and make data available to all collaborative parties. A map service allows the user to navigate an online map and zoom and pan to explore particular locations of interests, features, and associated data. The SCWBA is available for viewing by agencies and the general public at: http://farnorcalgis.org/platformviewer/wellbeing.html#.

Four student interns had the opportunity to participate in different roles in the process. Each semester a student was assigned different learning objectives with a specific focus. The main focuses of the project were analysis, cartography, geodatabase design, and development of a map service. Shasta College students worked with experts in GIS and public health and were expected to meet the needs and expectations specific to their assigned learning objectives. This project was directed and supervised by VESTRA Resources, Inc. to ensure appropriate methods, rigor of quality control and defensibility of results.

Community Well-Being Indicators and Mapping Methods

Health indicator and demographic data underwent analysis and interpretation to the standards of the project team, including performing quality assurance/quality control of the data. Analysis for the SCWBA Demonstration Project consisted of applying the framework and workflow of the geocoding process, including the development of addressing services and resolving errors. Documentation of procedures and methodologies was completed, as well as the creation of metadata.

Maps were designed using cartographic principles in order to create an effective map display and style. Many different geographic mapping units were implemented in order to investigate and determine the best display of the health indicator and demographic data that was analyzed. Due to the level of detail needed to view the smaller block groups located in the cities, the south central urban region of Shasta County has been displayed as the focus areas. Different cartographic methods were applied while creating an effective map for display in both hardcopy and on-line.

Upon the completion of data analysis and application of cartographic principles, a map service was published to create an operational layer map to optimize the display of all six health indicators on a single map. In addition to displaying data in an operational map, a regional government geodatabase was configured for storing base layers. This required analyzing a geodatabase template provided by Esri and included emptying all feature classes of example records, projecting feature classes and development of attribute domains relative to the region.

Air Quality - Percent of Residential Parcels within 500 Feet of a Truck Route

The air quality map shows the percent of residential parcels within 500 feet of a truck route for each 2000 Census block group. Epidemiologic studies have consistently found that people living within a certain proximity to areas with high traffic density are at an increased risk for health issues such as reduced lung function, increased asthma hospitalizations and symptoms, bronchitis symptoms, and increased medical visits. Children appear to be the most sensitive to adverse effects. California freeway studies show that exposure levels approach background levels after a distance of 500 feet. (Excerpted from the Healthy Development Measurement Tool [HDMT], www.thehdmt.org)

This indicator was created by selecting residential parcels within 500 feet of a truck route. The data is displayed for Shasta County at the 2000 Census block group level. Population figures are from the 2005-2009 U.S. Census American Community Survey. Truck routes were created from local and state sources including Shasta County, the California Department of Transportation traffic counts, and local city transportation planners. Parcel data is from the Shasta County Assessors-Recorder's Office.

Education - Percent of Adults with a Bachelor's Degree or Higher

The education map shows the percent of people over 25 years old who have a bachelor's degree or higher in each 2000 Census block group. Research has shown that educational attainment is one of the strongest predictors of health. Education provides people with a comprehensive understanding of health information to lead healthy lives socially, physically and mentally. Education is correlated with many social, economic, and health conditions. Higher education increases the opportunity to obtain housing in a safe neighborhood, pursue healthy food options, and receive quality health insurance.

This indicator was created from the U.S. Census 2005-2009 American Community Survey table B15002 - 'Sex by Education Attainment for the Population 25 Years and Over'. This data is displayed for Shasta County at the 2000 Census block group level. Population figures are from the 2005-2009 U.S. Census American Community Survey.

Off-Sale Alcohol - Number of Off-Sale Alcohol Outlets per 1,000 People

The off-sale alcohol map shows the number of off-sale alcohol outlets per 1,000 people in each 2000 Census block group. Off-sale alcohol outlets are those that are authorized by the State of California to sell alcoholic beverages for off-site consumption. Grocery stores, liquor stores and mini-marts are included; restaurants and eating establishments are excluded. Research indicates that as alcohol outlet density increases, the risk of negative public health outcomes also increases. Examples include death from liver cirrhosis, alcohol related hospitalizations, traffic collisions, sexually transmitted diseases, child abuse, and crime and violence. (Excerpted from HDMT)

This indicator was created by geocoding the addresses of off-sale alcohol retailers. This data is displayed for Shasta County at the 2000 Census block group level. Addresses of active off-sale retail locations are from the California Department of Alcoholic Beverage Control. Population figures are from the 2005-2009 U.S. Census American Community Survey.

Poverty - Percent of Households Living Below Poverty

The poverty map shows the percent of households whose income is below the Federal Poverty Level in each 2000 Census block group. Research shows that low socioeconomic status underlies limited access to health care, detrimental environmental exposures, and poor or risky health behaviors. Chronic stress associated with poverty also increases disease and death. In America, people living in poverty have substantially shorter life expectancies and an increase in illness than those who are financially secure. (Excerpted from the HDMT)

This indicator was created from U.S. Census 2005-2009 American Community Survey table C17002 - 'Ratio of Income to Poverty Level in the Past 12 Months'. This data is displayed for Shasta County at the 2000 Census block group level. Population figures are from the 2005-2009 U.S. Census American Community Survey.

Poverty statistics in ACS products adhere to the standards specified by the Office of Management and Budget in Statistical Policy Directive 14. The Census Bureau uses a set of dollar value thresholds that vary by family size and composition to determine who is in poverty. If an individual's total income is less than the appropriate threshold, then that individual is considered to be in poverty. Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. These groups were excluded from the numerator and denominator when calculating poverty rates.

WIC - Number of Retail Establishments that Accept WIC per 1,000 People

The WIC map shows the number of retail food establishments that accepts WIC per 1,000 people in each 2000 Census block group. WIC (Women, Infants and Children) provides Federal grants to States for supplemental foods for low-income pregnant, breastfeeding, and non-breastfeeding postpartum

women, and to infants and children up to age five who are found to be at nutritional risk. (USDA Food & Nutrition Service, www.fns.usda.gov/wic/)

The WIC program contains specifics as to what qualifies as healthy food. Identifying retail establishments that accept WIC allows areas to be displayed that are serviced by large scale grocery stores or small markets that provide access to healthy food options. Research shows that good nutrition, including the consumption of fruits and vegetables have positive health outcomes such as lower risk of obesity, heart disease, and some types of cancer.

This indicator was created by geocoding the addresses of retail establishments that accept WIC. This data is displayed for Shasta County at the 2000 Census block group level. Addresses of WIC authorized vendors are from the Shasta County Health and Human Services Agency, WIC Program. Population figures are from the 2005-2009 U.S. Census American Community Survey.

YPLL - Years of Potential Life Lost per 1,000 People

The Years of Potential Life Lost (YPLL) map shows the average number of years of potential life lost per 1000 residents (under 75 years of age) from 2005-2009 in each 2010 Census block group. This is an indicator of premature (early) death in a population. Leading causes of premature death include unintentional injuries and heart disease. Addresses used in the analysis indicate where the individual who died lived at the time of death, not where the death occurred. Addresses could not be geocoded for approximately 1.5% of deaths, therefore those are not reflected in this map.

Because of the fact that a small number of events make rates susceptible to large fluctuation, block groups with fewer than 20 premature deaths have been labeled as unstable and therefore, comparisons are not valid.

This indicator was created by geocoding death record addresses from 2005 to 2009. This data is displayed for Shasta County at the 2010 Census block group level. Death records for Shasta County from 2005 to 2009 are from the California Department of Public Health, Health and Information Research Section. Population figures are from the 2010 U.S. Census.

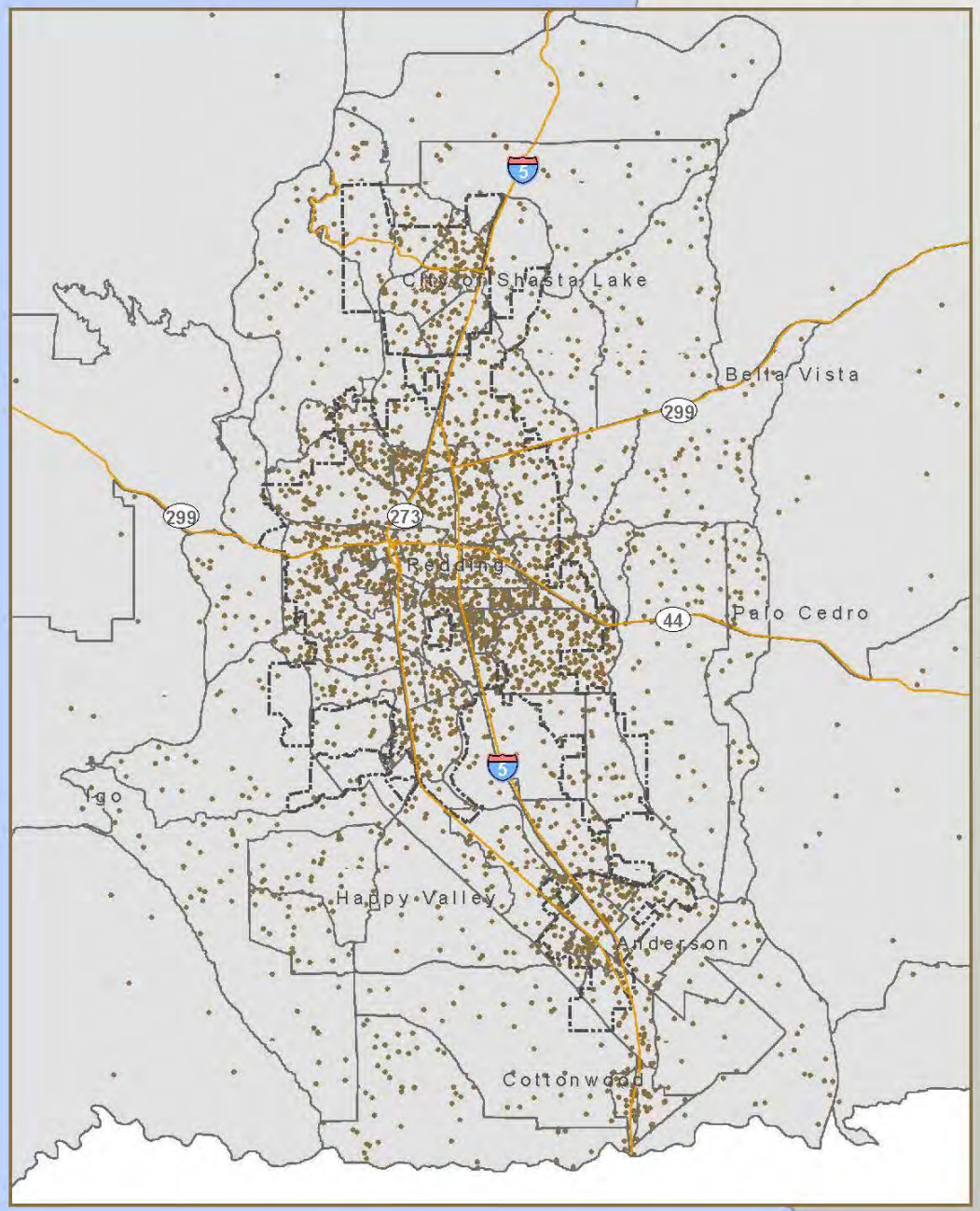
Community Well-Being Indicator Maps

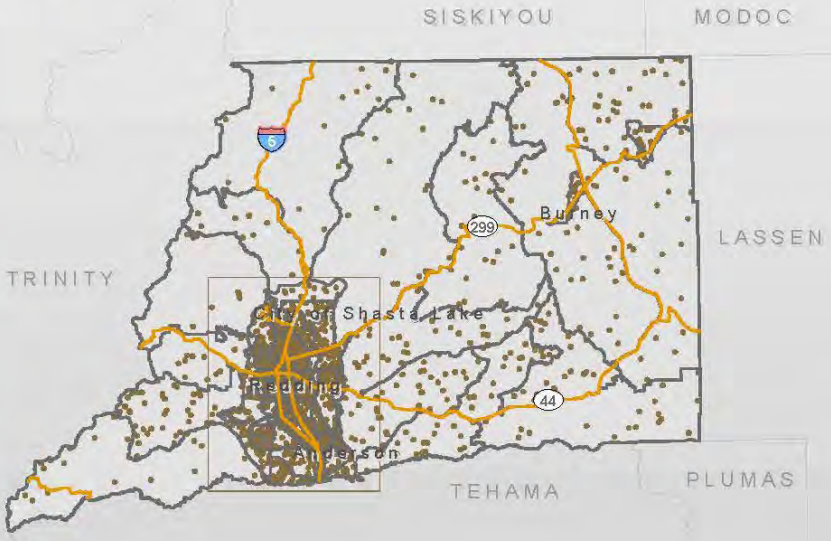
The following community well-being indicator maps are presented on subsequent pages.

- Shasta County Population Density
- Air Quality - Percent of Residential Parcels within 500 Feet of a Truck Route
- Education - Percent of Adults with a Bachelor's Degree or Higher
- Off-Sale Alcohol - Number of Off-Sale Alcohol Outlets per 1,000 People
- Poverty - Percent of Households Living Below Poverty
- WIC - Number of Retail Establishments that Accept WIC per 1,000 People
- YPLL - Years of Potential Life Lost per 1,000 People

Shasta Community Well-Being Atlas

Population Density





Population Density

1 Dot = 50

City Boundaries

This map shows the 2005 to 2009 U.S. Census 5-year American Community Survey population density. Each dot represents 50 people.

