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**TO:** Up for Growth  
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**SUBJECT:** Approach to creating custom 2022 PUMA geographies

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## Introduction

This memo outlines the approach ECONorthwest used to reconcile boundary differences between the Census 2010 and 2020 vintage Public Use Microdata Area (PUMA) geographies. Every decade the U.S. Census Bureau alters PUMA boundaries based on patterns of demographic change from the previous decade. PUMA boundaries are split in some cases, merged in others, and—in rare cases—redrawn entirely. To maintain a longitudinally consistent account of underproduction across the 2010s and 2020s for all metro areas, ECONorthwest created custom 2020 vintage (v2020) PUMA-Metro geographies that are comparable across the two decades.

## Context

### What are PUMAs and why are their boundaries inconsistent over time?

PUMAs are statistical geographies that contain microdata estimates (i.e. person level and household level responses) from the American Community Survey (ACS). To allay confidentiality concerns from such a detailed data set, the Census requires that all PUMAs must be large enough to contain 100,000 people. This inherently creates challenges to producing MSA equivalent geographies using PUMAs as MSAs typically include peri-urban and suburban counties that have fewer than 100,000 people. As such, PUMA boundaries typically span across the outlying counties (i.e. they do not nest) and require algorithmic—and sometimes manual—approaches to identify whether a PUMA should be assigned to an MSA or not.

## Approach

ECONorthwest developed multiple approaches to match 2020 PUMAs to the pre-existing PUMA-metro geographies (v2010 metros) built from the v2010 PUMAs.

### “Perfect Match”: v2020 PUMAs that nest within v2010 metros

As a first pass, we spatially intersected v2020 PUMAs to the v2010 metros and identified metros where 95% to 100% of the combined housing stock from the v2020 PUMAs were contained within the v2010 metro. Shares below 95% indicate that PUMAs extend beyond

the v2010 metro boundary. Shares above 100% indicate that the v2010 metro is larger than the combined area of the intersected PUMAs.

Consider the following example, a v2010 metro has a housing unit count of 100,000 and there are four v2020 intersecting PUMAs that somewhat extend beyond the v2010 metro boundary. The combine housing unit count of the four PUMAs is 105,000 with a 100,000 of them located in the v2010 metro. In this scenario, at least 95% of the combined PUMAs housing unit stock is located within the v2010 metro boundary and thus we would assign those four PUMAs as the v2020 metro boundary.

We found that v2020 PUMAs nested within 253 out of the 309 v2010 metros (80%). Next, we attempted to spatially match v2010 and v2020 PUMAs that nested within the central counties<sup>1</sup> for the remaining 56 metros.

### **“Match to Central Counties”: v2010 and v2020 PUMAs that nest within Central Counties**

As a second pass, we spatially intersected v2020 PUMAs to the central counties of the v2010 metros and applied the same 95% to 100% threshold to generate suitable v2020 metros through this approach.

For example, the Portland (OR) MSA consists of seven counties: Multnomah, Clackamas, Washington, Clark, Yamhill, Columbia, and Skamania. Of these seven, OMB defines the first four as central counties, while the other three are outlying. Under this approach, we would determine if the v2010 and v2020 PUMAs nested within the 4-county area.

Of the 56 remaining metros, only seven contained PUMAs that nested within the respective central counties. In addition to assigning the v2020 PUMAs to the new v2020 metro geographies, we also retroactively updated the v2010 boundaries to reflect this change in approach.

### **“Spanned & Manual Matches”: Matching v2010 and v2020 PUMAs to each other**

The remaining 49 metros had PUMA boundary differences that were so large that it was impossible to produce consistent boundaries between the two vintages and required manual and imperfect assignments.

We manually matched v2020 PUMAs to 14 v2010 metros. Conversely, we retroactively updated the 8 v2010 metro boundaries so that they matched, albeit imperfectly, to the v2020 PUMA boundaries. For the remaining 27 metros, we assigned v2020 PUMAs to a metro if over two-thirds of its housing unit stock was contained within a v2010 metro.

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<sup>1</sup> The Office of Management and Budget (OMB) defines the central and outlying counties of each MSA. Generally, central counties have a large urban population while outlying counties are more integrated through commuting patterns.



# Summary of Metro Boundaries by Approach

