ArcGIS Integration in REMI

Regional Economic Models, Inc.

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Agenda

- Introduction
- Overview of ArcGIS Integration in the REMI model
- Mapping land use codes to NAICS codes
- Weighting employment data by square footage
- Visualization in ArcGIS
- Obtaining specific parcel data
- Conclusion

Overview

When ArcGIS data is available for a particular region, results from TranSight can be linked to parcel data in ArcGIS in order to allow the user to visualize the results within ArcGIS at a granular level.

Depending on the data in the shape file, indicators such as the following can be linked to ArcGIS:

- Employment weighted by parcel square footage
- Population by parcel level based on residential parcel type

Linking of Land Use to NAICS Codes

- Export ArcGIS attribute table to Excel
- Create key between land use codes associated with the shape file and associated NAICS codes

LUCODE	DESCRIPTION	NAICS Code	NAICS Description	DEFINITION (of colum
1000	**Spaced Rural Residential**			Single family homes lo
1090	Spaced Rural Residential Without Units			Parcels of land that do
1100	**Single Family Residential**			
1110	Single Family Detached			A single-unit structure
1120	Single Family Multiple-Units			A single-unit attached
1190	Single Family Residential Without Units			Parcels of land that do
1200	**Multi-Family Residential**			Multiple dwelling units
1280	Single Room Occupancy			For Rent SROs provide
1290	Multi-Family Residential Without Units			Parcels of land that do
1300	**Mobile Home Park**			Includes mobile home
1400	**Group Quarters**			Group living accommoc
1401	Jail/Prison	N/A	State and Local Government	
1402	Dormitory	61	Educational services; private	School associated grou
1403	Military Barracks	N/A	Federal Military	Group living accommoc
1404	Monastery	813	Religious, grantmaking, civic, professional, and similar organ	
1409	Other Group Quarters Facility	N/A	State and Local Government	Convalescent or retiren
1500	**Hotel/Motel/Resort**			
1501	Hotel/Motel (Low-Rise)	721	Accommodation	Hotels, motels, and oth
1502	Hotel/Motel (High-Rise)	721	Accommodation	Hotels and motels that
1503	Resort	721	Accommodation	Resorts with hotel acco
2000	**Heavy Industry**			
2001	Heavy Industry	3364-3369	Manufacturing	Shipbuilding, airframe,
2100	**Light Industry**			
2101	Industrial Park	3364-3369	Manufacturing	Office/industrial uses c
2103	Light Industry - General	3364-3369	Manufacturing	All other industrial uses
2104	Warehousing	493		Usually large buildings
2105	Public Storage	493		Public self-storage buil
2200	**Extractive Industry**			
2201	Extractive Industry	212		Mining, sand and grave
2300	**Junkyards/Dumps/Landfills**			
2301	Junkyard/Dump/Landfill	562	Waste management and	The landscape should s
4100	**Airports**			
4101	Commercial Airport	481	Air transportation	Lindbergh Field only.
4102	Military Airport	481	Air transportation	Airports owned and op
4103	General Aviation Airport	481	Air transportation	All general aviation air
4104	Airstrip	481	Air transportation	

Join REMI Employment Data with Shape File

- Join the employment data by NAICS code to the shape file data using the NAICS-land use key
  - In the screenshot to the right, the third column represents the total employment change for that NAICS code, and the fourth column is the employment change for that specific parcel
- This can also be done for simulations to determine the employment change by parcel