Population Data Source: US Census Bureau 5-year ACS

Map developed through a partnership between

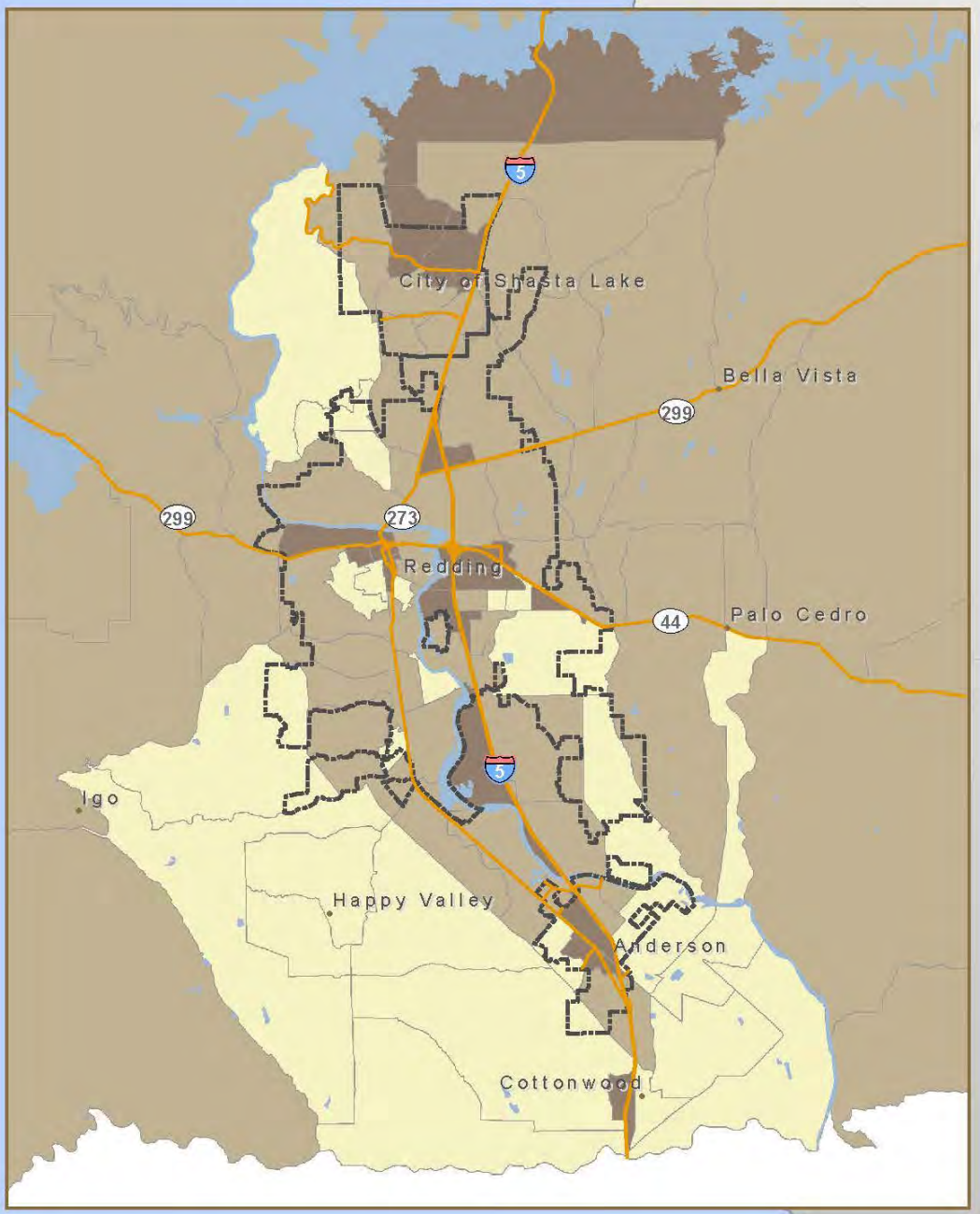
HEALTHY SHASTA · GCC · Shasta County · VESTRA

N

S

Shasta Community Well-Being Atlas

Residential Parcels at Risk of Adverse Traffic Related Air Quality Exposure



Percent of Residential Parcels within 500 Feet of a Truck Route

Statistical differences cannot be inferred from these assigned breaks

County Average = 6.4

- 0 - 0.4
- > 0.4 and < 12.3
- > 12.3
- Truck Routes
- City Boundaries

This map shows the percent of residential parcels within 500 feet of a truck route in each 2000 Census block group. Epidemiologic studies have consistently found that people living within a certain proximity to areas with high traffic density are at an increased risk for health issues such as reduced lung function and increased asthma hospitalizations, asthma symptoms, bronchitis symptoms, and medical visits. Children appear to be the most sensitive to adverse effects. California freeway studies show exposure levels approach background levels after a

Source: Shasta County GIS Division, Caltrans Traffic Data Branch, City of Redding, Anderson, and Shasta Lake

Map developed through a partnership between

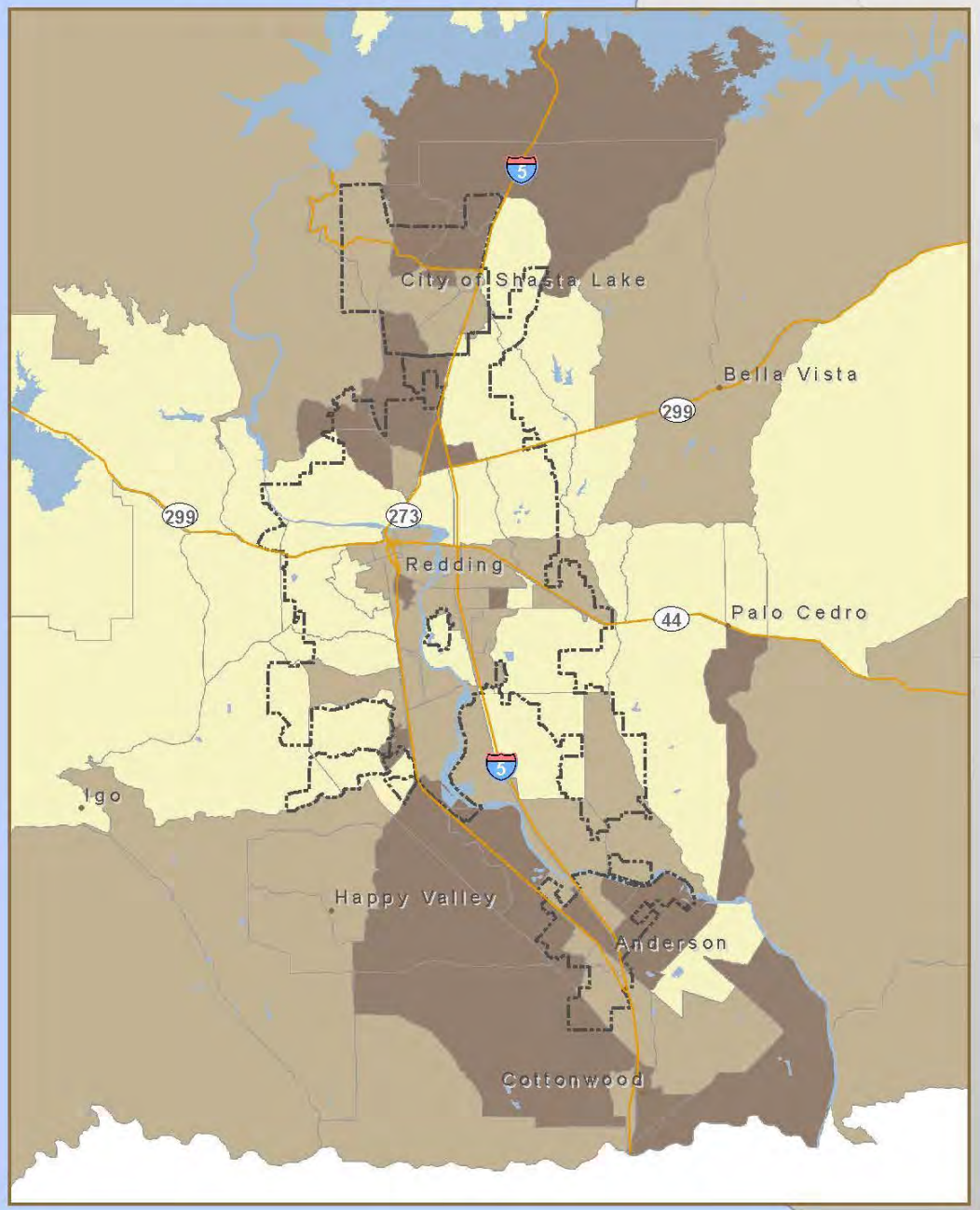
HEALTHY SHASTA · GCC · Shasta County · VESTRA

N

S

Shasta Community Well-Being Atlas

People Aged 25 Years and Over Who Have a Bachelor's Degree or Higher



Percent of Adults with a Bachelor's Degree or Higher

Statistical differences cannot be inferred from these assigned breaks

County Average = 19.4

- > 22.2
- > 11.2 and < 22.2
- 0 - 11.2
- City Boundaries

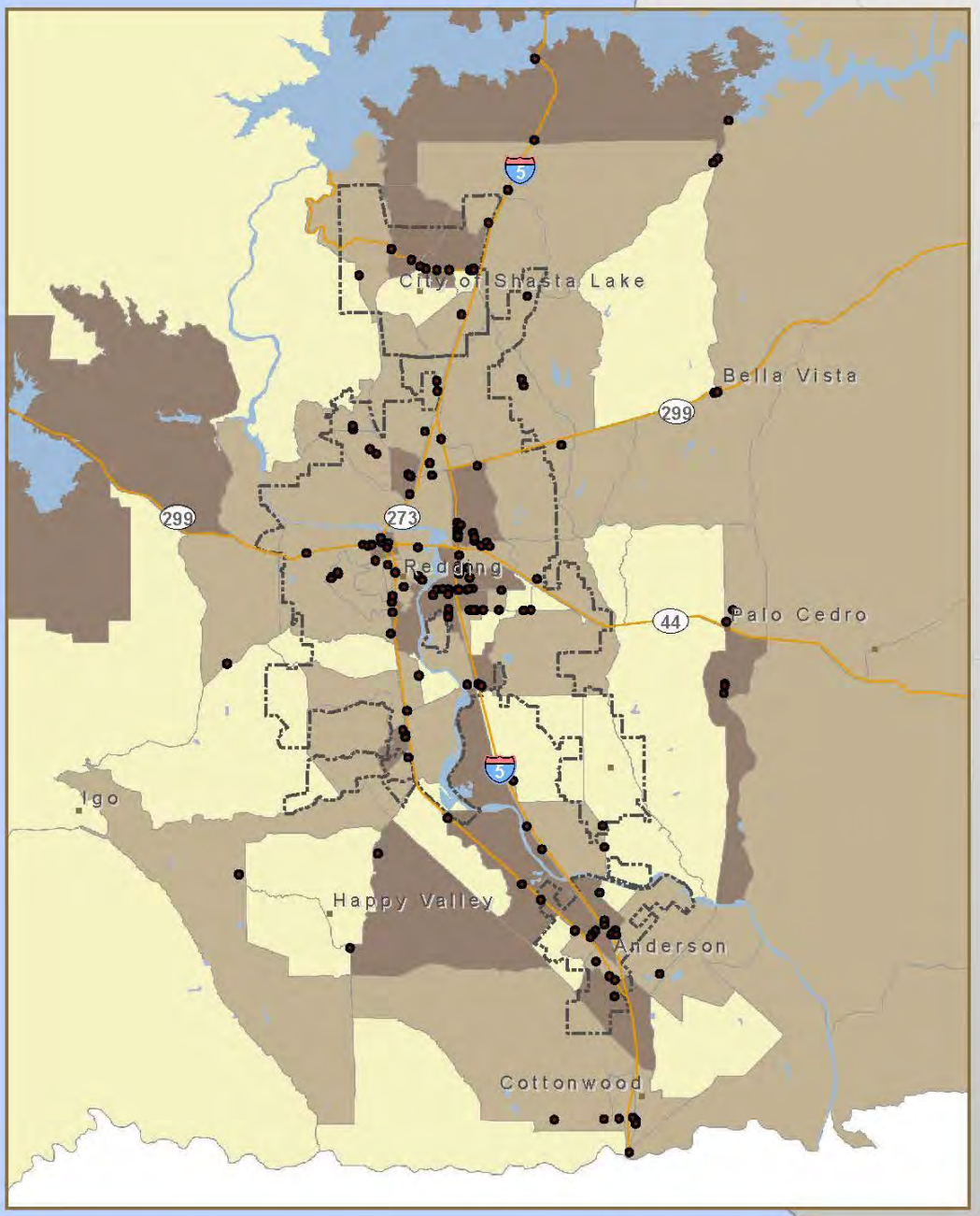
This map shows the percentage of people over 25 years old who have a bachelor's degree or higher for each 2000 Census block group. Research has shown that educational attainment is one of the strongest predictors of health. It is correlated with many social, economic, and health conditions. Higher education increases one's chances of having healthy housing in safe neighborhoods, healthy food options and better health insurance. It also helps people gain a sense of control over their lives, leads to better comprehension of health information to inform health behavior choices, and broadens social support

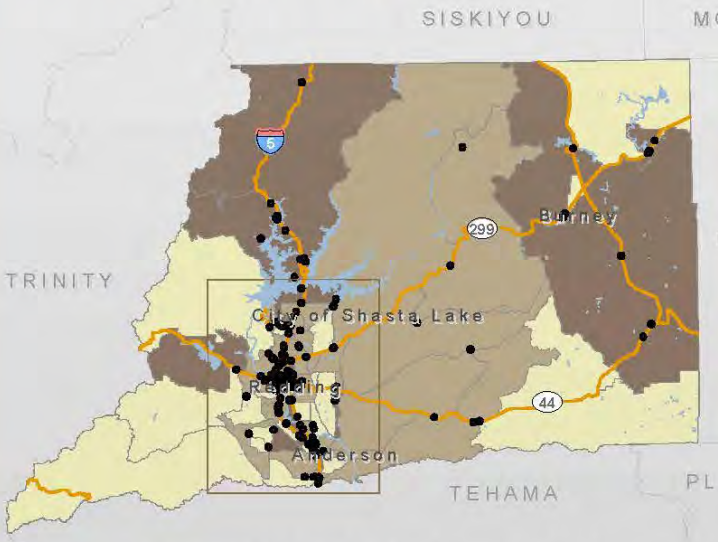
Education Data Source: US Census Bureau 5-year ACS

Map developed through a partnership between

Shasta Community Well-Being Atlas

Number of Off-Sale Alcohol Outlets Per 1,000 People





Number of Off-Sale Alcohol Outlets per 1,000 People

Statistical differences cannot be inferred from these assigned breaks

County Average = 1.1

- 0
- > 0 and < 1.7
- > 1.7
- Off-Sale Locations
- City Boundaries

This map shows the number of off-sale alcohol outlets per 1000 people for each 2000 Census block group. Off-sale alcohol outlets are those that are authorized by the State of California to sell alcoholic beverages for off site consumption. They include grocery stores, liquor stores and mini-marts. They exclude restaurants and eating establishments. Research strongly suggests that there are several public health issues related to alcohol outlet density. These include deaths from liver cirrhosis, alcohol related hospitalizations, traffic collisions, sexually transmitted diseases, child abuse, crime and violence.

