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The Early California Cultural Atlas:
Visualizing Processes and Peoples Over Time

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I. Brief Project Summary and History

Beginning in 1769, California was resettled by Spanish Franciscans, soldiers, and colonists. Over the next eighty years the peoples and lands of California were remade by political and biological forces that we are only now beginning to understand in their totality. The establishment of Mission San Diego in 1769 as the first of twenty-one Franciscan missions in California initiated the movement of tens of thousands of Indians to the missions where most died prematurely from disease. At that same time, Spanish livestock began to crowd out California's native fauna, and newly introduced vegetation began to push aside indigenous plants, greatly undermining the subsistence practices of California Indians. During the 1820s, 1830s, and 1840s, the ownership of much of California passed from Indians to Spaniards and Mexicans, as Mexican governors granted large tracts of land to their followers and friends. ECCA visualizes these trends unfolding in California before 1850.

The ECCA emerged out of the Huntington Library's Early California Population Project (ECPP), a project that was completed in 2006 with NEH funding. The ECPP database contains all the information in the California mission baptism, marriage, and burial records; thus, it holds an extraordinary wealth of unique information on more than 110,000 Indians, soldiers, and settlers in California. Most important for the ECCA, the ECPP database lends itself to spatial and temporal analysis. For, each of the more than 200 fields in every record describes a person or event that can be situated in time and place. Beginning in the spring of 2006 Hackel and Jeanette Zerneke began to discuss the advantages of displaying ECPP data spatially and temporally through visualizations. They created an interactive map of Indian villages at the time the Spaniards arrived in the Monterey region and linked the ECPP data for Indians baptized to a map of the villages from which they came.

With this exploratory work complete, in the spring of 2008 ECCA received the NEH Digital Humanities Level I Start-Up Grant and Level II funding in 2011 to extend and deepen ECCA's research and work. With Level I funding we constructed a basic website of historical change in the region of Monterey, California, and resolved many technical issues. In the process, we encountered significant new historical questions. With Level II support, we created new data for mapping Indian villages while implementing a scalable system of visualization that can be applied to the entire California mission system. With Level II funding we extended our data collection to include the Los Angeles Basin with its more arid climate, expansive network of Juaneño and Gabrielino/Tongva villages, multiple Spanish missions, Mexican ranchos, and civilian settlers. We created a new map of Native villages from multiple references sources and developed a new data management methodology that will make most of the mapping data available to scholars.

ECCA enhances the humanities by calling greater attention to the way databases tend to erase or render meaningless geographical information. Databases like the ECPP—which contains information on more than 110,000 California Indians, soldiers, and settlers of colonial California and upon which the ECCA is largely based—are increasingly common in the humanities and social sciences. They are full of geographic information, but coding and database structure can reduce this information to mere place names and administrative units. What is left are records that have locational information that can only be deduced or understood by experts who have local knowledge and special maps. In this project, we breathed new life into geographical

information embedded in the ECPP, reintroduced the geographical component back into the study of early California and its peoples, and helped create a foundation for humanistic inquiries that incorporate spatial analysis.

Historians are accustomed to measuring change over time but are not particularly adept at studying the relationships between time and space and change. In this project, we are demonstrating how adding the spatial component to temporal analysis leads not only to a deepening of humanistic inquiry but to a reformulation of the inquiry itself. During the Level II phase of implementation, we focused on the issues of uncertainty and ambiguity. Our work to 'ingest' this data was a complex process that dealt with multiple reference sources and created both a complex and a robust, simplified view to use with our different visualization methods.

One result of this process is that it now seems clear that ECCA will force us to fundamentally rethink what we have understood and written about the movements of Indians to missions in California. Most important, we discovered new historical questions that emerge directly out of visualizations we prepared with Level I and Level II funding. In our mapping of the movement of Indians to two missions in the Monterey region (San Carlos and San Juan Bautista) we became aware not only that mission recruitment proceeded steadily outward from each mission, but that in the 1820s and 1830s Indians came to the missions from the interior of California, an area previously thought to be far less affected than the coastal region by the growth of mission agriculture and livestock and the creation of Spanish and Mexican ranchos. Thus, we are now asking new questions: if mission encroachment on native subsistence drove Indian movement to the coastal missions before 1820, what led Indians from the interior of California to the missions after 1820? Furthermore, now that we can see the spatial and temporal patterns of mission recruitment for the Monterey region and the Los Angeles Basin, how might these patterns differ from other parts of coastal California? Our work in digital history suggests that scholars need to figure out more complicated stories to tell about Indians' movements to the missions and environmental change in early California.

II. Findings: Addressing Uncertainty and Ambiguity in the Early California Cultural Atlas Project

We have chosen to intentionally address uncertainty and ambiguity in this study. For this project we will refer to uncertainty as a combination of multiple factors, which affect the accuracy and precision of data. Ambiguity on the other hand is uncertainty whose source is differences of opinion, perception or understanding of the data. In humanities projects, ambiguity is accepted. It is not expected to be eliminated.

Each of the sources of ECCA data and information has it's own characteristics of uncertainty. The participants in this history had diverse paradigms including diverse perceptions of time and place. Native Californians represented their relationship to their environment in their oral traditions. Representation of the geography of California in Western Maps and Atlases changed dramatically during the time period. The skills of cartography and mapping were improving and there were many voyages of exploration to the region. In European culture, the role and function of mapping was evolving and development of charts and timelines was flourishing. Changes in population, land use, economics, and environment both reflected and altered the understanding of California.

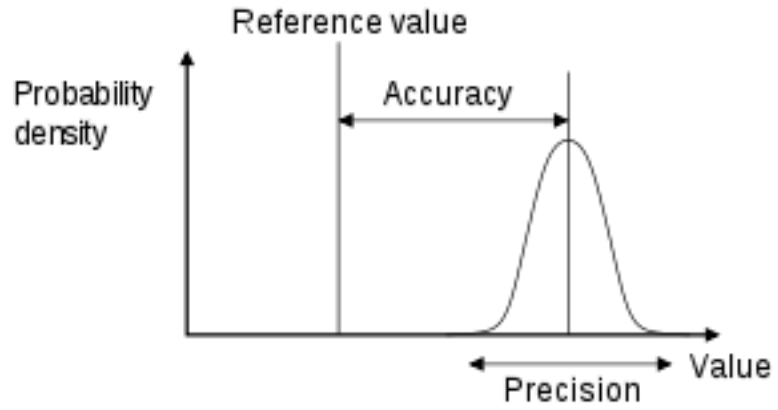


Fig 1. Accuracy vs. precision

Developing a Typology of Uncertainty

To begin we had to develop a working typology of uncertainty for the project. We began to work with the data and develop a characterization of the types and sources of uncertainty we were finding. We identified standard approaches used in various fields including, IT, GIS and visualization. We considered what adaptations were needed for humanities and spatially oriented projects. Then we developed an approach for this work, which addresses the specific goals of the project -- to provide access to and integrate the diverse sets of information and develop dynamic integrated visualizations of the early history of California. One of the typologies, which provides a good framework is the "Spatial Data Transfer Standards (SDTS)." It includes the following categories of data quality:

- **Lineage:** a description of the source material from which the data were derived and the methods of derivation, including all transformations involved in producing the final digital files (USGS 1997, p. 15)
- **Positional accuracy:** must include the degree of compliance to the spatial registration standard; measures can include: deductive estimate, internal evidence, comparison to source, or independent source of higher authority (USGS, 1997, p. 15)
- **Attribute accuracy:** both measurement accuracy (for features measured on a continuous scale) and class assignment accuracy (for categorical features) are included here (USGS 1997, p. 16)
- **Logical consistency:** here, the objective is to describe the fidelity of relationships encoded in the data structure of the digital spatial data (USGS 1997, p. 16)
- **Completeness:** the goal here is to describe the relationship between the objects represented and the abstract universe of all such objects. Includes issues such as selection criteria (e.g., size thresholds for spatial features, frequency counts for attributes), definitions used, and other mapping/abstraction rules (USGS 1997, p. 17)

Another typology of uncertainty, which is relevant to geospatial information visualization comes from the context of intelligence analysis:

- **Accuracy/error:** difference between observation and reality
- **Precision:** exactness of measurement
- **Completeness:** extent to which information is comprehensive
- **Consistency:** extent to which information components agree
- **Lineage:** conduit through which information has passed
- **Currency:** time span from occurrence through information collection/processing to use
- **Credibility:** combination of factors such as reliability of information source
- **Subjectivity:** the extent to which human interpretation or judgment is involved in information construction
- **Interrelatedness:** source independence from other information

(Thomson et al. 2004, quoted in MacEachren, 2005)

Our topology of uncertainty has to address the fact that Humanities data is almost always "fuzzy." In the Humanities, accuracy and completeness are hard to evaluate. However, this is not unique to history or cultural studies. Science and social science often use sampling of bounded or unbounded sets to investigate processes. For example, in environmental studies, plant observations tell you where a plant was at a certain time. It doesn't tell you where the plant "was not" or where else it could have been. In economics, the number of people filing for unemployment benefits is used to indicate how many people aren't working. There are also examples in GIS, spatial theory, information visualization that we can use as guides. However, in our work we need to acknowledge that perspective and ambiguity play a larger role and are not expected to be resolved. Multiple perspectives of information need to be displayed.

This project is investigating a period in history of significant change in perspectives on and representation of space and time. The measurement and representation of the reference dimensions – time and space – are themselves "fuzzy." In the past and the present there are a diversity of time and space paradigms used by cultures and communities. Digital Humanities must capture, represent, and analyze these concepts. Our research must be able to incorporate non-Cartesian views of place. In addition, we are dealing with new emerging conceptions of time and space in using and representing our project data and results in this digitally connected world.

ECCA Topology of Uncertainty

For the ECCA project we have divided uncertainty characteristics into two dimensions: its source and type.

Sources of Uncertainty

In the ECCA project, each data layer has unique uncertainty and ambiguity. We have characterized the sources of this uncertainty below.

- **Spatio-temporal paradigm diversity** (Ambiguity/Subjectivity)
  - Perception of time and place for different communities effects how place and 'land use' are documented
- **Data recording and collection** (variety of ambiguity, accuracy, and precision)
  - What was recorded and what has been preserved
    - Cultural perspectives and technology have influenced what was recorded
    - Events that followed affect preservation
- **Data characterization- categorization** (generalization and interpretation)
  - Deciding how to convert the collected data into categories and objects which can be visualized and analyzed
  - Building / using ontologies with mapping (e.g., building an ontology of village life styles)

Type of Uncertainty

For ECCA we have developed the following composite characterization of the types of uncertainty:

- **Accuracy** - Is there a knowable correct value? How close are we to it?
- **Precision** – exactness of measurement
- **Lineage of the data** - Documenting sources & metadata
- **Protocol limitations** – what data is available for study
- **Credibility** - reliability of information source
- **Completeness** - Data sample size / number of observations
  - What percent of the total items do we know
  - Documentation if there are known areas of missing data
- **Scale** - For maps and timelines scale is important
  - What scale is appropriate for what we know or can represent about the data? When developing dynamic maps, or a cultural atlas, this typology can be applied to the spatial, temporal, and attribute data. As defined, note that precision does not necessarily imply accuracy. GPS can be very precise even when measuring an approximate location. Protocol limitations, either legal or cultural, may apply to data collection, data characterization, and/or visualization.

Protocol limitations of data use include: laws, copyright or property rights, etc; security, political instability, personal or community safety or rights/ownership of communities, including scholarly communities.

Completeness is a measurement or estimation of both the sample and total dataset size. The sample size is the number observations available for study. A larger sample size can lead to increased 'precision'. Repeated measurements and replication of sampling can also increase 'precision'. In the study of history and culture estimates of set size are often quite difficult.

The Role of Scale

For maps and timelines scale is a crucial component of the visualization design. Precision implies scale in spatial and temporal data. It affects the scale at which it is appropriate to represent the data. If the data is presented at an incorrect scale it can appear either more or less specific than the data warrants. Other aspects of uncertainty can also impact the appropriate scale of data representation. Interactive maps display change of scale seamlessly with zoom functions. At the small-scale, lines are generalized and labels are moved around or even dropped for some items when they won't fit. "Zooming in" triggers display of data with greater precision. For some implementations we will need to have datasets customized for different scales of display.

Handling Uncertainty in Research Projects

In practice, dealing with uncertainty is a process that must be included at all stages of the project. It incorporates using experimental science techniques including: identifying samples, posing theories, and estimating accuracy. It requires documenting your methodology, sources of data, and accuracy annotation. The scale at which uncertainty is documented, e.g., for an entire dataset or each data point must be noted. It is important to indicate what is known about your sample size, including how many data points were not represented – what you left out. Using this characterization should help make sure that you use appropriate visualization techniques, which enable the users to better understand the data and allows them to connect to source and data quality documentation. This process helps to make what you know and don't know explicit.

Uncertainty in ECCA Data Layers

Examples of identifying uncertainty sources and types for the ECCA data are shown in Fig. 2. proposed methods for incorporating the data are included.