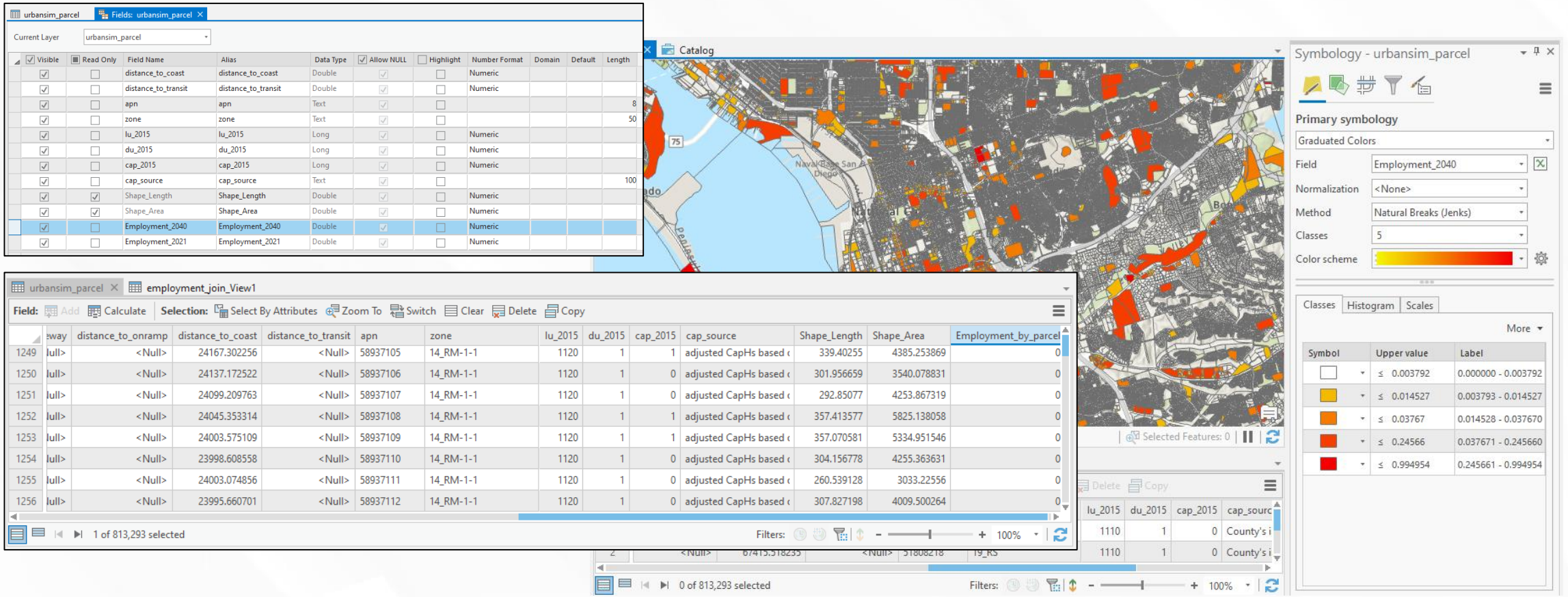
OID_	NAICS	Employment i	Employment_Value
336	813	23	0.000181321
1175	112	11	6.31E-06
1922	713	25	0.000111283
2536	813	23	0.000354852
2538	44	194	0.00552554
2539	44	194	0.004300316
2540	44	194	0.006256099
2541	493	3	4.22E-05
2647	44	194	0.004912187
2700	112	11	1.54E-05
2701	112	11	3.46E-05
2703	112	11	2.18E-05
2755	713	25	5.36E-05
3169	112	11	2.03E-05
3217	112	11	9.06E-05
3222	112	11	4.85E-05
3255	44	194	0.051207974
3388	493	3	1.46E-05
4081	112	11	8.66E-05
5107	713	25	7.21E-05
5124	713	25	5.12E-05
5223	61	51	0.001046969
5240	561	133	0.000707612