Off-Sale Location Source: California Department of Alcohol and Beverage Control

Map developed through a partnership between

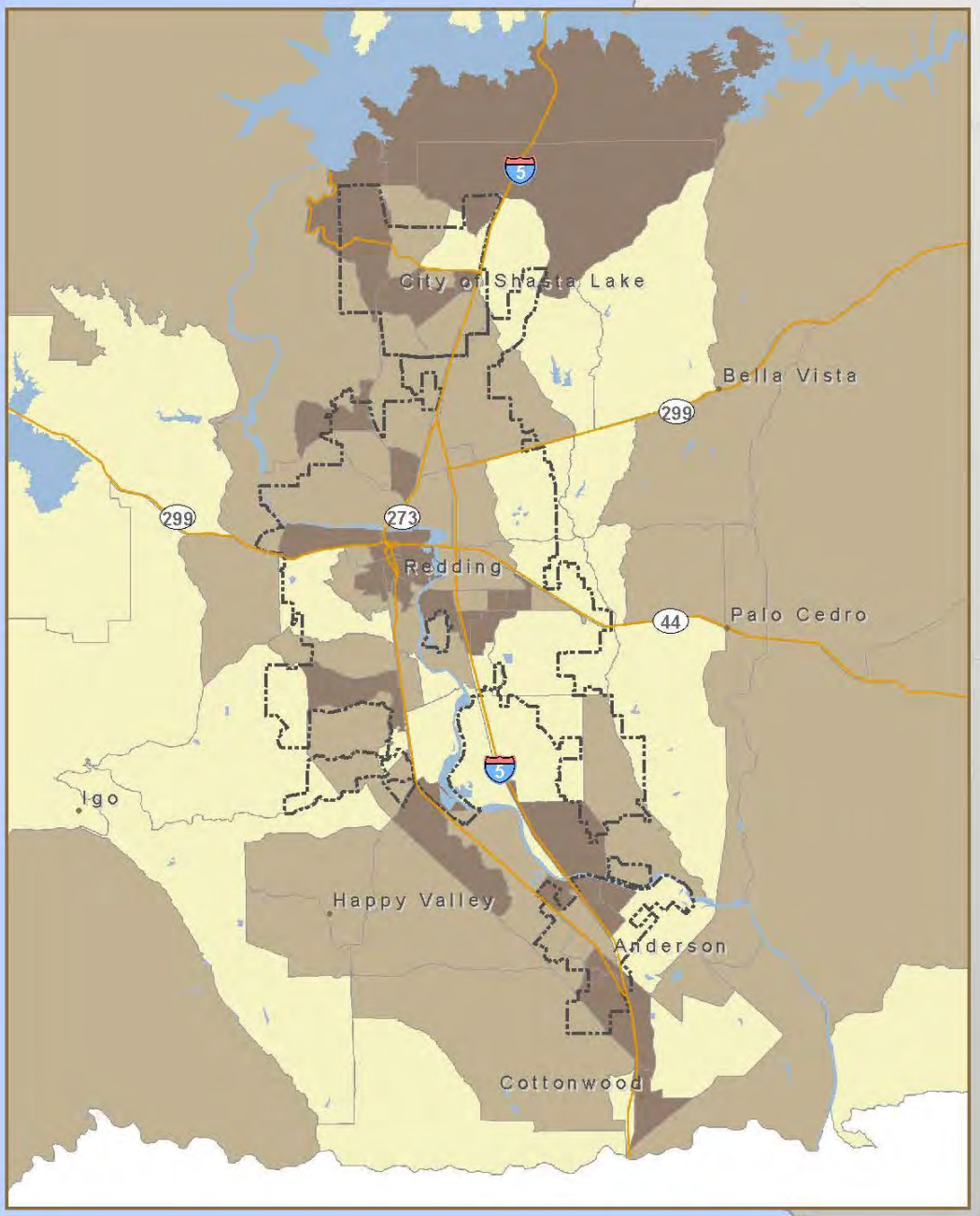
HEALTHY SHASTA · GCC · Shasta County · VESTRA

N

S

Shasta Community Well-Being Atlas

People Living Below the Poverty Level



Percent of Households Living Below Poverty Level

Statistical differences cannot be inferred from these assigned breaks

County Average = 15.4

- 0 - 9.1
- > 9.1 and < 22.5
- > 22.5
- City Boundaries

This map shows the percentage of households whose income is below the Federal Poverty Level for each 2000 Census block group. Research has shown that low socioeconomic status underlies limited access to health care, detrimental environmental exposures, and poor or risky health behaviors. The chronic stress associated with poverty in and of itself also increases disease and death. In our county, people who are living in poverty have substantially shorter life expectancies and more illness than those who are financially secure.

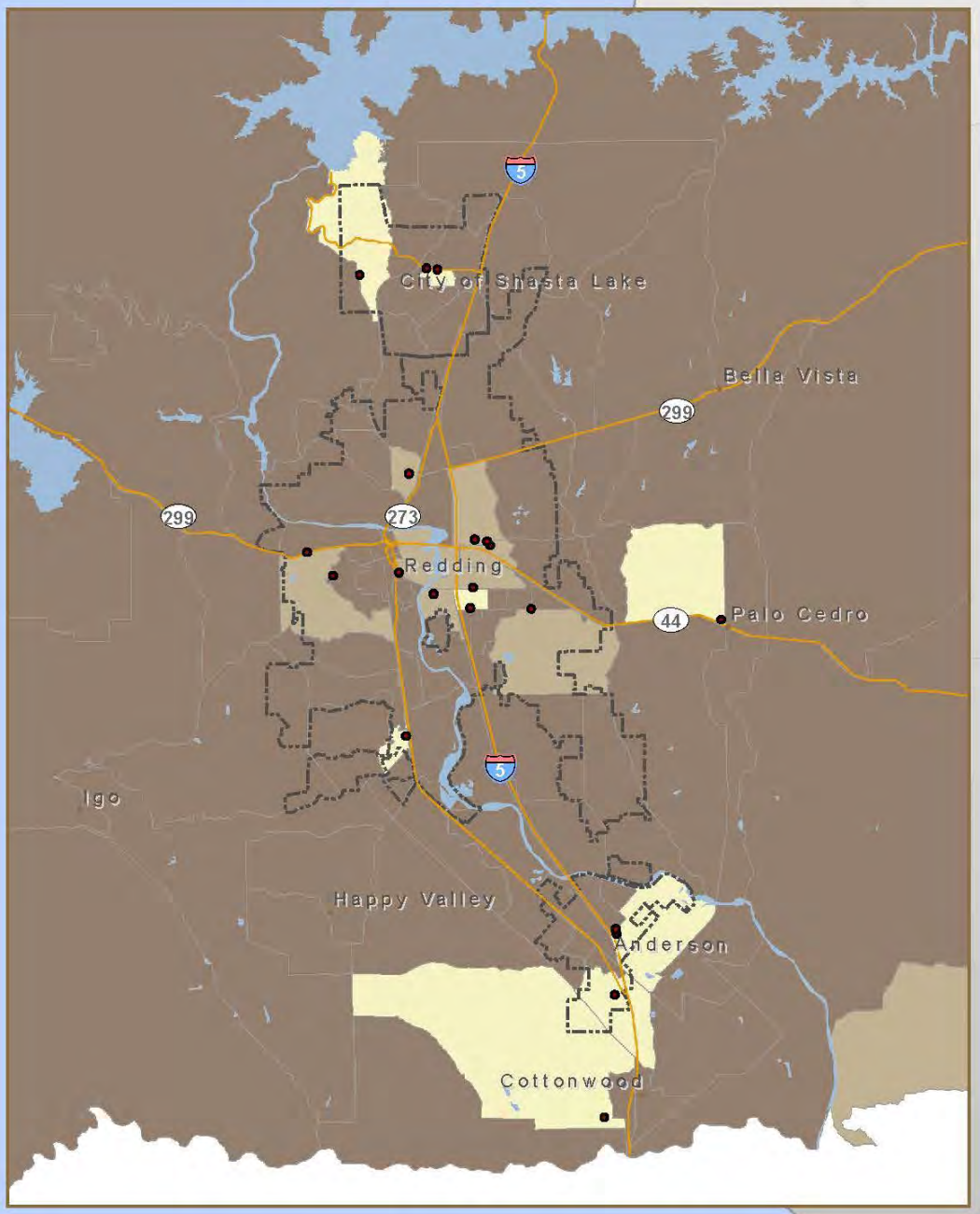
Poverty Data Source: US Census Bureau 5-year ACS

Map developed through a partnership between

HEALTHY SHASTA · GCC · Shasta County · VESTRA

Shasta Community Well-Being Atlas

Number of Retail Establishments That Accept WIC Per 1,000 People



Number of Retail Establishments That Accept WIC per 1000 People

Statistical differences cannot be inferred from these assigned breaks

County Average = 0.1

- > 0.6
- > 0 and < 0.6
- 0
- WIC Vendors
- City Boundaries

This map shows the number of retail food establishments that accepts WIC per 1000 people in each 2000 Census block group. Research shows that good nutrition, including the consumption of fruits and vegetables, has positive health outcomes such as lower risk of obesity, heart disease, and some types of cancer. WIC vouchers have specific standards as to what qualifies as healthy food. By looking at retail establishments that accept WIC vouchers we are able to identify areas services by large scale grocery stores or small markets, indicating that people have access to a variety of healthy food options.

WIC Location Source: Shasta County Health and Human Services

Map developed through a partnership between

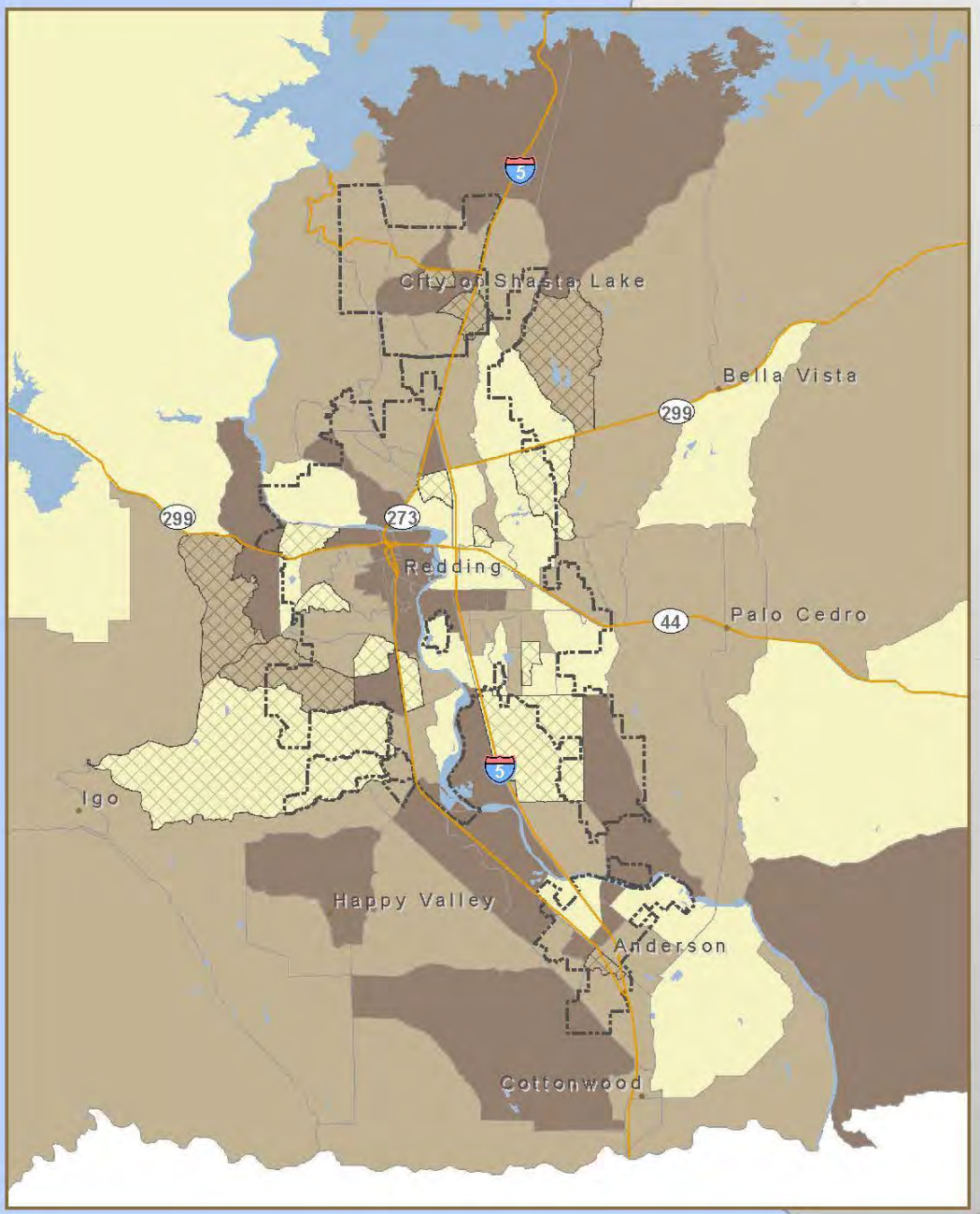
HEALTHY SHASTA · GCC · Shasta County · VESTRA

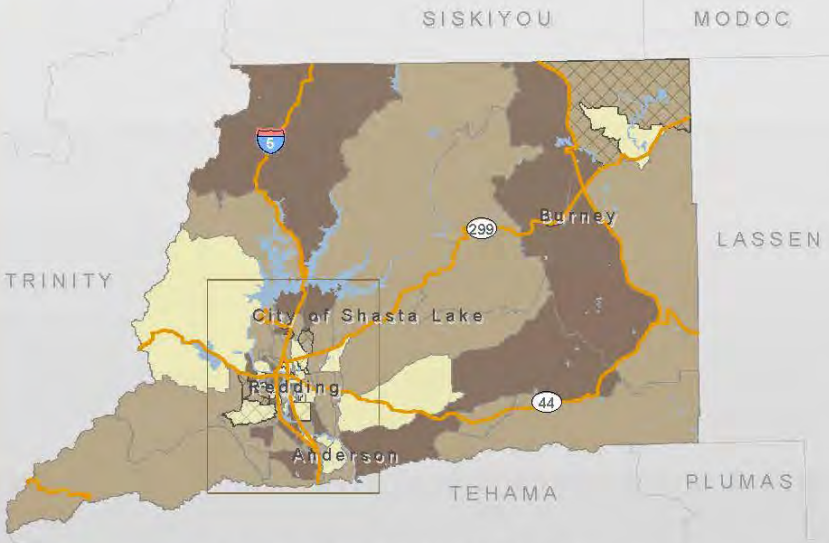
N

S

Shasta Community Well-Being Atlas

Years of Potential Life Lost Per 1,000 People





Years of Potential Life Lost per 1,000 People

Statistical differences cannot be inferred from these assigned breaks

County Average = 85.7

- 0 - 65.1
- > 65.1 and < 107.6
- > 107.6
- Data Unstable*
- City Boundaries

This map shows the average number of years of potential life lost per 1000 residents (under 75 years of age) from 2005-2009 in each 2010 Census block group. This is an indicator of premature (early) death. Leading causes of premature death include unintentional injuries and heart disease.