Complexity

Dealing with these multiple datasets and building dynamic spatio-temporal visualizations introduces significant complexity. "In general usage, complexity tends to be used to characterize something with many parts in intricate arrangement." When displayed individually each layer / dataset can be represented with the precision appropriate for that specific data. Using multiple layers requires development of an authored map – a statement about the relationships between the data layers.

When displayed with other data the result could imply more precision than available. Care must be taken for a layer not to be perceived to inherit the certainty of the other layers in the map when not appropriate. Two major cases are common. For the integrated visualizations, we may use generalization in a data layer when using it with other data. For example, an ontology, shown in figure 3, of the village types and village networks around San Juan Bautista was constructed. In this case some of the data elements may have more precision or complexity than is being presented.

Source of Ambiguity	Examples	Proposed methodology
Data recording/ collection		
Unclear documentation	Village name ambiguity: spelling variations, unclear writing	Choose the most likely village name or drop it from the data set. Document the choice.
Incomplete attribute documentation	Documentation exists but not for all the data of a particular type: Age of Indians at baptism often estimated and sometimes missing	Use best estimates and document Metadata: what are the characteristics of the data set, it's source and history. What percent of data is known, what is not known.
Temporal documentation incomplete or vague	Don't know exactly when, or don't have the same degree of accuracy for all items of a data set – e.g., exact founding dates not available for all Spanish Ranchos	Use dates when available. Round to nearest year. Choose a default date by which all Ranchos were founded. Use the default date if actual date is unknown. Document this choice in Map legend.
Spatial information incomplete or uncertain	Village name is registered in Mission Records. However, the location of some villages is not recorded	We can give them a generalized location or drop them from the visualization. Proposed methodology – drop from spatial visualization.
	Historical Maps don't have standardized representation of location and knowledge of North America was incomplete	Geo-register the historical maps approximately where they would fit in comparison to modern satellite imagery to allow comparison of views over time
Interpretation of data:		
Difference of opinion among scholars about the specific location of a village.	Often location is based on interpretation of textual descriptions of the site and/or incomplete documentation. Multiple attempts to decide where the villages are have been published	Choose a site base on ranking of reference data sources. Include lineage data in data presentation
Data classification:		
What was meant by the Origin of an individual in the baptism records? Ambiguity in definition of home or village	Name may refer to an inhabited region, a specific site or multiple sites inhabited by a group of people	Develop a ontology of village types
	A person may come from multiple villages/ locations, perhaps because of intermarriage	Assign first listed village only, OR count them multiple times? Document the choice

Fig. 2. ECCA data uncertainty sample

Table 2 Indian Ethnogeographic Ontology

Data classification:		
Ambiguity in definition and spatial location of villages	1) Name may refer to an inhabited region with no clear village sites or exact boundaries	Choose a generalized point of the region or the location of later settlements which inherited the name for visualizations
	2) Multiple names given to generally the same location: perhaps a network of related sub-villages that function as a unit	Map both sub-villages and 'Main' network site. Use Network site when available for visualization and linkage to attributes
	3) Same name with multiple locations: One group of people who live different places at different times such as seasonal migration.	Map multiple locations, but choose one for linkage to attributes in visualizations

Fig 3. Indian Ethnogeography Ontology

Sometimes, precise visualization is used to represent data that is not precise. Then visualization needs to make it easy to see this. For example, we display the rancho boundaries from the court cases of the 1850's. It is the only map-able complete set of boundaries that exists. To help the user understand that this boundary changes over time, we make the polygons semi-transparent and link to the hand-drawn historical images of the sites and to the documents of the land grant cases.

Dynamic Spatio-Temporal Visualizations

Regional demos using the full set of demographic/land use data layers collected have been constructed for the Monterey and Los Angeles areas. Construction of the regional profiles incorporated differences in the Indian ethnography for the two regions. Case studies summarizing the process and decisions made for the ethnography are presented separately. The two regional dynamic spatio-temporal visualizations present our conclusions, constructing a functional display of this complexity. Variations of this visualization can now be constructed for specific uses including targeted user groups, specific academic investigations, or embedding in websites with specific functions.

III. ECCA Case Studies - Native California Ethnogeography in Central California in Los Angeles

Central California

The residential seasonality lifestyle of the Native Californians of Central California meant that what a person reported to the missionaries as their place of origin could vary considerably. To characterize the possible meanings the project developed a matrix of common spatial or land use strategies of the native population documented at first encounter with the Spaniards. Multiple scholarly sources were consulted and an ontology of village types was developed. A complex dataset showing both individual villages and their associations in village networks was developed. Then a simplified version using village networks to represent multiple villages and individual village when they were unique was created. This generalized dataset is used when the data is being displayed at a more general level with other datasets. It is also used to provide links to information cataloged by village name. This source and ambiguity characterization will be included in the metadata for the village ethnogeography data layer.

Table 1. Collection of location references

VillageNetwork	Linguistic Affiliation	Political Entity	Accuracy	map or text
Aromas	Costanoan	Mutsun	exact coordinates	The Motsuns held the site of Mission San Juan Bautista, its environs, and the areas of Aromas and Natividad to the west and south.
Atsnil	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Ausaima Network	Costanoan	Ausaima	exact coordinates--8 1/2 miles NE of Gilroy	The core area of the Ausaima tribe is confidently placed on the east side of the San Felipe sink on Pacheco Creek.
Calendaruc Network	Costanoan	Calendaruc	within 10 miles	At San Juan Bautista the term Calendaruc seems to have been applied only to the Tiuvta group of the Pajaro River.
Chaloctac	Costanoan	Chaloctac	somewhat accurate--within 50 miles	The band or tribelet of Chaloctac are thought to have hedl the rough country around Loma Prieta Creek along the crest of the Santa Cruz Mountains.
Chalon	Costanoan	Chamon	accurate--within 10 miles	Map
Chausila	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Cheneches	Penutian	N.V. Yokuts	accurate--within 10 miles	Opposite mouth of Mariposa Creek, north of Los Banos.
Chequisinthre	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Chipuctac	Costanoan	Ausaima	almost exact coordinates--8 1/2 miles NE of Gilroy	Chipuctac [is] located in the Canada de los Osos area northeast of the present town of Gilroy.
Copcha	Penutian	N.V. Yokuts	accurate--within 10 miles	Opposite mouth of Chowchilla
Cuchunu	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Cutocho	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Eyulahuas	Penutian	N.V. Yokuts	accurate--within 10 miles	Map
Guachirron Network	Costanoan/Penutian	Ochentac	accurate--within 10 miles	The group seems to have been located at a village near the beach (identified as probably near Castrovile); :App., I-1
Guachirron Network	Costanoan/Penutian	Ochentac	accurate--within 10 miles	The…Ochentac held the Little Panoche and Ortigilata Creek drainages.