Weighting by Industry Parcel Square Footage

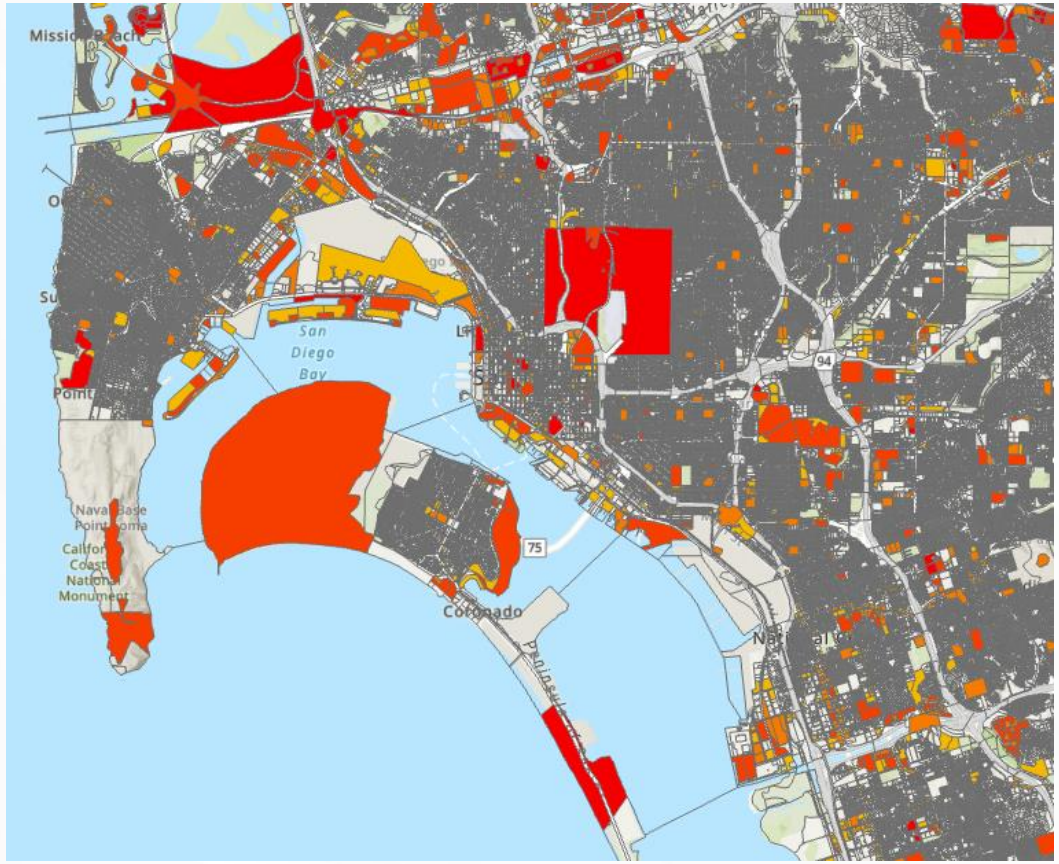
- Determine each parcel's square footage as a percentage of the total square footage of each industry
- Multiply this percentage by the total employment change for that particular industry
  - Example (baseline employment data):
    - Parcel 4408 NAICS code: 713 (Amusement, Gambling, and Recreation industry)
    - Shape area: 256,234 sq ft
    - Parcel square footage as % of total (which is 36,089,295 ft^2) for NAICS 713: 0.71%
    - NAICS 713 employment: 24,345 * 0.71% = **181 jobs in parcel 4408 from the Amusement, Gambling, and Recreation industry**

Weighting by Industry Parcel Square Footage

- Add a field of the shape file within ArcGIS for the employment by parcel
- Copy the employment by parcel calculations to the new field created in the shape file
- Use the “Symbology” feature within ArcGIS to create a color coded map showing the magnitude of employment impacts by parcel



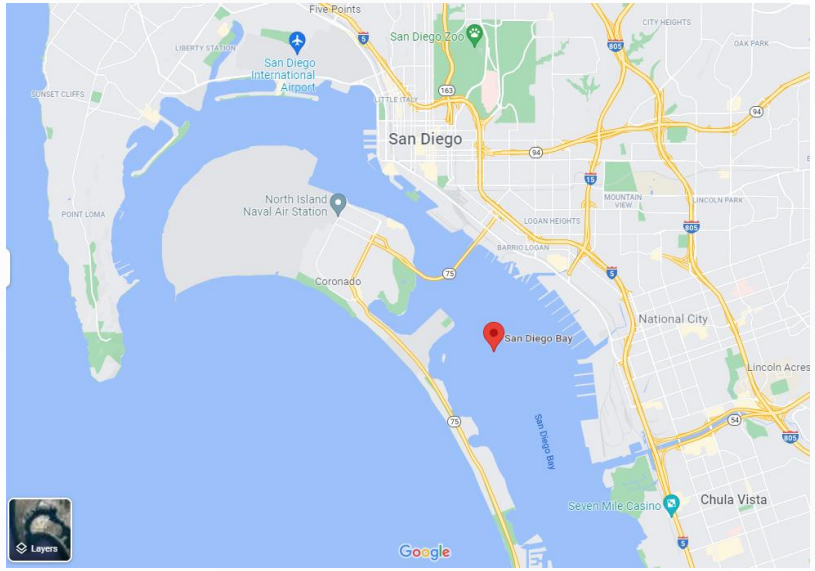
Visualizing REMI baseline employment for San Diego within ArcGIS



Baseline employment by parcel (2021)

Symbol	Upper value	Label
	≤ 0.003792	0.000000 - 0.003792
	≤ 0.014527	0.003793 - 0.014527
	≤ 0.03767	0.014528 - 0.037670
	≤ 0.24566	0.037671 - 0.245660
	≤ 0.994954	0.245661 - 0.994954

Key (thousands of jobs)