*A small number of events make the rates susceptible to large fluctuation. Block groups with fewer than 20 premature deaths have been labeled as unstable and therefore, comparisons are not valid.

Approximately 1.5% of dealths were not located and are therefore not reflected in this map.

Dealth Data Source: California Department of Public Health, Health and Information Research Section; death records for 2005 to 2009

Map developed through a partnership between

HEALTHY SHASTA · GCC · Shasta County · VESTRA

N

S

Future of the Shasta CWBA

The Shasta Community Well-Being Atlas Demonstration Project was developed with the intent that it would be available to Shasta College students for further development. There are a variety of classes at Shasta College where Geographic Information Systems students have the opportunity to potentially develop additional data that directly relates to the objective of the SCWBA Demonstration Project.

In parallel with the wrap up of the demonstration project, the current intern's GIS Project class is combining data from the SCWBA Demonstration project and another intern's community service organization data to create an interactive map that will be shared on ArcGIS online. The purpose of this map is to represent locations in Redding, CA where people in need can find and receive aid; specifically women and children seeking aid and health care, people seeking general health care, people seeking help for addictions, and people seeking aid to obtain employment.

In the near term Shasta College GIS students could add hyperlinked images of graphs depicting the five indicators that are based on the Census 2000 block groups. For this to be meaningful to the end users, the five indicators would need to be normalized to the same scale and a couple of the indicators would need to be inversed. For example, the demonstration project indicators for education and access to healthy food should be inversed for a relative well-being assessment of all project indicators in a bar graph.

The five indicators that were based on Census 2000 could also be updated to Census 2010 geography and demographics. The analysis that was completed is well documented in the metadata for each indicator and future students could follow the same steps using more timely data.

The SCWBA map service, showing the six demonstration project well-being indicators, was placed in a duplicate of the Sustainable Communities Strategy Green House Gas web map. A future project for Shasta College students could be to create a Silverlight or Flex map viewer using the builder applications provided by Esri. Additional functionality and map services could be included in a unique map viewer for the SCWBA. Similarly ArcGIS Online web maps can consume the SCWBA map service hosted on the FarNorCal GIS server.

Disclaimer

Shasta Community Well-Being Atlas (SCWBA) Demonstration Project makes no representations or warranties regarding the accuracy of data. The user will not seek to hold SCWBA Demonstration Project or its contributors liable under any circumstances. The user will cite SCWBA Demonstration Project as the original source of the data and will clearly denote cases where the original data have been updated, modified, or in any way altered from the original condition.

Community Well-being Atlas Project Design

January 12, 2011

10:00 A.M.

VESTRA, Small Conference Room

Meeting called by:	Dan Wayne	**Type of meeting:**	Design meeting
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Refine project concept		
o GIS-based map viewer		
o Access to information about Shasta County community well-being		
✓ Refine project goals		
o Expose Shasta College students to ArcGIS server technology	Dan Scollon, Jenn Pollom	
o Develop a tool to spatially analyze health measures at a "neighborhood" level	Dan Wayne, Minnie Sagar, Jenn Pollom	
✓ Refine organizational roles and responsibilities		
o VESTRA Resources Inc.		
▪ Provide project management	Jenn Pollom	
▪ Supervise student interns		
▪ Develop map viewer		
o SCRTPA		
▪ Coordinate project activities in conjunction with RTPA's Sustainable Communities Strategy	Dan Wayne	
o Shasta College		
▪ Server specifications	Dan Scollon	
o Shasta County Public Health		
▪ Define 3-5 indicators to make up well-being index	Minnie Sagar	
✓ Refine schedule/timeline		
o Shasta College		
▪ Intern schedule	Dan Scollon	
▪ Grant requirements		
o Shasta County Public Health		
▪ SOW: January 2011-January 2012	Minnie Sagar	
o SCRTPA	Dan Wayne	

Previous Action Items

Item	Results	Follow Up
✓		
✓		
✓		
✓		
✓		

New Action Items

Item	Owner	Due
✓		
✓		
✓		
✓		

Other Information

Observers: **Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin**

Resources:

Special notes:

Community Well-being Atlas Project Design Meeting Minutes

Subject	**Community Well-being Atlas Project Design**	**Date**	**January 12, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	10:00 AM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Clint Kellar		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Project Concept	Project is a collaborative effort between SCRTPA, Shasta College, SC Public Health, and VESTRA. Use of both demographic and data for health indicators okay but not allow demographics to take over.
2.	Project Goals	Student exposure and experience, server based end-product, data acquired and created available to parties involved and general public
3.	Organizational Roles and Responsibilities	Public Health to take lead in identifying health indicators and data collection methodologies, Shasta College to coordinate student interns and server specifications, SCRTPA to facilitate successful projects for both Public Health and Shasta College, VESTRA to provide project management and supervise interns.
4.	Schedule/Timeline	Inters by semester (Spring, Summer, Fall), Early June – 1st grant report due, Monthly meetings with milestones/deliverables (Feb-May)
5.		
6.		
7.		
8.		

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Revise project design document and send to all parties for input/approval	Jenn and Jody	
2.	Refine student goals and learning objectives	Jenn, Jody, Dan S.	
3.			

Community Well-being Atlas

February 14, 2011

1:00 P.M.

VESTRA, Small Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Student Intern o Daniel Stills	Jenn Pollom	
✓ Shasta College Server o Available funding	Dan Scollon	
✓ Student Learning Objectives	Jody Tarvin, Dan Scollon	
✓ SCRTPA Updates	Dan Wayne	
✓ Public Health Updates	Minnie Sagar	
✓ Shasta College/Grant Updates	Dan Scollon	

Previous Action Items

Item	Results	Follow Up
✓ Revise project design document and send to all parties for input/approval	Delivered project design document. Made updates/changes according to received feedback	
✓ Establish student goals and learning objectives	In progress	
✓ Intern Selection	Daniel Stills	

New Action Items

Item	Owner	Due
✓ Identify/define initial 12 health indicators	Public Health	March 18, 2011
✓ Provide possible data sources for health indicators	Public Health	March 18, 2011
✓		
✓		

Other Information

Observers: **Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	**Community Well-being Atlas**	**Date**	**February 14, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	1:00 PM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Server Funding	Brad Banghart may be able to come up with most of the funds for server. Dan S. will know one way or another in about a month. Dan W. looked into his sources for funding with no luck.
2.	Server	Doug Melin (IT director @ Shasta College) supportive of server
3.	Health Indicators	Public health on target for indicator selection
4.	Geographic units and weights	Need to establish weight according to geographic unit
5.	Grant Money	Dan W. does not have update on grand money availability. Dan W. will attempt to re-contact to get date.
6.	Data collection	Will look at indicators that don't need primary data collection first because Dan W. money will cover primary data collection
7.	Community/Business Analyst	Possible source for data. Jenn to send link to Minnie
8.	Grant requirements	Dan S. needs to fulfill grant requirements including outreach. Interested in presenting project to audience (feedback opportunity). Can possibly be hosted by Public Health

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Update timeline of objectives and refine tasks	Jody Tarvin	Ongoing
2.	Identify/define initial 12 health indicators	Minnie Sagar	3/18/11
3.	Provide possible data sources for health indicators	Minnie Sagar	3/18/11

March 18, 2011

10:15 A.M.

VESTRA, Small Conference Room

Community Well-being Atlas

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Review Health Indicators	Minnie Sagar	
✓ Intern Update/Tasks	Jenn Pollom, Jody Tarvin	
✓ Data Discovery Progress and Sources	Daniel Stills	
✓ SCRTPA Updates o Funding Availability	Dan Wayne	
✓ Public Health Updates	Minnie Sagar	
✓ Shasta College/Grant Updates o Server Funding	Dan Scollon	
✓ Contract Amendment o Timeline Revision	Jenn Pollom	

Previous Action Items

Item	Results	Follow Up
✓ Identify/define initial 12 health indicators	Due March 18, 2011	
✓ Provide possible data sources for health indicators	Due March 18, 2011	
✓ Update timeline of objectives and refine tasks	Ongoing	

New Action Items

Item	Owner	Due
✓ Assess the usability of the initial 12 health indicators in a GIS platform and report findings and recommendations to SC Public Health	Daniel Stills	Prior to April 15, 2011
✓ Select 3-5 health indicators from the initial 12	Minnie Sagar	April 15, 2011
✓		

✓

Other Information

Observers: **Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	**Community Well-being Atlas**	**Date**	**March 18, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	10:15 AM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Health indicators	- Minnie delivered list of 12 health indicators (and alternatives) with potential sources (handout) - Nothing larger than Census tract (Blocks & Block group level). - Some indicators chosen from TheHDMT.org - Nee to discuss how to approach the different sources – Some may be sensitive topics - Spatial scale and coverage – County vs City data. Some data will likely not have complete county coverage. Focus on data from urban areas (but not all). Identify what jurisdictions data can be obtained. - Indicators alone may not indicate health, but combined into an index and incorporated with geography they may.
2.	Other options	Minnie prepared other possible options such as a transportation safety index and recreational index (handout)
3.	Funding	Dan W. – Start invoicing late June-July Dan S. – Less optimistic about EOC funds to cover cost of server
4.	Timeline, deliverables	Dan S.would like May deliverable (interim). Possibly map book (samples maps) with narrative from Public Health. Possibly progress update on how GIS platform is being built with samples of data and the development process
5.	TAZ Layer (SCRTPA)	Transportation analysis zones. Possibly use to help define “neighborhoods”. May go down to parcel level
6.		
7.		
8.		

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.			
2.			

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
3.			

Community Well-being Atlas

April 15, 2011

10:15 A.M.

VESTRA, Small Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Report findings and recommendations on the usability of the initial 12 health indicators in a GIS platform	Daniel Stills	
✓ SCRPTA Updates	Dan Wayne	
✓ Public Health Updates	Minnie Sagar	
✓ Shasta College Updates	Dan Scollon	
✓ VESTRA Updates o Contract Amendment	Jenn Pollom	
✓ Open Discussion		

Previous Action Items

Item	Results	Follow Up
✓ Assess the usability of the initial 12 health indicators in a GIS platform and report findings and recommendations to SC Public Health	Deliver to Public Health by April 15, 2011	

New Action Items

Item	Owner	Due
✓ Public Health to select 3-5 health indicators from the initial 12	Minnie Sagar	?
✓ Define geographic area that will represent neighborhoods	VESTRA	May 2, 2011
✓		
✓		

Other Information

Observers: **Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	**Community Well-being Atlas**	**Date**	**April 15, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	10:15 AM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Delivered report on findings and recommendations for Initial 12 health indicators. Indicator assessment needs further updating.	- Need to better define community centers – Non-denominational buildings, public access, services provided (ex: only one community center in Shasta Lake City met criteria) - Need to continue to contact possible sources for data (Mainly indicators 2, 3, 5, 9, and 11) - Need to Broaden the jurisdictions contacted for data - Need to explore what information is available in 2010 census and when data will be released - Need to investigate when updated information will be available for the ACS (using 2010 census geometries)
2.	"Phase 1" deliverable	- Dan Scollon needs a "Phase 1" Deliverable for his grant requirements - Possibly a product that goes on Shasta College GIS website - Possible product –Static maps of indicators (6 PDFs) that show information about Shasta County and a project description to give viewers a basic understanding of the project (objectives, progress, etc.) - It is important not to draw any conclusions or make any suggestions about the data at this point but rather just present the data to the public for informational purposes only - Ultimately Dan Scollon would like indictor data available on the Server
3.	Health in policy at the state level	Minnie to forward Jenn link so that we may determine if it should be applied to our project. Determine if data is stratifiable and possible use similar criteria as state
4.		
5.		
6.		
7.		
8.		

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Deliver updated Indicator Usability Assessment to Minnie	Daniel Stills, Jody Tarvin	4/22/11
2.	Send PDF map to Minnie or possibly have a GoTo Meeting	Danile Stills, Jody Tarvin	
3.	Prepare “Phase 1” deliverable for Dan Scollon - Project description - PDF maps - Send to Minnie prior to delivery for approval (appropriate wording of project description)	Daniel Stills, Jody Tarvin	5/6/11

Community Well-being Atlas

May 15, 2012

8:15 A.M.