Table 2 Indian Ethnogeographic Ontology

Data classification:		
Ambiguity in definition and spatial location of villages	1) Name may refer to an inhabited region with no clear village sites or exact boundaries	Choose a generalized point of the region or the location of later settlements which inherited the name for visualizations
	2) Multiple names given to generally the same location: perhaps a network of related sub-villages that function as a unit	Map both sub-villages and 'Main' network site. Use Network site when available for visualization and linkage to attributes
	3) Same name with multiple locations: One group of people who live different places at different times such as seasonal migration.	Map multiple locations, but choose one for linkage to attributes in visualizations

Figure 1. Complex GIS Data: Individual villages, networks of villages that functioned together, and villages that changed locations.

Figure 2. An example of village and network detail

Figure 3. The Synthesis – A Gazetteer with one set of Locations for each village name

Los Angeles Area Ethnogeography

The LA area profile provides a mapping of the records of four missions --- San Fernando Rey, San Gabriel de Arcangel, San Juan Capistrano, and San Luis Rey. San Gabriel and San Juan Capistrano are the two core missions, and nearly all of their data was used to cover the Gabrielino/Tongva and Juaneno/Acjachemen tribal territories. San Fernando Rey was used to contribute data for the eastern Tongva sphere, while San Luis Rey contributed data for the southern Juaneño sphere.

Anthropologist, Steve O'Neil, has worked with the tribal communities in the Los Angeles area for many years. He provided his expertise for the mapping of the Native Californian villages. He developed the reference list of village names for the gazetteer and the location mapping of the villages. Documentation of his methodology for selecting standardized names is summarized below in: "Early California Cultural Atlas -- Research Into the Native American Village Locations and Attributes of the Greater Los Angeles Region During the Contact Period: Rationale for Standardization of Ranchería Place Names" by Stephen O'Neil, November 2011.

Tables of proposed names appearing in the ECPP records for these missions were prepared. O'Neil's work was essential in linking the names recorded in the Mission records to the reference list of village names. O'Neil worked from maps he authored in 1995, ethnographic and historical records, and for a few villages, site location reliability is excellent as the archaeological remains of the village in question have been excavated. O'Neil suggests that the ontology used for the central California area is not useful in for this region. He says, "Some of the internal location hints identified for the Mission San Juan Bautista data, such as village networks, probably do not apply to the LA regional data.

Two community meetings were held with leaders of the Native American community representing the two major tribal groups covered by the four missions, the Tongva and the Juaneño. The projects goals and research protocols were described. Additional information resources for locating villages were suggested by the community. Concerns about overly accurate data were discussed. Permission to do this research project and create public information resources was granted.

"Early California Cultural Atlas -- Research Into the Native American Village Locations and Attributes of the Greater Los Angeles Region During the Contact Period: Rationale for Standardization of Ranchería Place Names" by Stephen O'Neil, November 2011.

The Atlas will show the location and name of each ranchería in the database. A single name will appear on the map, yet the records that have come down to us often have a bewildering array of possible pronunciations and spellings for each ranchería name depending on when the name was collected and the source. Therefore a standardized set of names needs to be determined, while preserving the various synonyms within the database so that variants are preserved, and the historic and social foundation of the synonyms is available for further consideration.

A table was prepared that gathers together the several sources for synonyms of the village names. This includes listings of village from contemporary sources – Fr. Geronimo Boscana (1934) for the Acjachemen and Hugo Reid (1846) for the Tongva, other historic documents produced by explorers and travelers, linguistic work professionals such as J.P. Harrington, ethnographic

research by Alfred Kroeber, and the baptismal registers of the missions. Each of these several forms has the potential to be used in the Atlas.

All of the rancherías utilized in the Atlas appear in the mission baptismal registers by the very nature of the Project's database consisting of the Early California Population Project material which is drawn from the range of mission sacramental registers. The ranchería names in the registers, however, often provide a wide range of variant spellings for the individual rancherías for various reasons – the ear of the priest recording the name, the priest's own linguistic background (Castilian, Andalusian, Basque, German, etc.), utilization of a standard spelling by a previous minister, the change of priests ministering at the mission over time, and so forth. Ethnographic work recorded a limited number of village names, those recalled by tribal descendents decades following involvement with the traditional way of life, and at times received names of places in nearby territory from members of a different group. Trained linguists have recorded place names and reconstructed others, but often using learned formal rules of a Native language without access to ordinary conversational usage.

For the ECCA Atlas the primary source for an Acjachemen ranchería name are those determined by the linguist Harrington (1933). His place names, however, are limited in number, being only 11 out of 27 known villages in the mission register. Rancheria names in the mission's baptismal register was also used, looking at the variant spelling most consistently used. In the case of the Acjachemen, the village list provided by Boscana and the linguistic work provided by Harrington (1933) were used to confirm or modify the mission register form. Some known linguistic aspects of the language were used, such as placing an initial glottal stop /'/ with all terms beginning with a vowel. Slight modifications in orthography were made to allow easier but still reasonably accurate pronunciation: h or ch or x for χ, ñ for ŋ, d for δ, and u for ʊ.

Figure 1. Example map – Figure 20c. Located Villages of Mission San Gabriel Noted in 10 Year Intervals as They First Appear in the Baptismal Registers. Source: O'Neil (1995)