Google map of San Diego for reference

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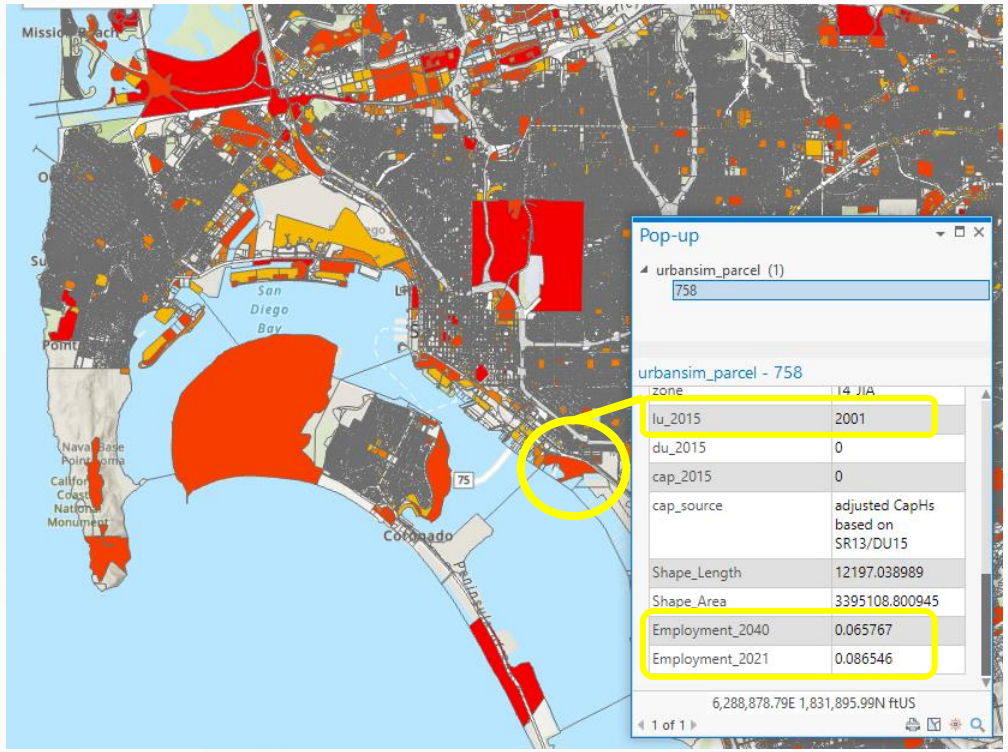
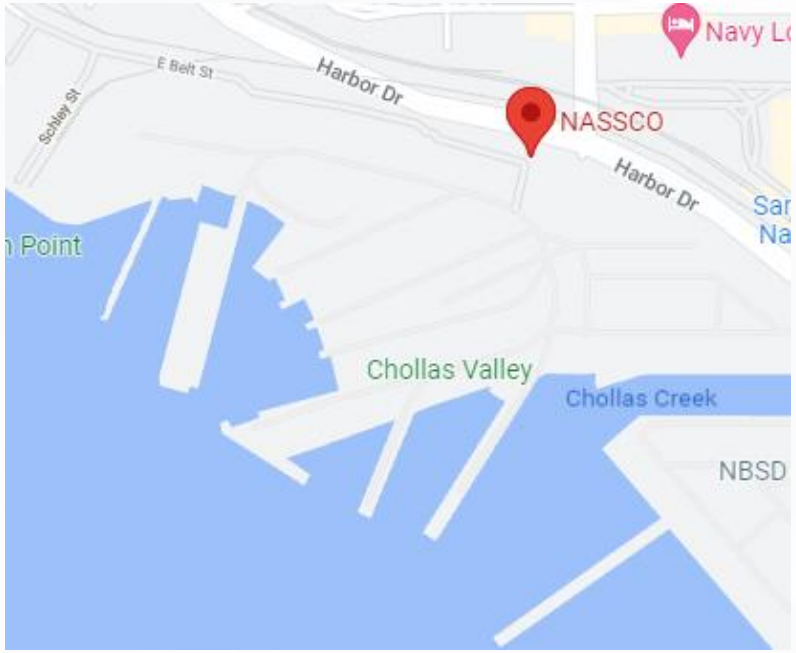
Obtaining employment data for specific parcels



- Land use code of 2001 (Heavy Industry) corresponds to the NAICS code of 3364-3369 (Manufacturing) based on the land use to NAICS mapping
- 2021 employment: 86
- 2040 employment: 66
- This actual parcel in San Diego corresponds to NASSCO, a General Dynamics shipbuilding/ship repair yard