VESTRA, Large Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter
✓ Map Viewer o Indicators displayed separately o Indicators displayed together	
✓ Final Report o Review final document with maps o This will be distributed (review recipient list) ▪ Community service organizations?	Jenn Pollom
✓ GHG Viewer o When will it be launched? o Who will be encouraged to use? o Suggestions ▪ Map tips for legends	
✓ Future project ideas o Shasta College to potentially use the base information to on The CWBA to guide/support future projects	
✓	
✓	

Other Information

Observers: **Dan Wayne, Dan Scollon, Amy Pendergast, Jenn Pollom, Jody Tarvin, Alyson Stubbendick**

Community Well-being Atlas

May 20, 2011

11:00 A.M.

VESTRA, Small Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ "Phase 1" Deliverable for NSF grant	Dan Scollon	
o Map display and critique	Daniel Stills	
✓ Final Health Indicator Selection	Minnie Sagar	
✓ Internship Summary	Daniel Stills	
✓ Summer Intern Logistics	Dan Scollon	
✓ Project Description Update o Collaboration between Healthy Shasta instead of SC Public Health	Jody Tarvin	
✓ Open Discussion/Updates	All	

Previous Action Items

Item	Results	Follow Up
✓ Deliver updated indicator usability assessment	Delivered to Public Health	Final indicator selection
✓ Prepare "Phase 1" deliverables for Dan Scollon o Project description and PDF maps o Incorporate feedback from partners		

New Action Items

Item	Owner	Due
✓ Summer intern selection	Dan Scollon, VESTRA	
✓		
✓		
✓		

Other Information

Observers: **Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	**Community Well-being Atlas**	**Date**	**May 20, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	11:00 AM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Minnie Sagar, Jenn Pollom, Jody Tarvin, Daniel Stills		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Deliverables to Dan Scollon for Grant	June 1st deliverable to NSF
2.	Map scale	Maps may need to show larger scale (cities in more detail)
3.	Final indicator selection	Minnie selected 6 health indicators
4.	Additional indicators	In addition to the 6 health indicators selected, Minnie has highlighted 6 additional indicators (3 transportation safety indicators and 3 recreation indicators). Dan Wayne pointed out that some of the transportation safety indicators have already been completed or are going to be completed by another task. Minnie will look into further for the indicators that have already been completed (through Healthy Shasta)
5.	Further refine indicators	Indicator 1 – possibly map parcels within ½ mile of highways. Weigh in amount of traffic on highways. Indicator 2 – Staff shortage at public health. PH Unable to work on this indicator. Potential to hire intern through Dan Scollon. All indicators will need further analysis. Indicators may be given a "weight" on importance in the composite index
6.	Health indicators and planning	How to health indicators play into development decisions? Public Health may use index results to identify problem areas to guide outreach locations. Professional interpretation of data needed by Public Health.
7.	Partner expectations	Need to revisit group understanding and goals of project as a whole and establish individual expectations. Discussion about PR needed.
8.	Project updates	Previous amendment intended to last through summer. New $2500 amendment in August. New interns (summer semester begins June 6th). Schedule monthly meetings (Fridays do not work for Minnie).

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Refine project description	Jody Tarvin	Prior to 6/1
2.	Schedule intern interviews	Jenn Pollom, Dan S	5/31-6/3
3.	Schedule monthly meetings	Jenn Pollom, Jody	

Community Well-being Atlas

September 22, 2011

9:00 A.M.

VESTRA, Large Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Introductions (Amy and Harmony)	Jody Tarvin	
o Summer intern – Hilly Wallis		
✓ Project Background and Update	Jody Tarvin	
✓ Public Health Interest/Understanding	Amy Pendergast	
✓ Project Status		
o Data	Jenn Pollom	
o Maps		
✓ Project Future Plans		
o Platform	Jenn Pollom	
o Server		
✓ Open Discussions/Updates	All	

Previous Action Items

Item	Results	Follow Up
✓ Interns		
o Summer – Hilly Wallis		
o Fall – Harmony Gugino		

New Action Items

Item	Owner	Due

✓

Other Information

Observers: **Dan Wayne, Dan Scollon, Amy Pendergast, Jenn Pollom, Jody Tarvin, Harmony Gugino**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	**Community Well-being Atlas**	**Date**	**September 22, 2011**
Facilitator	Jennifer Pollom, VESTRA	**Time**	9:00 AM
Location	VESTRA Resources, Inc.	**Scribe**	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Amy Pendergast, Jenn Pollom, Jody Tarvin, Harmony Gugino		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Are indicators academically defensible? Documented relationships?	Questions brought up by Dan Wayne. Many indicators were selected from HDMT.org. Minnie included "Health Rationale" in her indicator selection
2.	Road ways by traffic counts rather than classification	Dan Wayne suggested that we look at (in the Air Quality map) average daily traffic counts instead of just the distance from the road based on classification (Highway, etc.)
3.	Are indicators canceling each other out?	Dan Wayne expressed concern that the indicators will "cancel" each other out when combined into an index
4.	Dan Wayne's project needs	Needs to look at focus areas (areas to promote growth and development, areas at risk). Needs a combination of indicators (index) and documented information/data to use to justify more grant money
5.	Certain areas have more characteristics that support health – high or low	
6.	Data QC	QC of data should include the question of "are we using a good metric to describe the indicator"
7.	How to combine indicators to come up with Index	VESTRA and SCPH to work on how to combine and interpret the indicators
8.	Map Display	Possibly display exact locations (WIC, Off-Sale) as point locations (clusters) Possibly display some things as counts others as proportions
9.	Map scale	Dan Wayne concerned about the scale of the maps. He would like it to be more at a "neighborhood" level. May not be feasible because of data inaccessibility and privacy issues

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Send data and maps to Amy	Jody Tarvin	
2.	QC Data	Jody, Jenn, SCPH (Brandy)	
3.	Provide Description of the goal of combining the indicators (from feasibility study?) to Amy	Jenn Pollom	
4.	Combine and interpret indicators	VESTRA, SCPH (Amy)	

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
5.	Schedule monthly meetings	Jody Tarvin	

Community Well-being Atlas

November 1, 2011

8:30 A.M.

VESTRA, Large Conference Room

Meeting called by:	Dan Scollon	**Type of meeting:**	Communication/Feedback
Facilitator:	Jenn Pollom	**Note taker:**	Jody Tarvin

Agenda Items

Topic	Presenter	Time allotted
✓ Introductions o Dan Scollon o Amy Pendergast o Brandy Isola	Jody Tarvin	
✓ Project Update o Indicator/Index Concerns o Potential new framework o Meeting partner project needs	Jenn Pollom Dan Wayne Amy Pendergast Dan Scollon	
✓ Project future direction	Jenn Pollom Dan Wayne	
✓ Map symbology and Classification	Jody Tarvin Amy Pendergast	
✓ GIS day and public outreach	Jenn Pollom Dan Scollon	
✓ Open Discussions/Updates	All	

Previous Action Items

Item	Results	Follow Up
✓ Send updated data and maps to Amy (SC Public Health)		
✓ QC Data		

- ✓ Provide description of the goal of combining the indicators to Amy
- ✓ Combine and interpret indicators

New Action Items

Item	Owner	Due

- ✓ Schedule next meeting
- ✓
- ✓

Other Information

Observers: **Dan Wayne, Dan Scollon, Amy Pendergast, Jenn Pollom, Jody Tarvin, Harmony Gugino, Brandy Isola**

Resources:

Special notes:

Community Well-being Atlas Meeting Minutes

Subject	Community Well-being Atlas	Date	November 1, 2011
Facilitator	Jennifer Pollom, VESTRA	Time	8:30 AM
Location	VESTRA Resources, Inc.	Scribe	Jody Tarvin, VESTRA
Attendees	Dan Wayne, Dan Scollon, Amy Pendergast, Jenn Pollom, Jody Tarvin, Harmony Gugino, Brandy Isola		

Key Points Discussed		
No.	**Topic**	**Highlights**
1.	Concern over combining indicators	Public Health concerned that there are too few indicators to combine into index to give meaningful information. May be Possible to layer and look at some indicators together but not as one index. Everyone okay with putting the 6 indicators by themselves out to public.
2.	Outreach/publicity	Dan Wayne concerned about the SCRPTA logo appearing on maps. He would like to know how maps are being presented and who will see them. Concerned over the public's interpretation of maps. Having the logo on the map may imply that the indicators are what the agency thinks defines public health. Possibly provide hardcopy packets to community (need to come up with list of people to send to?). May also want to provide package in digital format, possibly on GIS platform. May want to send out small flier/brochure instead of paper packet that would direct people to the platform. Include in the packet recommended next steps
3.	New framework	Indicators as layers that can be seen together but not combined. Present indicators as research topics rather than policy definitions. Indicators can be used in combination with other tools (such as health impact assessments) to help make recommendations that are project specific.
4.	NSF Grant external evaluation	What value does this project provide to the community? What are the indicators of the success of the project? Measurable outcomes of the project: Maps/data actually used/incorporated into decision making. Project has an influence on the sustainability strategy and is a contributing factor on how money is invested. Data made available to community via the GIS platform. Project acted as a pilot project for a community based, multi-discipline tool.
5.	How maps/data will be interpreted by the community	May need to prepare a guideline document that includes how the data and maps could be used. Brandy suggested that a community wide standard should be created using statistical analysis that helps drive the symbology of the maps to help the "significance" be more easily understood. It is

Key Points Discussed		
No.	**Topic**	**Highlights**
		important to describe the “significance” in the context that the data is being used. A revised project description should be approved by all partners. Include project description where maps are being presented (online pdfs, map viewer)

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date**
1.	Schedule next meeting	Jody Tarvin	11/1/11
2.	How to achieve the “layering” affect with the indicators cartographically	Harmony Gugino	
3.	Prepare GIS day presentation of project	Harmony Gugino	11/16/11
4.	Revise project description that could be included as a preface to the data/maps. Get approval of description from all project partners.	Jenn Pollom Jody Tarvin	
5.	Make note (change symbology) of block groups with no people – can be misleading (possibly add ownership layer?)	Harmony Gugino	
6.	Amy to provide list of other possible ideas for layers to add to help further develop the CWBA	Amy Pendergast	
7.	Amy to provide feedback on maps	Amy Pendergast	
8.	Deliver data to Brandy for help with map symbology (send histograms)	Jody Tarvin Brandy Isola	

TASK #2: EXURBAN GROWTH TOOL

Objective: Develop a spatial analysis tool for application in rural areas where spatial data is limited and community priorities are different.

Key Deliverables:

- Exurban Growth Tool, a geographic measure of wildfire risk and emergency response times

Shasta County

Exurban Growth Tool

Produced for:
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001

July 18, 2013

Version 1.0

Produced by:

VESTRA Resources, Inc.
5300 Aviation Drive
Redding, CA 96002
(530) 223-2585

Project Understanding

The Exurban Growth Tool is a GIS-based spatial analysis tool for use in rural, unincorporated areas. The tool measures wildfire hazard and emergency response times in the area outside of the South Central Urban Region (SCUR). Low wildfire hazard factors and acceptable emergency response times will be utilized as a proxy to assess suitability for growth and development that are also transportation accessible/efficient. Results are intended to better define potential rural community areas based on community values and priorities in the region's rural areas as documented via the Shasta*FORWARD*>> Regional Blueprint.

Data Sources

Response Times and Service Areas

The National Fire Protection Association (NFPA), an international nonprofit organization that advocates for fire safety through training and research, defines response time as the full measure from the initial call to the first fire truck's arrival, and the association's Standards 1710 and 1221 set time standards for each phase of the response time process. National Fire Protection Association 1710, 'Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments' Section 5.2.3.2.1 states that: The fire department shall have the ***capability to deploy an initial full alarm assignment with 8-minute response time*** to 90 percent of the incidents. NFPA 1710 further defines the recommended times for the following:

- Turnout time: One minute (60 seconds) for turnout time
- ***Fire response time: Four minutes*** (240 seconds) or less for the arrival of the first arriving engine company at a fire suppression incident and/or eight minutes (480 seconds) or less for the deployment of a full first alarm assignment at a fire suppression incident
- First responder or higher emergency medical response time: Four minutes (240 seconds) or less for the arrival of a unit with first responder or higher-level capability at an emergency medical incident
- Advanced life support response time: Eight minutes (480 seconds) or less for the arrival of an advanced life support unit at an emergency medical incident, where the service is provided by the fire department

For the Exurban Growth Tool, service areas were defined based on drive times from a fire station using a road network. The service areas are used to help evaluate the accessibility of land from a fire station. To create the service areas, drive times of 0-4 minutes, 4-6 minutes, and 6-8 minutes were considered.

Fire Hazard

Cal Fire, Fire Hazard severity Zones (FHSZ) were used in the analysis of the Exurban Growth Tool. CAL FIRE maps Fire Hazard Severity Zones (FHSZ) for State Responsibility Areas (SRA) and Very High Fire Hazard Severity Zones (VHFHSZ) in Local Responsibility Areas (LRA). PRC 4201 - 4204 and Govt. Code 51175-89 directs the California Department of Forestry and Fire Protection (CAL FIRE) to map areas of

significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones (FHSZ), define the application of various mitigation strategies to reduce risk associated with wildland fires. Government Code 51175-89 directs the California Department of Forestry and Fire Protection (CAL FIRE) to identify areas of very high fire hazard severity zones within Local Responsibility Areas (LRA). Mapping of the areas, referred to as Very High Fire Hazard Severity Zones (VHFHSZ), is based on data and models of, potential fuels over a 30-50 year time horizon and their associated expected fire behavior, and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure (including firebrands) to buildings. For the Exurban Growth Tool, three Fire Hazard datasets were used to create county wide coverage for Shasta County: fire hazard zones in SRAs, as adopted by CAL FIRE on November 7, 2007; final CAL FIRE recommendations for Very High FHSZs within the local jurisdiction; and DRAFT boundaries for Very High FHSZs within LRA lands for the purposes of review and comment by local jurisdictions (these zones were the result of a model that considers influence of fire behavior and embers from adjacent lands, zones for SRA and FRA lands are included to assist in understanding the hazard zoning on LRA lands).