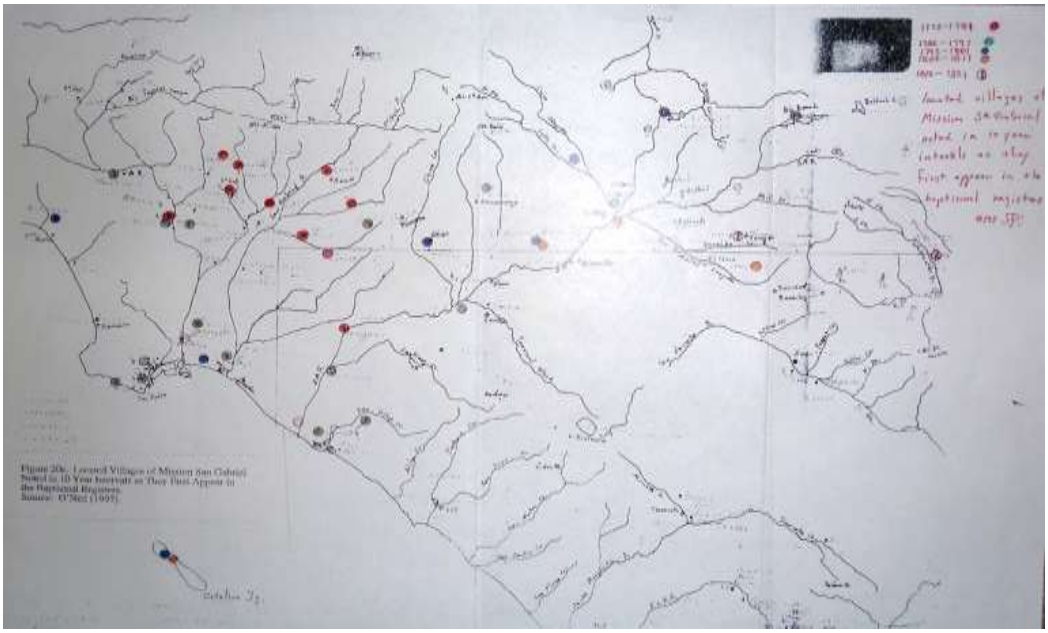


Figure 2. ECCA Acjachemen Rancherias -- Standardized Names

The table below includes 30 villages, three of which do not appear in the Mission San Juan Capistrano baptismal registers, leaving 27 for ECCA's ECPP-connected map.

No.	Boscana	Harrington	Ethnographic	MSJC Libro de Bautismos	Standardized for ECCA
1	Putuidem	Pʊtiiðʊm [1933:215]	Pu-tuid-em [Kroeb'r 1925]	Puituide	Putiidum
2	Acagchemen	'Aχatcme [1933: 103, 222]	Akhachmai [Kroeb'r 1925]	Captivit / Acaptivit	'Axachme
3	Ulbe	----	----	Julve	Julve
4	Tébone	Tóovʊnŋa [1933:148]	----	Tobna	Tóovunña
5	Eñe	----	----	-----	----
6	Panga	Pánχe [1986]	Pankhe, Panhe [Kroeb'r 1907, 1925, 1959]	Pange	Pánhe
7	Souche	----	----	Zoucche	Zoucche
8	Tobe	----	----	Tove	Tove
9	Túmume	----	----	Tomome/ Thumume	Túmume
10	Tepipche	----	----	-----	----
11	Ecjelme	----	----	Equeme/Quellme	Equelme
12	Tajé	----	----	Taque	Taque
13	Uút	----	Huumai [Kroeber 1907, 1925]	Uhunga / Huhunga	'Uhunga
14	Alume	----	Alona [Kroeb'r 1907]	Alauna	'Alauna
15	Uxme	----	Ushmai, ushmay [Kroeber	Huichme / Uchme	'Uchme

			1907, 1959]		
16	----	----	Lukup [Kroeb'r 1907]	Llecupe	Llecupe
17	----	Pii'iv [1933:114]	Piwiva [Kroeber 1907, 1925]	Pivits / Peviva	Piwiva
18	----	Paχavχa [1933:114]	Pakhavkha, Pahav [Kroeber 1907, 1925]	Pajauja / Pajabja	Paxavxa
19	----	'Anooŋa [1933:114]	----	Anonga	'Anonga
20	----	Nivé'wuna [1933:114]	----	Nabojot / Naubojuich	Nivé'wuna
21	----	Paayaχtci [1933:114]	Paiakhche [Kroeb'r 1907]	Poialchue	Paayaxchi
22	Quanis-savit [LdB title page]	----	Kwanisa-vit [Kroeb'r 1925]	Zagibit / Sagivit	Sagivit
23	----	----	Mekha [Kroeb'r 1907]	----	----
24	----	Chakápa [in Johnson & O'Neil 2001:22]	Chakapa [Kroeb'r 1907]	Chacape	Chakápe
25	----	Mukwá'chi [in Johnson & O'Neil 2001:22]	----	Mocuache	Mukwá'chi
26	----	Pumámay [in Johnson & O'Neil 2001:23]	----	Pameye / Pomameye	Pumámay
27	----	----	----	Atosemeie	'Atosemeie
28	----	----	----	Guillucome	Guillucome

29	----	----	----	Paplenga	Paplenga
30	----	----	Amaugen [M. Carrillo y J.F. Ortega 1778]	Amàuge	'Amàuge

IV. Conclusion

The ECCA has broken new ground by embracing ambiguity, an issue that has bedeviled humanists' attempts to use new mapping technologies, especially in studies that involve complicated notions of time and space. There has been considerable research in defining geographic uncertainty, developing frameworks for representing geographic uncertainty, and work on methods of visualizing uncertainty. Most of this research focuses on contemporary GIS data for decision-making, visualization of single dimensions of geospatial uncertainty or complex visualization of non-spatial uncertainty. Work in Spatial Information Theory provides examples of modeling complex spatial understanding. In this project, we demonstrated that adding the spatial component to temporal analysis leads not only to a deepening of humanistic inquiry, but to a reformulation of the inquiry itself.

This work addresses the issues of ambiguity and uncertainty holistically as a case study in spatial history. Each of the sources of data and information available to map this study area has its own characteristics of ambiguity. For instance, the representation of the geography of California in Western maps and atlases changed dramatically. The skills of cartography and mapping were improving and there were many voyages of exploration to this region. It also now seems clear that ECCA will force us to fundamentally rethink what we have understood and written about the movements of Indians to missions in California. Most important, the historical questions we are now asking emerged directly out of visualizations we prepared with Level I funding. In our mapping of the movement of Indians to two missions in the Monterey region (San Carlos and San Juan Bautista) we became aware not only that mission recruitment proceeded steadily outward from each mission, but that in the 1820s and 1830s Indians came to the missions from the interior of California, an area previously thought to be far less affected than the coastal region by the growth of mission agriculture and livestock and the creation of Spanish and Mexican ranchos.

Thus, we are now asking new questions: if mission encroachment on native subsistence drove Indian movement to the coastal missions before 1820, what led Indians from the interior of California to the missions after 1820? Furthermore, now that we can see the spatial and temporal patterns of mission recruitment for the Monterey region, how might these patterns differ from those of the Los Angeles Basin, a region of greater aridity, greater Spanish settlement, and greater cultural diversity? Our work in digital history suggests that scholars need to figure out more complicated stories to tell about Indians' movements to the missions and environmental change in early California.