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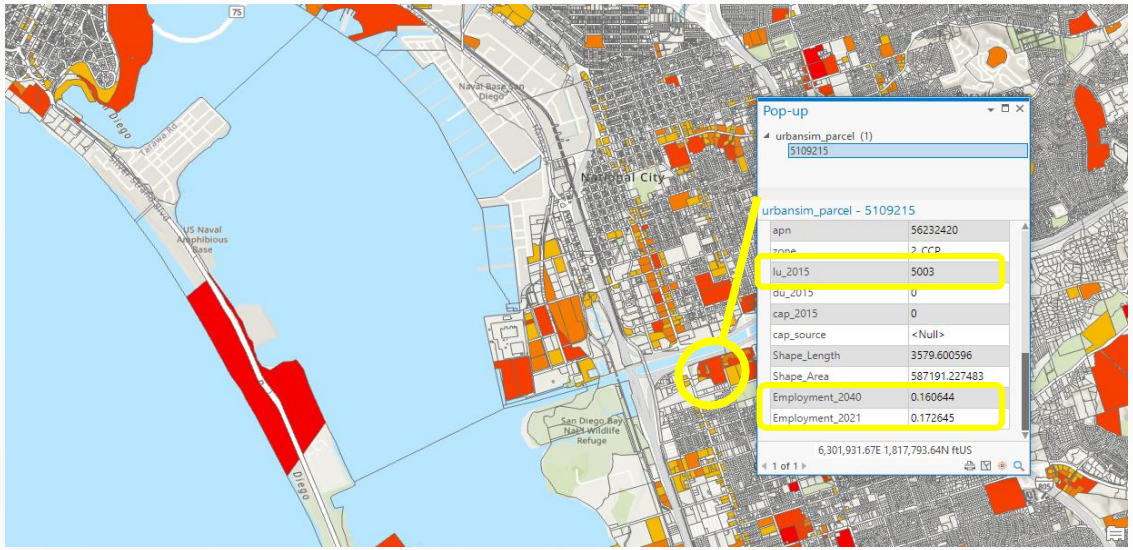