Fire Hazard is a way to measure the physical fire behavior so that people can predict the damage a fire is likely to cause. Fire hazard measurement includes the speed at which a wildfire moves, the amount of heat the fire produces, and most importantly, the burning fire brands that the fire sends ahead of the flaming front. The fire hazard model considers the wildland fuels. Fuel is that part of the natural vegetation that burns during the wildfire. The model also considers topography, especially the steepness of the slopes. Fires burn faster as they burn up-slope. Weather (temperature, humidity, and wind) has a significant influence on fire behavior. The model recognizes that some areas of California have more frequent and severe wildfires than other areas. Finally, the model considers the production of burning fire brands (embers) how far they move, and how receptive the landing site is to new fires.

Wildfire hazard has two key components: ***probability and behavior.*** The FHSZ modeling uses these two components to describe hazard, but has no information regarding asset or resource characterization nor their relative vulnerability to damage as based on the hazard score. Consider ***fire hazard to only be concerned with the nature of the fire itself***: how often we believe an area will burn, and when it does burn, what kinds of potential ignition mechanisms will that fire create such that exposure to buildings may lead to the structure being damaged/destroyed. Hazard does not equal risk, but is an important factor in determining risk. Ongoing work at true quantified risk assessment must include hazard, asset characterization, and response (damage) relationships of various assets to the mixture of fire behaviors it will be exposed.

Wildland zones are defined as relatively homogeneous areas 200 ac and larger dominated by native vegetation cover. They may include inholdings of nonburnable types including water, agricultural lands and barren/rock, but the majority of the landscape is covered by natural plant cover. Developed/Urban zones are areas that have a strong influence of human development, and are characterized by parcel sizes 2 acres or smaller and/or intermingled commercial properties. Contiguous Zones are a minimum of 20 acres in total size, and wildland enclaves within urban areas are also a minimum of 20 acres.

Fire Hazard Severity Zones include the following classes:

Moderate

Relatively modest fire behavior. Contributing factors may include a relatively short active fire season and/or low frequency of severe fire weather conditions; modest slope; low incidence of past large and damaging fires; dominant climax fuel types supporting modest surface fire regimes with respect to fire intensity and minimal areas supporting crown fire and associated firebrand development and reception; nearby or interspersed areas supporting non-wildland fuels (agriculture lands, water, rock/barren) may also be present. Or b) developed/urbanized areas with a very high density of non-burnable surfaces including roadways, irrigated lawn/parks, and low total vegetation cover (<30%) that is highly fragmented and low in flammability (e.g., irrigated, manicured, managed vegetation). These areas are classic high density urban residential areas or commercial properties where wildland areas are removed by a large distance (>.5 mile) or if closer, only present modest fire hazards ((see above). If fire was to spread through these zones it would either be isolated and contained due to incidence of firebrands, or resulting from house-to-house ignitions under the most extreme weather conditions.

High

Either a) wildland areas supporting medium to high hazard fire behavior and roughly average burn probabilities. Typically characterized by climax fuels from Page 14 of 16 surface strata only with flat to steep slopes in conjunction with relatively rare fire occurrence influenced by short fire seasons and/or significant moderation of fire weather conditions (e.g. marine influence on fuel moistures), or lesser hazard fuels types subject to more prevalent burn frequencies. Nearby forested areas supporting crown fire are isolated or non-existent. Slopes vary from flat to steep, depending on fuel hazards and burn probabilities. Or b) developed/urbanized areas with moderate vegetation cover and more limited non burnable cover. Vegetation cover typically ranges from 30-50% and is only partially fragmented. Short-range lateral spotting may breech fuel discontinuities and allow for some areas to spread as a flame front. Areas supporting tree cover should not result in significant torching. Adjacent nearby wildlands (within ¼ mile) are typically High Hazard zones (see above) or if farther away, more typical of Very High Hazard zones (see below). These areas lie midway between classic urbanized areas dominated by homes, roadways, and low flammability vegetation cover, and those developed areas where both surface and crown fuels are dense and continuous.

Very High

Either a) wildland areas supporting high-to extreme- fire behavior resulting from climax fuels typified by well-developed surface fuel profiles (e.g., mature chaparral) or forested systems where crown fire is likely. Additional site elements include steep and mixed topography and climate/fire weather patterns that include seasonal extreme weather conditions of strong winds and dry fuel moistures. Burn frequency is typically high, and should be evidenced by numerous historical large fires in the area. Firebrands from both short- (<200 yards) and long-range sources are often abundant. Or b) developed/urban areas typically with high vegetation density (>70% cover) and associated high fuel continuity, allowing for frontal flame spread over much of the area to progress impeded by only isolated non-burnable fractions. Often where tree cover is abundant, these areas look very similar to adjacent wildland areas. Developed areas may have less vegetation cover and still be in this class when in the immediate vicinity (1/4 mile) of wildland areas zoned as Very High (see above).

Urban/non-zoned
Developed areas spatially removed from proximity to wildland fire areas. These are urban centers ranging from 200 feet to ¾ miles away from wildland zones, where the critical distance allowing for this classification is dependent on the nature of the fire hazards in those wildland areas.

Non burnable open space
Areas outside State Responsibility Areas (SRA) that are not classified as developed/urban or as a wildland zone, and are typically associated with nonflammable conditions: water, agricultural lands (excluding rangelands) and barren/rock areas. ***Similar areas within SRA are recoded to the Moderate class per state statute.***

Methodology

Suitability for Development

To determine the suitability of an area for development the fire station service areas and FHSZ were combined. An area was considered to have high suitability for development if it was in a moderate fire hazard severity zone and had a response time of 0-4 minutes, 4-6 minutes, or 6-8 minutes, or if it was in a non-wildland/non-urban fire hazard severity zone and had a response time of 0-4 minutes, 4-6 minutes, or 6-8 minutes, or if it was in a high fire hazard severity zone and had a response time of 0-4 minutes or 4-6 minutes. An area was considered to have medium suitability for development if it was in a non-wildland/non-urban fire hazard severity zone and had a response time or greater than 8 minutes, or if it was in a moderate fire hazard severity zone and had a response time of greater than 8 minutes, or if it was in a high fire hazard severity zone and had a response time of 6-8 minutes, or if it was in a very high fire hazard severity zone and had a response time of 0-4 minutes or 4-6 minutes. An area was considered to have low suitability for development if it was in a high fire hazard severity zone and had a response time of greater than 8 minutes, or if it was in a very high fire hazard severity zone and had a response time of 6-8 minutes or greater than 8 minutes.

From these suitability classes a heat map was created using a kernel density based on residentially zoned parcels. Parcels were considered residential if they had the following zoning: A1, CR, EA, ER, HP, IR, MHP, NRA-S, NRA-WI, PD, R-1, R-2, R-3, RL, R-M, RR, TL, U (as per the Permitted Uses section of the Shasta County Zoning Plan).

Findings

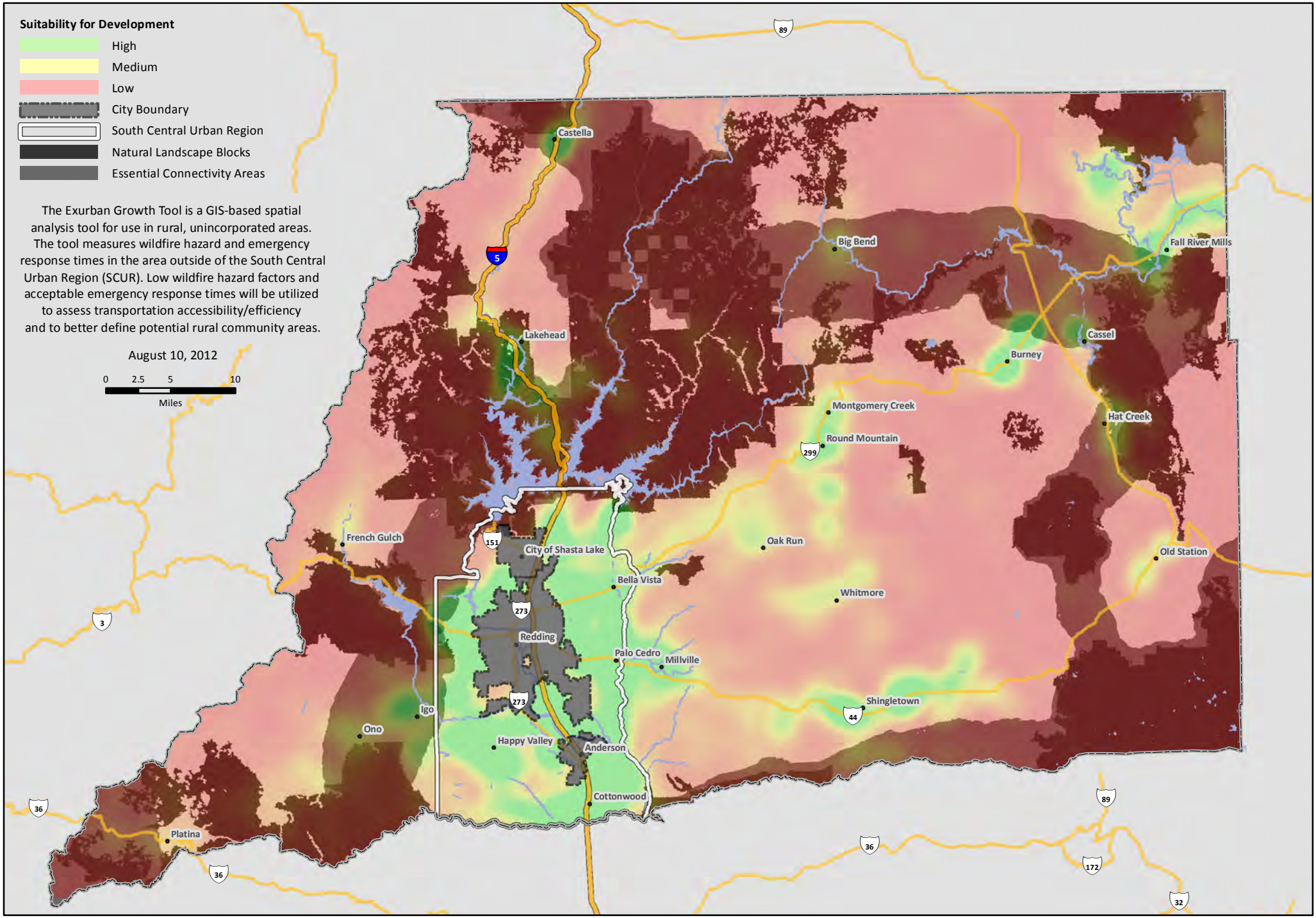
To validate the Exurban Growth Tool, the results were displayed graphically overlaying the following reference layers.

1. Environmentally sensitive lands
    - Comprised of Vernal Pools, CNDDB Threatened and Endangered Species Areas, Deer Ranges, Oak Woodlands, Wetlands (NWI), Named Streams (NHDM with GNIS Name), NPS Parcels, and Shasta Land Trust
2. Natural Landscape Blocks and Essential Connectivity Areas
    - From the California Essential Habitat Connectivity Project commissioned by California Department of Transportation (Caltrans) and California Department of Fish and Game (CDFG)

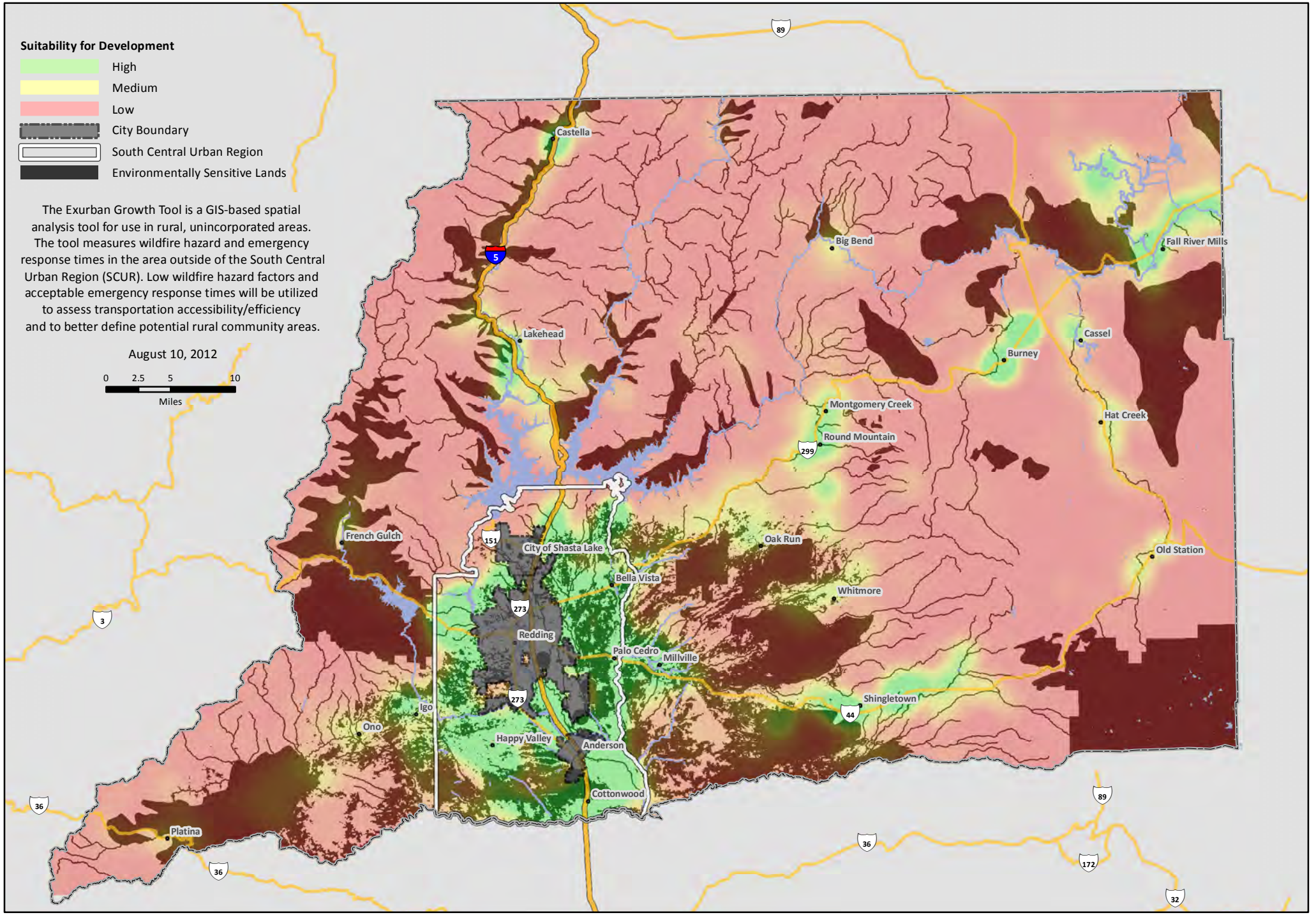
In addition to this graphical analysis, residential acres available in the "High" suitability class were calculated and compared to projected residential acres needed from the Shasta Regional Blueprint planning project. This analysis compared results from different Blueprint UPlan scenarios (average of scenarios B and C for 2020 and 2035 and current trend scenario for 2020 and 2035). This analysis focused only on areas of Shasta County outside the incorporated cities (Redding, Anderson, and Shasta Lake). This comparison of residential acres available in "High" suitability to the projected residential acres needed in 2020 and 2035 indicated that there are sufficient residential acres available in the "High" suitability for the anticipated growth.