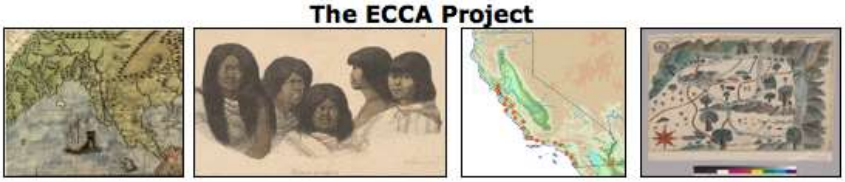
V. Appendix A: Website Tour Through Time

Website Home Page

Early California Cultural Atlas

Home | Dynamic Maps | Exploration | California Indians | Spanish Missions | Ranchos | Regional Profiles

The ECCA Project



The Early California Cultural Atlas (ECCA) is developing a digital atlas to integrate and manage historical resources and enable analysis of historical data related to the colonization and settlement of early California. The project is in the early stages of development. So far, several exploratory studies and interfaces have been constructed. Multiple types of data have been collected and integrated for two missions in the Monterey area and work is beginning for the Los Angeles area. Please read more: About the project

Early History of California - Demographic and land use changes from first encounter to California Statehood

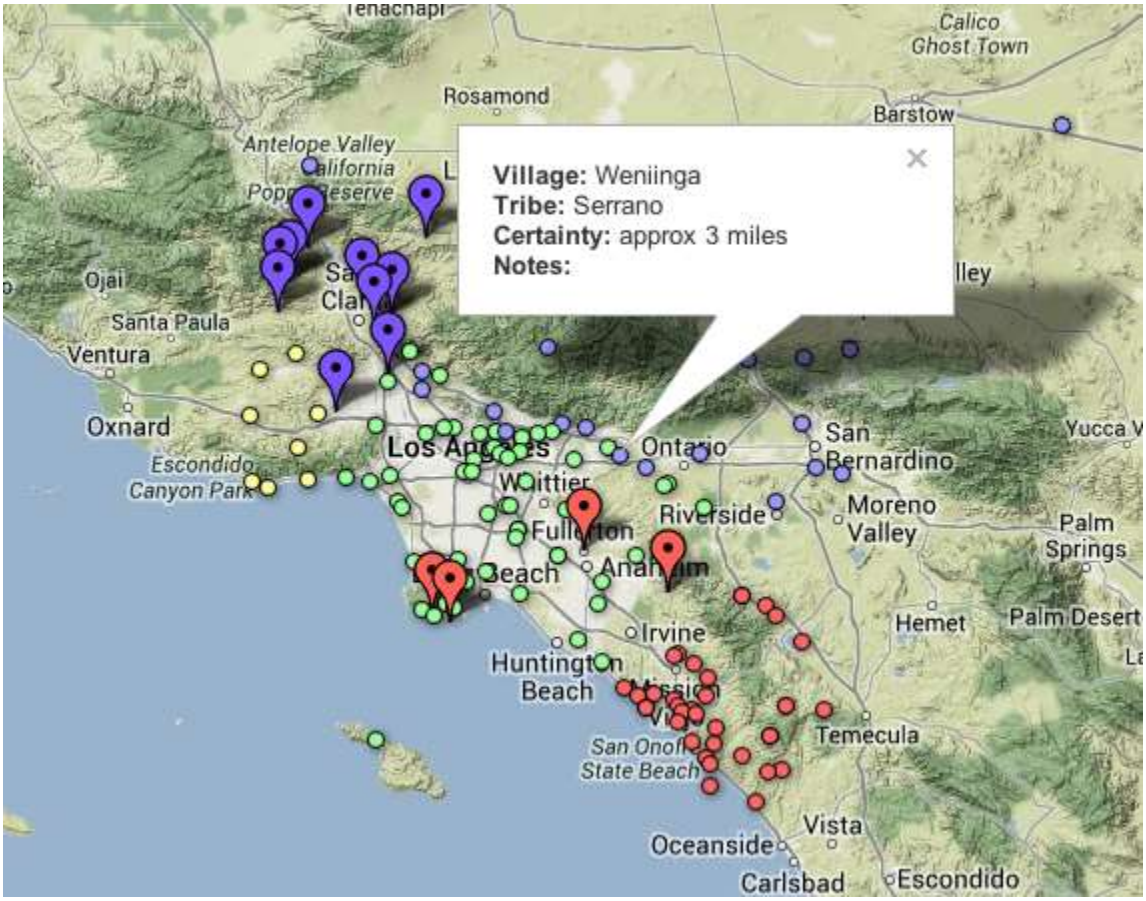
Beginning in 1769, California was resettled by Spanish Franciscans, soldiers, and colonists. Over the next eighty years the peoples and lands of California were remade by political and biological forces that we are only now beginning to understand in their totality. The establishment of Mission San Diego in 1769 as the first of twenty-one Franciscan missions in California initiated the movement of tens of thousands of Indians to the missions where most died prematurely from disease. At that same time, Spanish livestock began to crowd out California's native fauna, and introduced vegetation pushed aside indigenous plants, greatly undermining the subsistence practices of California Indians. During the 1830s and 1840s, the ownership of much of California passed from Indians to Spaniards and Mexicans, as Mexican governors granted large tracts of land to their followers, friends, and subordinates. The Early California Cultural Atlas (ECCA) attempts to demonstrate visually the spatial and temporal aspects of these enormous changes and thereby promote new ways of understanding California before 1850.