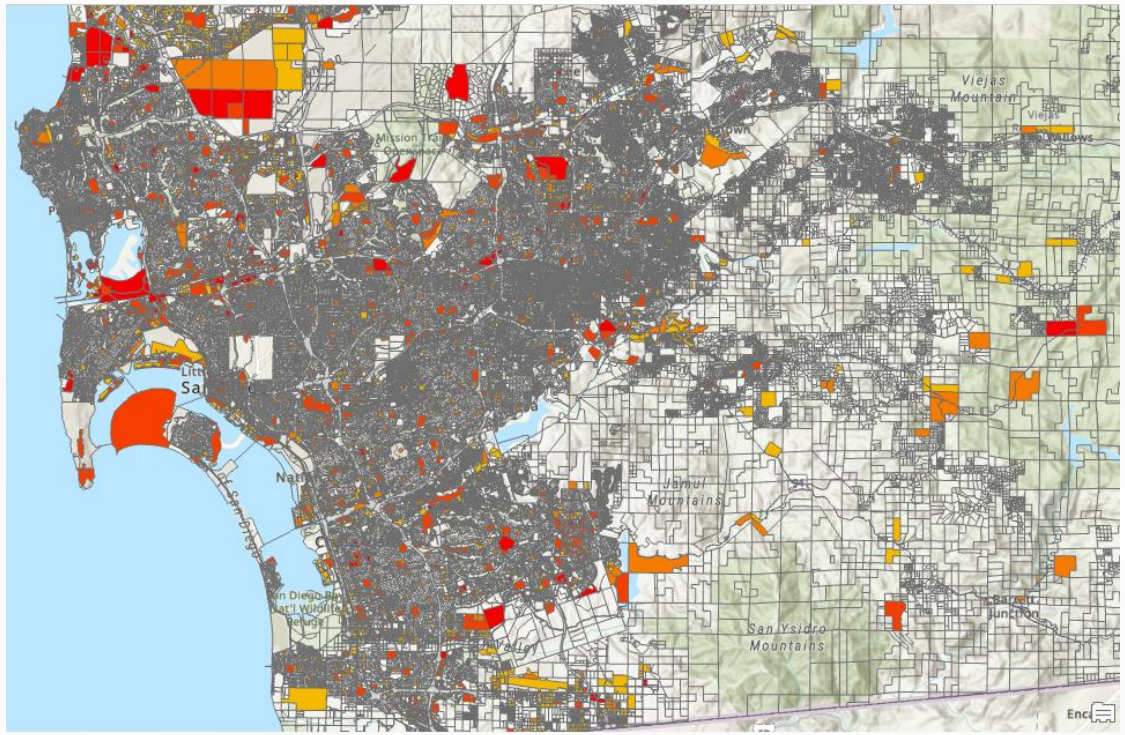
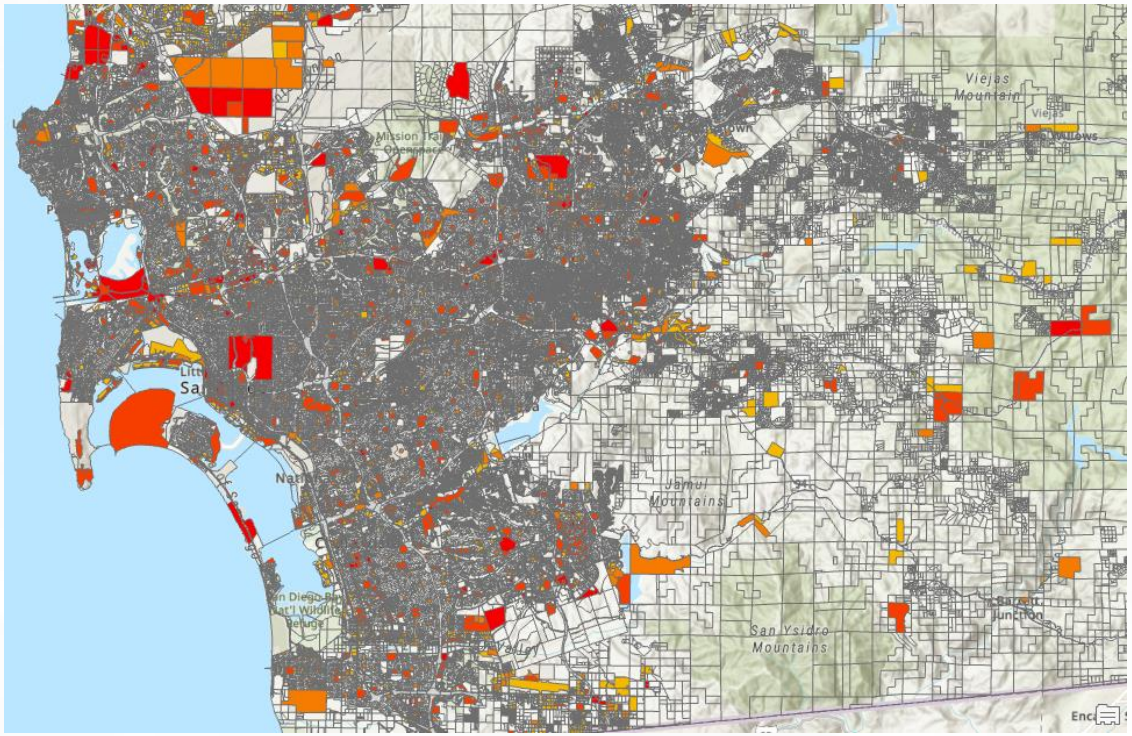