Results were shared with Shasta County planners and compared to community plan areas in the existing as well as currently being updated general plan. Naturally, those areas of higher suitability for growth and development overlapped with existing urban areas where topography is accommodating and transportation infrastructure is in place. However, the analysis also helped to define the future expansion potential of community areas and corridors and highlighted proximal pockets of suitable areas that, if further developed, could become more self-contained community centers.

Ex-Urban Growth Tool



Ex-Urban Growth Tool



TASK #3: COMPLETE STREETS/DATA/NETWORK INTEGRATION

Objective: Generate a non-motorized network for integration into travel demand model for more accurate mode choice forecasting. Develop complete streets policies suitable for next update of regional transportation plan.

Key Deliverables:

- Non-motorized network and integration with Shasta County Travel Demand Model
- Non-motorized level-of-service structure
- Complete streets policies

SRTA Complete Streets
Multi-modal Network Dataset

The Multimodal Transportation Network Dataset is housed in the Roads_MATII feature dataset within the ShastaCo_CL_Final_MATII geodatabase. NAD_1983_California_Teale_Albers coordinate system was used.

Feature Classes

Feature Classes Used Within the Network Dataset:

Feature Class Name (Network Dataset Element Type)
Detailed Description of Data
Source of Original Data

Bike_Paths (Edge Feature)
A line feature of current and planned bike paths within the City of Redding
The McConnell Foundation

Bus_Routes (Edge Feature)
A line feature of the Redding Area Bus Authority's routes
The City of Redding

Connections_BIKE_Flagstop (Junction Feature)
A point feature on the bike path where cyclists would stop to transfer so as to wait for a bus at a bus stop (AKA "flagstop")
VESTRA Resources created these in relation to the RABA bus stops

Connections_BIKE_Trail (Junction Feature)
A point feature where bike paths meet with multi-use trails
VESTRA Resources created these in relation to the bike paths and multi-use trails

Connections_BUS_Flagstop (Junction Feature)
A point feature on a bus route where the RABA buses stop for passengers
RABA provided the general locations, VESTRA Resources georeferenced the data

Connections_FLAGSTOP_Bikes (Junction Feature)
A point feature where bicyclists wait for a bus, either on the side of the road or on a sidewalk
RABA provided the general locations, VESTRA Resources georeferenced the data

Connections_FLAGSTOP_Bus (Junction Feature)
A point feature where pedestrians wait for a bus, either on the side of the road or on a sidewalk
RABA provided the general locations, VESTRA Resources georeferenced the data

Connections_TRAIL_Bike (Junction Feature)
A point feature on a multi-use trail where a cyclist would stop to connect with a bike path
VESTRA Resources georeferenced logical points were cyclists most likely transfer

Connections_TRAIIL_BIKE_direct_no_transfers (Junction Feature)
A point feature on a multi-use trail where a cyclist would directly transfer between a multi-use trail and a bike path
VESTRA Resources georeferenced logical points were cyclists most likely transfer

Connections_TRAIL_SIDEWALK_direct_no_transfers (Junction Feature)
A point feature on a multi-use trail where a pedestrian would directly transfer between a multi-use trail and a sidewalk
VESTRA Resources georeferenced logical points were pedestrians most likely transfer

Connections_TRAIL_Trail (Junction Feature)
A point feature on a multi-use trail where a pedestrian or cyclist would transfer between multi-use trails
VESTRA Resources georeferenced logical points where transfers most likely exist yet no trail officially exists

Sidewalks_20120606 (Edge Feature)
A line feature of sidewalks, crosswalks, unknown sidewalk types, railroad crossings, sidewalk bumpouts, sidewalk medians, parking lot entrance crossings and multi-use trail connections
Source of Original Data

Trails_20120531 (Edge Feature)
A line feature of multi-use trails
Source of Original Data

Transfers_Flagstop_Bike (Edge Feature)
A line feature linking where cyclists wait for buses and bike paths
RABA provided the general locations of bus stops, VESTRA Resources georeferenced the logical transfers where cyclists most likely transfer to/from buses

Transfers_Flagstop_Bus (Edge Feature)
A line feature linking where pedestrians wait for buses and the bus routes
RABA provided the general locations of bus stops, VESTRA Resources georeferenced the logical transfers where pedestrians most likely transfer to/from buses

Transfers_Trail_Bike (Edge Feature)
A line feature linking multi-use trails and bike paths
VESTRA Resources georeferenced the logical transfers where cyclists most likely transfer to/from multi-use trails

Transfers_Trail_Trail (Edge Feature)
A line feature linking multi-use trails to multi-use trails
VESTRA Resources georeferenced the logical transfers between multi-use trails where no trail officially exists

Reference Feature Classes Not Used Within the Network Dataset:

StreetFurniture
A point feature which may be used in the future to record street furniture (benches, bus shelters, planters, trash cans, bike racks, bollards, tree grates, tree guards, post boxes, kiosks, barricades, information signs, tables, monuments, sculptures, banners, newspaper dispensers, fire hydrants, other, unknown, bus flag stops)
ESRI Local Government standard template

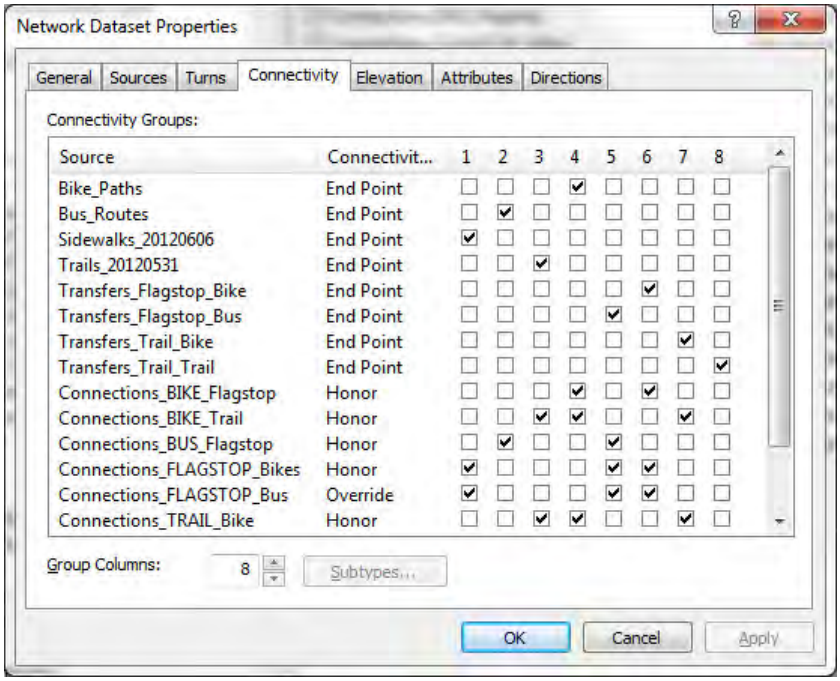
Roads_20120401_MATII
A line feature which was used for reference only, it is not included in the network
Source of Original Data

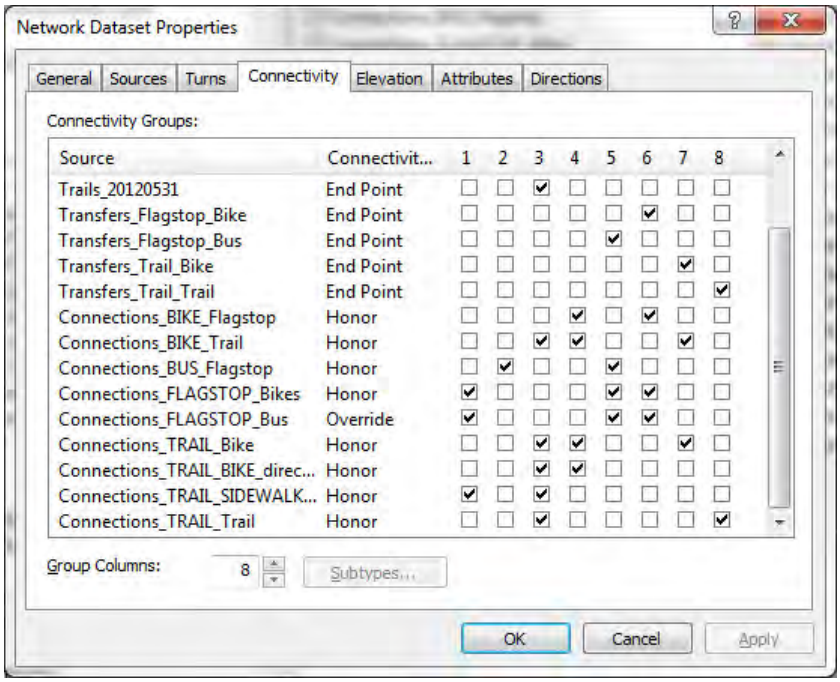
Network Dataset Properties

Turns

Within the Network Dataset Properties, we established the standard Global Turns. An implied global turn is present at every transition between two edges in the network where there is not already a turn feature present. We did not assign attribute values to global turns by specifying a global turn delay evaluator for the default values of turn elements. (FN1: http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#//00470000000p000000)

Connectivity





All line features were assigned end point connectivity and an individual group. All the point features were assigned to honor the connectivity policy except for Connections_FLAGSTOP_Bus which is the point where pedestrians and/or cyclists wait for buses. These points are sometimes located on sidewalks, sometimes on the sides of the road. Where they reside on the sidewalk, it is most often NOT on an endpoint, but rather just on a vertex. Thus, it is necessary to override the connectivity policy.

Elevation

All sources were assigned elevations within a field. Line features were assigned From End Z Elevations and To End Z Elevations. Point features were only assigned one Z Elevation.

Roads (even though they are not included in the network) were assigned ZLEV numbers in the ones.

Bus Routes and feature classes pertaining to them were assigned ZLEV numbers in the tens.

Sidewalks and feature classes pertaining to them were assigned ZLEV numbers in the twenties.

Bike Paths and feature classes pertaining to them were assigned ZLEVs numbers in and around the thirties.

The specific ZLEVs are as follows:

Feature Class Name	ZLEV	F_ZLEV	T_ZLEV
Roads		0, 1, 2	0, 1, 2
Bus_Routes		11	11
Connections_BUS_Flagstop	11		
Sidewalks		21, 22, 23 (to connect to Trails)	21, 22, 23 (to connect to Trails)
Connections_FLAGSTOP_Bikes	21		
Connections_FLAGSTOP_Bus	21		
Transfers_Flagstop_Bus		21	11
Transfers_Flagstop_Bike		21	31
Trails		23 (to connecto to Sidewalks/Flagstops), 25, 28	23 (to connecto to Sidewalks/Flagstops), 25, 26 (used for different ZLEV by Sundial Bridge), 28
Connections_TRAIL_Trail	23		
Connections_TRAIL_SIDEWALK_direct_no-transfers	23		
Connections_TRAIL_Bike	23, 25		

TASK #4: REGIONAL GIS/ CLIMATE CHANGE ACCOUNTABILITY PLATFORM

Objective: Implement the FarNorCalGIS platform and project website in coordination with member agencies and regional GIS stakeholders. Includes regional greenhouse gas emissions map in order to track, monitor, and report SB 375 related strategies and subsequent progress toward ARB targets.

Key Deliverables:

- FarNorCalGIS server in partnership with Shasta College
- Core regional land use and transportation GIS data aggregated, standardized, and uploaded to central server
- FarNorCalGIS.org online map viewer

Shasta County

FarNorCalGIS Platform

Produced for:
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001

July 31, 2013

Version 1.0

Produced by:

VESTRA Resources, Inc.
5300 Aviation Drive
Redding, CA 96002
(530) 223-2585

Project Understanding

Historically, the Shasta region has had a decentralized network of geo-spatial data maintained by various public and private sector entities. In response to the advent of regional blueprint planning, new planning requirements for metropolitan planning organization (MPO) regions per Senate Bill 375, and increased competition between regions for dwindling transportation infrastructure, the *Shasta Regional GIS Feasibility Study* was conducted to explore the options for consolidated, standardized, and merged region wide GIS data and analysis capabilities.

Professionals from the region's well-respected GIS community participated during each phase of the feasibility study, acting on behalf of their respective agency/organization and the greater region by way of the Far North Regional GIS Council (FNRGC). The following local, regional, state, and federal agencies, academia, private industry, and professional organizations were represented:

- SCRTPA
- Shasta County
- City of Redding
- City of Anderson
- City of Shasta Lake
- Tehama County
- Shasta College
- VESTRA Resources Inc.
- ENPLAN
- CalFIRE
- Caltrans
- Department of Fish and Game
- Bureau of Land Management
- Far North Regional GIS Council
- Sacramento Area Council of Governments

Five technical workshops were held; each workshop focused on a key work element of the project's scope of work. Small focus groups, individual interviews, and surveys explored each agency's potential benefit and contributions to the platform. Consensus was achieved at each stage of the process, including a recommended implementation strategy for the SCRTPA Board to consider. The agreed upon solution was to develop a Regional GIS Platform hosted at Shasta College, and supported by the regional GIS professionals. This document summarizes the key components of the Platform.