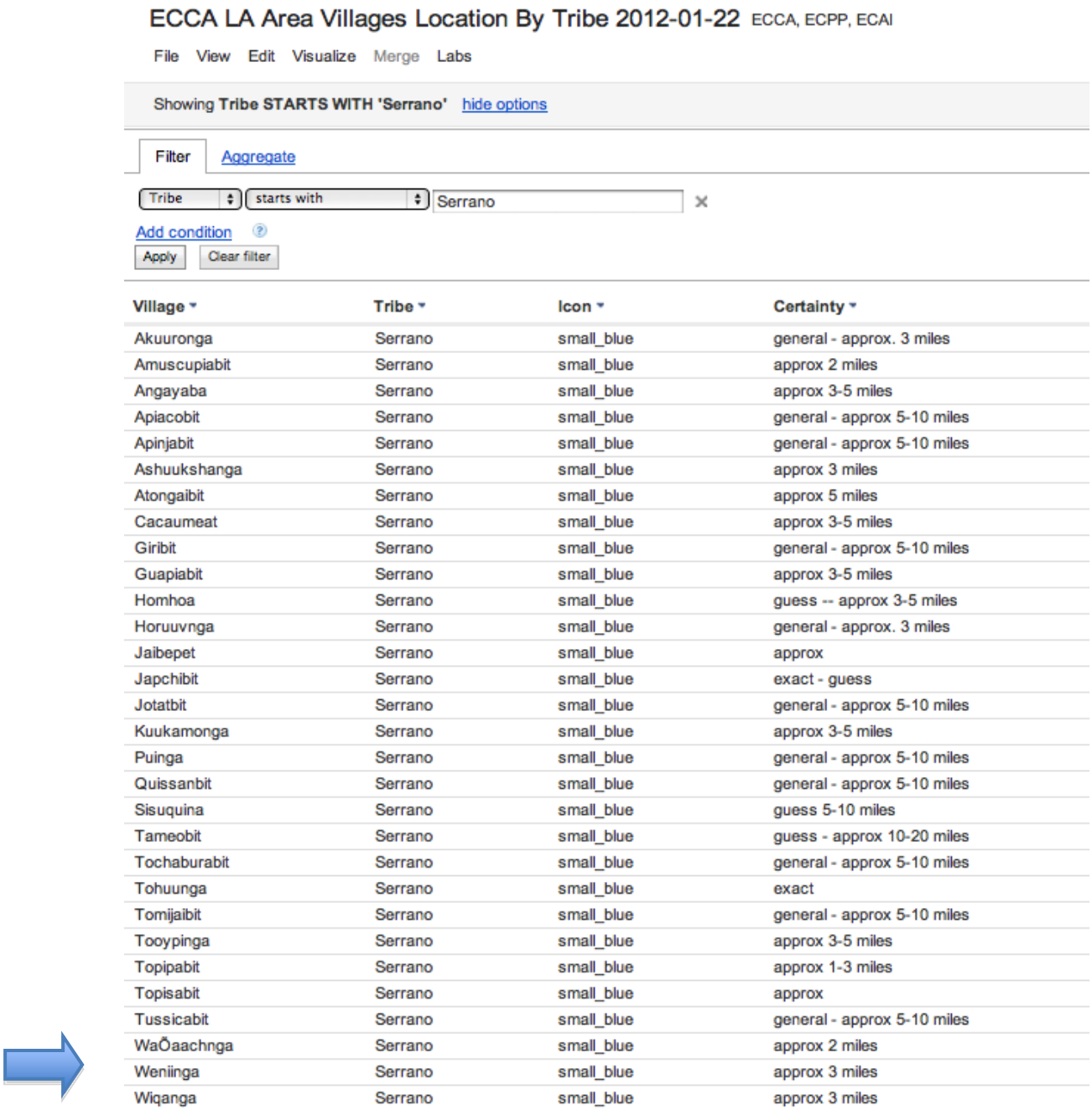
Early Maps from Exploration of California

1650 – California shown as an Island. Vinckeboons, Joan, from LOC

Native Californians

Map of Villages by Tribal Affiliation





ECCA LA Area Villages Location By Tribe 2012-01-22 ECCA, ECPP, ECAI

File View Edit Visualize Merge Labs

Showing **Tribe STARTS WITH 'Serrano'** hide options

Filter Aggregate

Tribe | starts with | Serrano

Add condition

Apply Clear filter

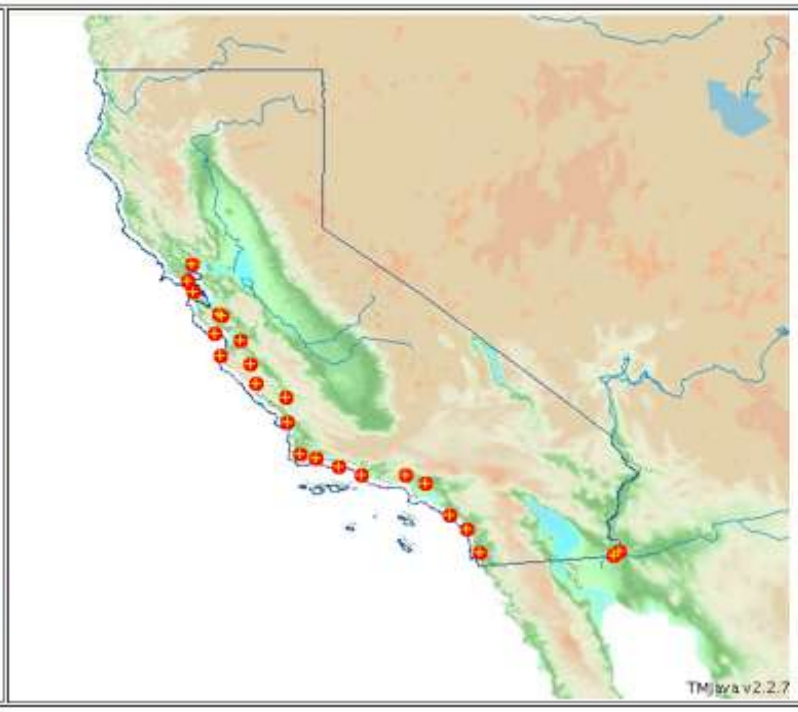
Village	Tribe	Icon	Certainty
Akuuronga	Serrano	small_blue	general - approx. 3 miles
Amuscupiabit	Serrano	small_blue	approx 2 miles
Angayaba	Serrano	small_blue	approx 3-5 miles
Apiacobit	Serrano	small_blue	general - approx 5-10 miles
Apinjabit	Serrano	small_blue	general - approx 5-10 miles
Ashuukshanga	Serrano	small_blue	approx 3 miles
Atongaibit	Serrano	small_blue	approx 5 miles
Cacaumeat	Serrano	small_blue	approx 3-5 miles
Giribit	Serrano	small_blue	general - approx 5-10 miles
Guapiabit	Serrano	small_blue	approx 3-5 miles
Homhoa	Serrano	small_blue	guess -- approx 3-5 miles
Horuuvnga	Serrano	small_blue	general - approx. 3 miles
Jaibepet	Serrano	small_blue	approx
Japchibit	Serrano	small_blue	exact - guess
Jotatbit	Serrano	small_blue	general - approx 5-10 miles
Kuukamonga	Serrano	small_blue	approx 3-5 miles
Puinga	Serrano	small_blue	general - approx 5-10 miles
Quissanbit	Serrano	small_blue	general - approx 5-10 miles
Sisuquina	Serrano	small_blue	guess 5-10 miles
Tameobit	Serrano	small_blue	guess - approx 10-20 miles
Tochaburabit	Serrano	small_blue	general - approx 5-10 miles
Tohuunga	Serrano	small_blue	exact
Tomijaibit	Serrano	small_blue	general - approx 5-10 miles
Tooypinga	Serrano	small_blue	approx 3-5 miles
Topipabit	Serrano	small_blue	approx 1-3 miles
Topisabit	Serrano	small_blue	approx
Tussicabit	Serrano	small_blue	general - approx 5-10 miles
WaÕaachnga	Serrano	small_blue	approx 2 miles
Weniinga	Serrano	small_blue	approx 3 miles
Wiqanga	Serrano	small_blue	approx 3 miles

Spanish Missions of Alta California

From 1769 to 1823, Spanish Missionaries established a string of Missions in Alta California.
The Missions were secularized by the Mexican Congress in 1833.