- Land use code of 5003 (Community Shopping Center) corresponds to the NAICS code of 44-45 (Retail Trade) based on the land use to NAICS mapping
- 2021 employment: 173
- 2040 employment: 161
- This actual parcel in San Diego corresponds to a shopping center including a Walmart and Best Buy

Visualizing REMI simulation results within ArcGIS – Incorporating REMI forecast years



2021



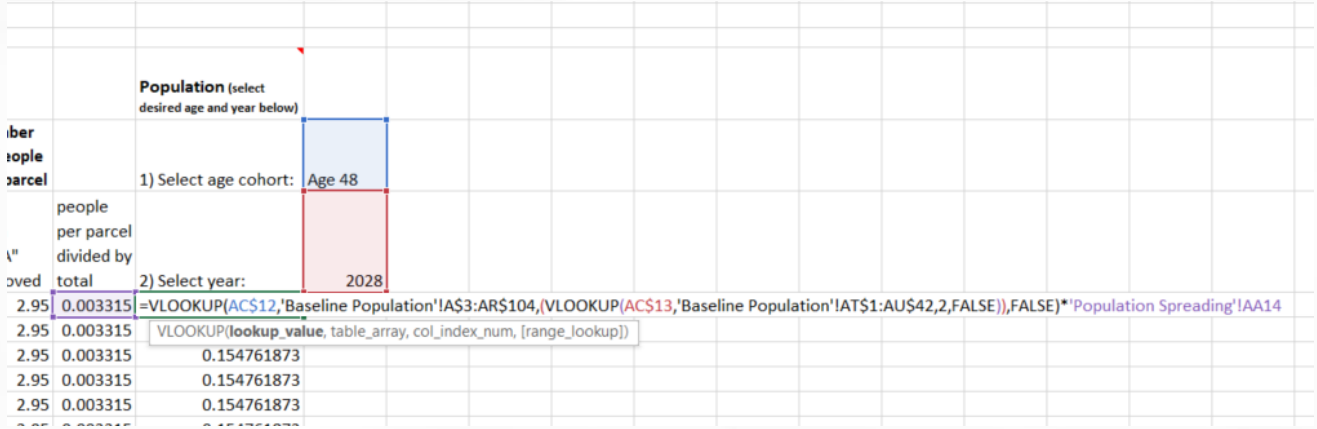
2040

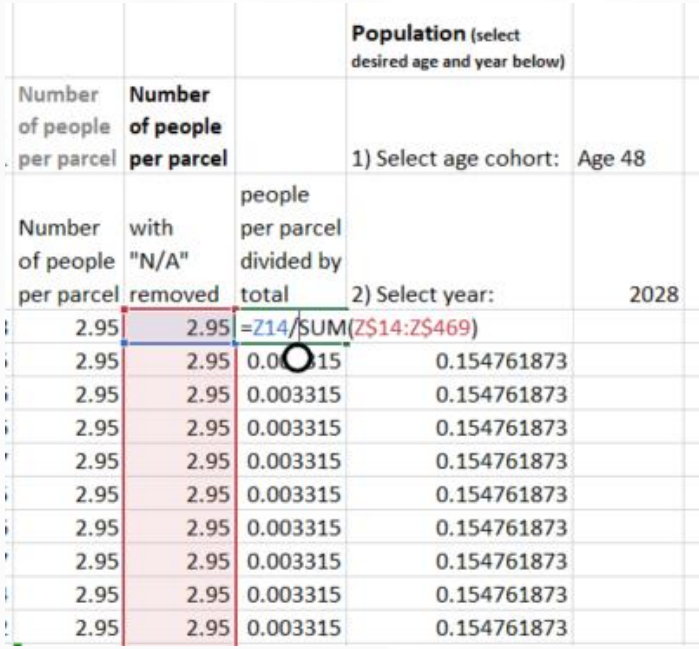
- Importing different years of the REMI forecast allows for visualization of how employment changes over time

Additional REMI-ArcGIS Integration - Population

- In addition to visualizing employment data, other REMI variables can be integrated with ArcGIS, assuming data availability in the shape file, such as population by parcel
- Based on the residential land use type the average number of people per household can be assigned based on the number of units in that land use code, which is then used to determine a percentage that each parcel represents of the population
- The actual population value is then multiplied by these percentages to determine the number of people for each parcel

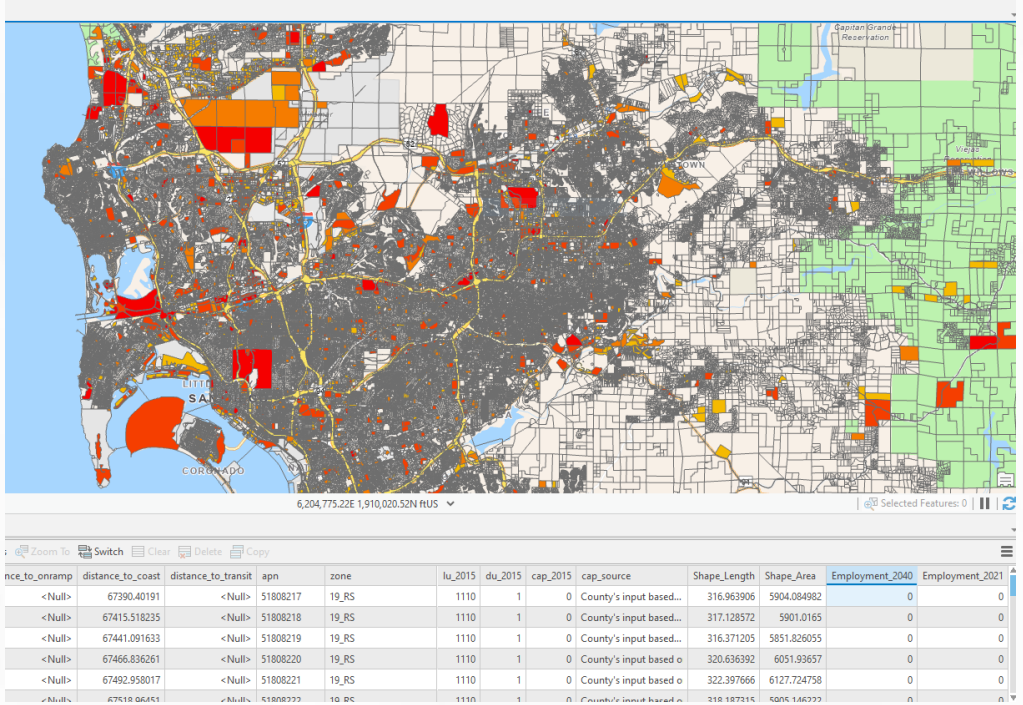
LUCODE	DESCRIPTION	Residential: Average Number of People per Household (source: Census Bureau)	Notes
1000	**Spaced Rural Residential**		
1090	Spaced Rural Residential Without Units	0	Does not conta
1100	**Single Family Residential**	**2.95**	
1110	Single Family Detached	2.95	
1120	Single Family Multiple-Units	2.95	
1190	Single Family Residential Without Units	0	Does not conta
1200	**Multi-Family Residential**	**35.73**	A rough estima
1280	Single Room Occupancy	2.95	
1290	Multi-Family Residential Without Units	0	Does not conta
1300	**Mobile Home Park**		