Agency Involvement

Agency Roles and Responsibilities are outlined in a Memorandum of Understanding (MOU) dated June 30, 2011.[1] A summary is provided here.

Shasta Regional Transportation Agency (SRTA)

- Primary funding source
- Owner of one Dell R610 Server and one T1600 workstation.[2]
- Owner of Microsoft Operating System licenses:
    - One (1) Windows Server Enterprise 2008R2, which allows for up to 4 ***virtual*** licenses.[3]
    - One (1) Windows 7 operating system for the Management PC (included in Dell Order[2]).

[1] FarNorCalGIS_MOU-SRTA and Shasta College.pdf
[2] DELL_Equipment_Description.pdf
[3] Microsoft Open License Order Confirmation.rtf

Shasta College

- Provided Esri education licenses for:
  - Two (2) ArcGIS for Server Advanced on the *SCStudentAGS* and *FNCGISPublicAGS* servers.[4]
  - ArcGIS for Desktop Advanced on the Management PC (*WorkStationFNCGIS*).[5]
- Shasta College IT provides power, rack space, network support and VPN access into the FNCGIS environment.[6]
- Shasta College EWD provided $20,000 toward the purchase of software licenses and equipment.

Far North Regional GIS Council (FNRGC)

- Provides day to day operational over site and direction for the Platform.

Management PC Summary

The Management PC (WorkStationFNCGIS) is used to manage the VMWare virtual environment on the FNCGIS server, management of the public AGS server using ArcGIS Desktop, and provide backups. Two 900GB hard drives are configured to provide backup capacity.[7]

ArcGIS Server Summary

ArcGIS Server (AGS) is installed on two virtual servers.[8] One is to support the Shasta College GIS program (SCStudentAGS) by providing access to GIS tools for publishing maps onto the internet. The other AGS (FNCGISPublicAGS) provides the core of the FarNorCalGIS platform. This is where spatial content is stored and served to the public as GIS services.

Web Server Summary

A web server (FNCPublicWeb) hosts the FarNorCalGIS website.[9] The FarNorCalGIS website provides a regional GIS presence for the North State GIS community. Originally FNRGC contracted with a local web developer to create the FarNorCalGIS website using open source tools (PHP, MySQL and phpMyAdmin). Through this development process, the core use cases and functionality of the website was established. Unfortunately, this solution proved to be too cumbersome to maintain by volunteer efforts.

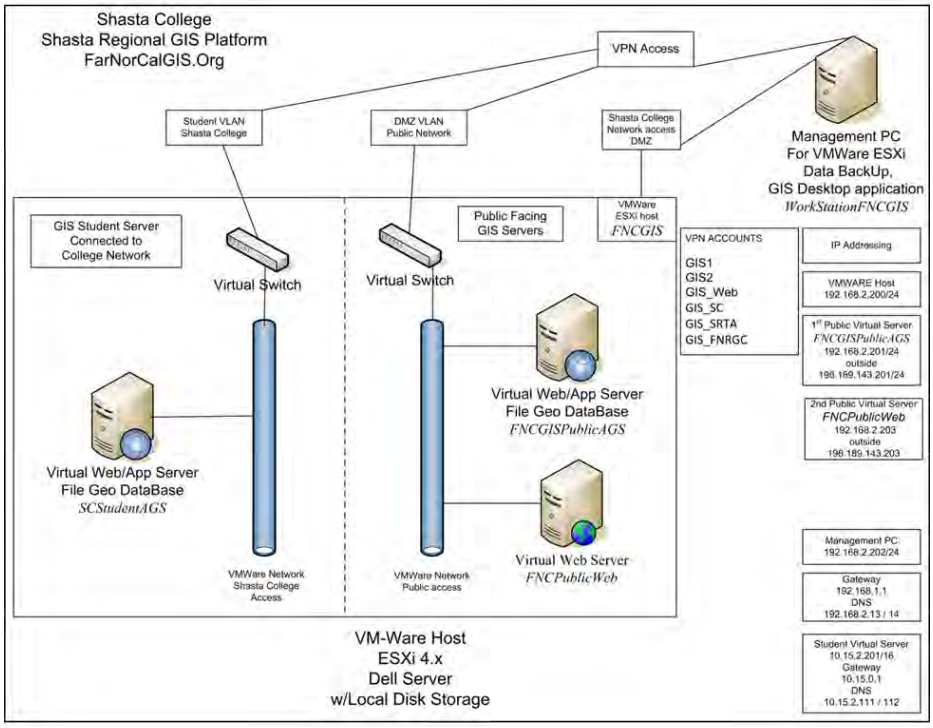
In early 2013, VESTRA Resources was hired to convert the website to a WordPress format. The WordPress format provided easier maintenance, single login, more streamlined administration.

[4] Esri_ArcGISServerAdvancedEnterprise_server.prvc
[5] Esri_ArcGISforDesktopAdvancedformerlyArcInfo_singleuse.prvc
[6] FarNorCalGIS_MOU-SRTA and Shasta College.pdf
[7] FarNorCalGIS_Workstation configuration.doc
[8] FarNorCalGIS_Server configuration.doc
[9] FarNorCalGIS__WebServer_Installs.docx

Visit the FarNorCalGIS website at www.farnorcalgis.org

System Architecture

The current FNCGIS Platform consists of an ArcGIS Server for student use and an ArcGIS Server and Webserver to provide public facing websites. Currently 3 of the 4 Windows Server licenses are being used.[10]



[10] FarNorCalGIS_Architecture_Diagram.pdf

TASK #5: ITS PLANNING & INTEGRATION STUDY

Objective: Identify ITS infrastructure needs and develop an implementation strategy.

Key Deliverables:

- Final report

Sean Tiedgen
Associate Transportation Planner
Shasta Regional Transportation Agency
1255 East Street, Suite 202
Redding, CA 96001
(530) 262-6185

Executive Summary

Integrated Traffic Data Collection and Management Plan
for the Shasta County South Central Urban Region (SCUR)

Project Background and Purpose

The current traffic data collection system for the South Central Urban Region (SCUR) does not provide timely, reliable data that can be useful to the Shasta Regional Transportation Agency (SRTA) for planning activities. With anticipated future growth in the SCUR, the SRTA and Caltrans District 2 envision a data collection system that would provide accurate, timely, reliable, and directly applicable data to make traffic operations and planning activities more efficient. This Implementation Plan:

- details the existing data collection system and processes;
- documents stakeholder needs;
- presents an evaluation of data collection tools and technologies; and
- identifies recommended deployment strategies and approaches.

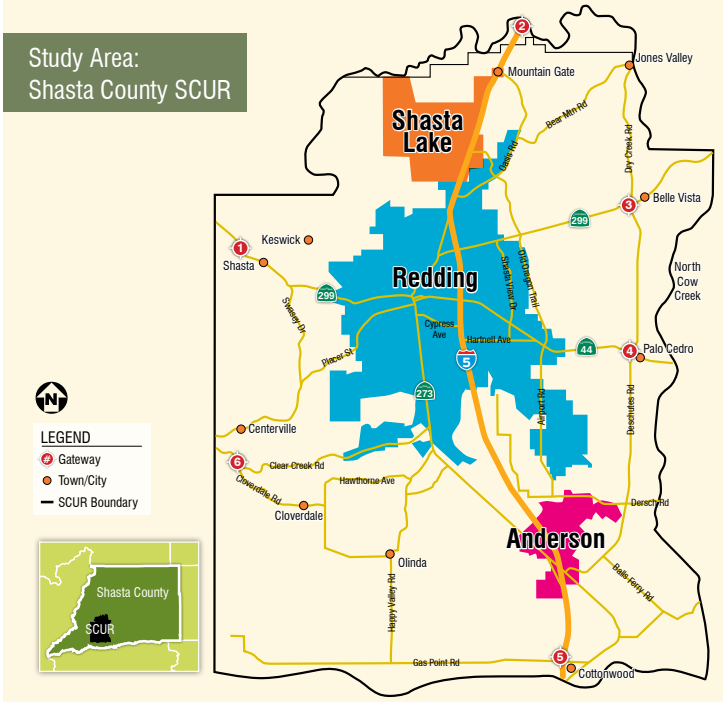
Integrated Traffic Data Collection

An integrated traffic data collection system will provide benefits that can be realized by agencies, as well as the public. For ***agencies***, it provides more frequent traffic data to inform transportation planning; faster incident detection, response and clearance; the ability to monitor traffic congestion; enhanced analysis of traffic conditions; and performance monitoring. For the ***public***, it means improved safety, greater mobility, and reduced congestion.

An enhanced data collection system is a crucial tool for SRTA to achieve regional transportation goals consistent with the 2010 Regional Transportation Plan (RTP):

- ***Improved Safety*** – Accurate and reliable traveler information reduces secondary accidents
- ***Improved Emergency Response*** – Detect and clear incidents quicker
- ***Improved Commercial Vehicle Operations*** – Through increased availability of commercial vehicle traffic data
- ***Increased Traveler Information and Trip Enhancement*** – An enhanced system will position the region for future dissemination of traveler information
- ***Improved Interagency Communications*** – Data is easily shared and accessed by partner agencies

Study Area:
Shasta County SCUR



- ***Reduced Congestion*** – Traveler information affects driver behavior, which can reduce fuel consumption and vehicle emissions
- ***Increased Economic Activity*** – Better mobility through the region will improve economic activity

Project Needs and Objectives

Stakeholders identified the following needs of an enhanced data collection system:

- Make volume data available more frequently, at more locations, and at shorter time intervals.
- Implement a tool to provide interregional, intraregional, and local Origin and Destination (O&D) trip information.
- Enhance current processes to better utilize existing traffic data.

Implementation Plan

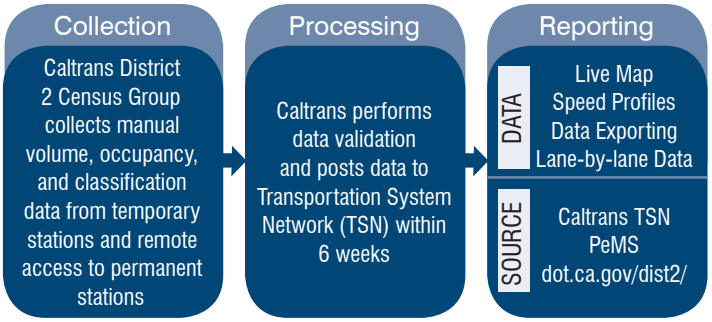
Within the industry, there are many solutions for collecting, processing, reporting, and disseminating traffic data. Data collection varies by the type of information collected, accessible formats, and granularity. Through an evaluation of the current data collection system and consideration of project needs, there are data collection enhancements that need to be implemented within the region to enhance the current Caltrans District 2 Data Collection Process shown to the right.

An alternatives analysis evaluated individual projects based on strategic corridors and feasible technologies that meet the needs of SRTA and Caltrans District 2. The projects are manageable, modular projects that enhance Caltrans' existing data collection infrastructure while considering the priorities and goals of both SRTA and Caltrans District 2. These projects can be deployed as funding becomes available. The table below highlights a $4.3 million program of preferred alternatives that will meet the data collection needs of SRTA and Caltrans District 2.

The following summary highlights project recommendations to deploy an Integrated Traffic Data Collection System:

- Expand the network of permanent detector count stations through the installation of new detection stations or the upgrading of temporary detection stations at every interchange throughout the SCUR.
- Provide permanent communications and detection equipment to automatically collect data on a more frequent basis.
- Conduct a Bluetooth Pilot Test to evaluate the performance and data samples for origin-destination data.
- If the Caltrans Headquarters' project to automate the interface between the Transportation System Network (TSN) and the Performance Measurement System (PeMS) is not scheduled for the near future, SRTA should work with Caltrans to deploy third party software with data processing and reporting capabilities.
- SRTA and Caltrans District 2 should pursue multiple funding sources for the deployment of the recommended integrated data collection system.

Current Caltrans District 2 Data Collection Process



Project Benefits

By implementing the recommended projects, SRTA, Caltrans and local jurisdictions will receive the following traffic data collection benefits:

- New Origin-Destination (O&D) stations will provide interregional, intraregional, and local trip information to assist with calibrating and validating traffic models. Furthermore, O&D traffic data will allow for tracking and showing progress toward meeting passenger vehicle greenhouse emission reduction targets.
- Expanded traffic detection system will provide greater data granularity for evaluation of traffic patterns and trends.
- Installs the necessary vehicle detection infrastructure for future ramp metering implementation as well as positions the region for future congestion monitoring and traffic management.
- Recommended detection stations will be connected to a communication network that allows for quicker collection and dissemination of data. Data can be acquired quarterly or monthly and possibly be shared in "real-time" as future needs arise.
- The extended detection system will reduce field work hours for Caltrans Census staff.

Needs	Project Recommendations	Estimated Capital Cost	Estimate Annual O&M Cost
1. Make volume data more frequently available, at more locations, and at shorter time intervals	Upgrade existing temporary stations to permanent stations and install new permanent stations at locations without existing detection	$3,096,000	$139,000
	Deploy Global Packet Radio System in the short-term to bring detector stations online		
	Implement Traffic Monitoring Stations by installing detection equipment, controllers and communications equipment at permanent stations	$290,000	$197,000
2. Implement a tool to provide interregional, intraregional, and local Origin and Destination (O&D) trip in-formation	Conduct Bluetooth pilot project and permanent system at County and SCUR gateways	$510,000	$58,000
	Integrate commercial off-the-shelf system to existing Caltrans system		
3. Create and implement tools to best utilize the existing traffic data collection system	Support Caltrans to upgrade existing functionality and process of Transportation System Network (TSN) and Performance Measurement System (PeMS)	Varies depending on features and scale.	Varies depending on features and scale.
	Support Caltrans to upgrade PeMS to automatically download census data from TSN. If the project for the PeMS upgrade is not anticipated in the near future, install third-party software data processing and reporting tool.		

TASK #6: RURAL COUNTY TECHNICAL ASSISTANCE

Objective: To provide technical assistance to other regions upon request

Key Deliverables:

- Technical consultation for peer agencies
- Sharing of pertinent data, methods, and deliverables