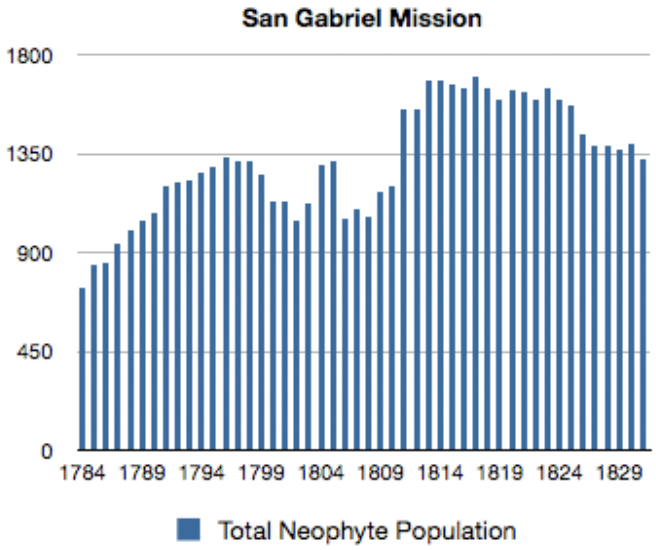
Maps and Animations of the Missions

- Simple image with terrain background
- Map with satellite image background
- View online Google Earth demo of Missions
- More maps, animations and information about the French and Spanish Missions in North America



San Gabriel

Mission = San Gabriel
Year = 1826
Total Neophyte Population = 1438



Baptism of Native Californians by Mission, Village and Year

Symbol Key

Each symbol represents a Native California Village with baptisms at a specific mission.

	Triangles	Mission San Gabriel
	Target	Mission San Fernando
	Diamond	Mission San Juan Capistrano
	Tack	LA Plaza Church

Native California Baptisms by Village

Total Baptisms by Year of people from

Hotuuknga

Tribe Affiliation - Tongva

Year	Mission	Baptisms
	San Gabriel Arcangel	5
	San Juan Capistrano	3
1774	San Gabriel Arcangel	2
1775	San Gabriel Arcangel	8
1776	San Gabriel Arcangel	7
1776	San Juan Capistrano	1
1777	San Gabriel Arcangel	6
1778	San Gabriel Arcangel	10
1780	San Gabriel Arcangel	5

Baptisms by Year of People from

Hotuuknga

Tribe Affiliation - Tongva

Year	Mission Name	Spanish Name	Age at Baptism	Burial Date	BaptismID
	San Gabriel Arcangel	[Corona Maria]	Year(s)	7/25/1785	8235
	San Gabriel Arcangel	Ugolino Maria	14 Year(s)	3/16/1824	8239
	San Gabriel Arcangel	[Justo Maria]		6/13/1780	8223
	San Gabriel Arcangel	[Eusebio Maria]		1/8/1795	10314
	San Gabriel Arcangel	[Diego Conrado]		11/13/1794	10281
	San Juan Capistrano	Joseph Antonio		11/26/1827	40670
	San Juan Capistrano	Maria Josefa		8/10/1825	40572
	San Juan Capistrano	Juan Maria		9/29/1824	40542
1774	San Gabriel Arcangel	Geronimo	siete a ocho Year(s)	1/26/1781	7960
1774	San Gabriel Arcangel	Juan de la Cruz	9 Year(s)		7717
1775	San Gabriel Arcangel	Ambrosio del Espiritu Santo	10 Year(s)	7/5/1801	7754

California Rancho Expansion

Historical Maps of Southern California Ranchos

Attribute information linked from Ranchos in Map with Timeline

VI. Selected References:

Lowell Bean, ed., *The Ohlone Past and Present* (Menlo Park, CA: Ballena Press, 1994)

Ross Brown, Binh Pham, and Alex Streit, "Visualization of Information Uncertainty: Progress and Challenges," *Trends in Interactive Visualization, Advanced Information and Knowledge Processing,* (2009).

Donald Thomas Clark, *Monterey County Place Names: A Geographical Dictionary* (Carmel Valley, CA: Kestral Press, 1991)

Andrew U. Frank, *Data Quality Ontology: An Ontology for Imperfect Knowledge, Spatial Information Theory, Lecture Notes in Computer Science* (Springer, 2007)

Ian N. Gregory, K. Kemp, and R. Mostern, "Geographical Information and historical research: Current progress and future directions," *History and Computing* 13(2003)

Steven W. Hackel, *Children of Coyote, Missionaries of Saint Francis: Indian-Spanish Relations in Colonial California, 1769-1850* (Chapel Hill, UNC Press, 2005)
Robert Heizer, *The California Indians: A Source Book* (Berkeley and Los Angeles: UC Press, 1952)

Robert Heizer, ed., "California Indian Linguistic Records: The Mission Indian Vocabularies of Alphonse Pinart," *University of California Anthropological Records* 15(1952)

Robert Heizer, ed., *HNAI Volume 8: California* 8(1978)

Anne Kelly Knowles, ed., *Past Time, Past Place: GIS for History*, (ESRI Press, 2002)

Alfred L. Kroeber, "The Chumash and Costanoan Languages," *University of California Publications in American Archaeology and Ethnology* 9(1910)

Alfred L. Kroeber, *Handbook of the Indians of California* (New York: Dover Press, 1976)

Alan M. MacEachren, et al., "Visualizing geospatial information uncertainty: what we know and what we need to know", *Cartography and Geographic Information Science 32*(2005)

Randall T. Milliken, *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area, 1769-1810* (Menlo Park, CA: Ballena Press, 1995)

Laurence H. Shoup and Randall T. Milliken, *Inigo of Rancho Posolmi: The Life and Times of a Mission Indian* (Menlo Park, CA: Ballena Press, 1999)

Ann Lucy Wiener Stodder, "Mechanisms and Trends in the Decline of the Costanoan Indian Population of Central California," *Coyote Press Archives of California Prehistory* 4(1986)

Linda Yamane, ed. *A Gathering of Voices: The Native Peoples of the Central California Coast,* Santa Cruz County History Journal 5(2002)