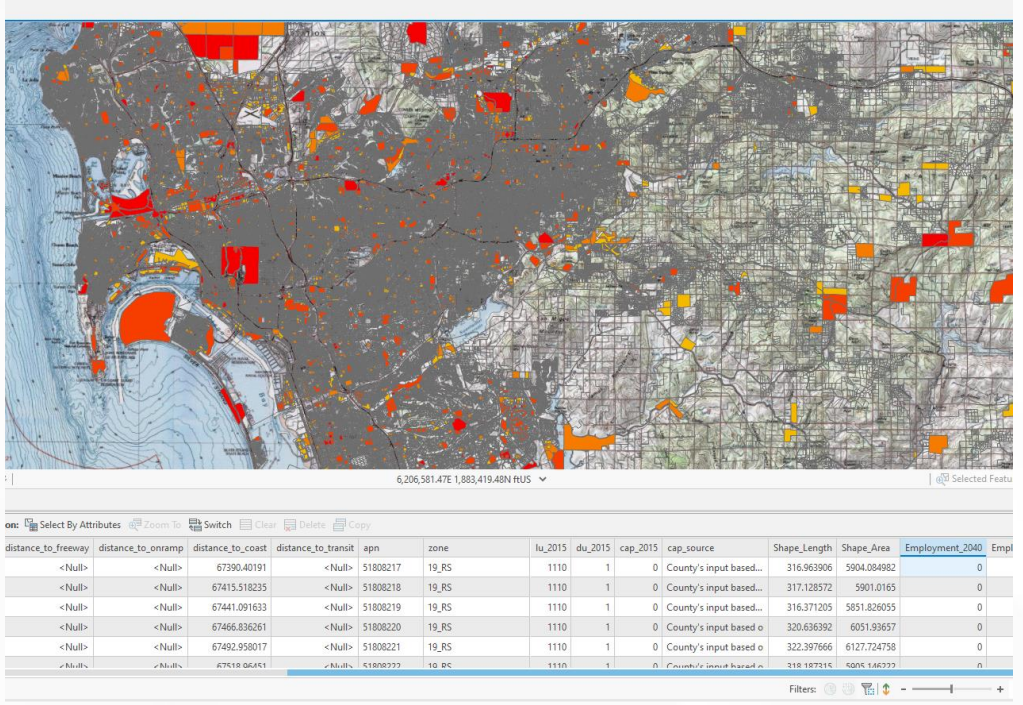




Other Applications

- Using other ArcGIS layers in conjunction with REMI results can help with utility and transportation planning
- Based on what components are available in the shape file, spreading of REMI results variables can be further customized





Conclusion

- ArcGIS visualization allows for planners to see where employment is concentrated within a region
- Visualization can be customized based on how detailed components are in the shape file (such as land use code detail, housing types, parcel square footage, etc.)
- Using other ArcGIS layers such as utility data along with forecast data can help planners forecast future needed utility expansion

Thank you for attending!

For more information, please contact
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