Regional Habitat Connectivity Working Group

Strategic Action Plan

2024-2034

Appendices

Regional Habitat Connectivity Working Group

Strategic Action Plan 2024-2034

Appendix 1 - List of Contributors

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Appendix 2 - Resource List

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Appendix 3 - Habitat Connectivity, Equity and Environmental Justice Planning Resources

Habitat connectivity is currently addressed in the Metro region in a very limited capacity. Preserving or repairing connectivity is generally listed as a policy statement in plans or as a metric for determining habitat quality in natural resource inventories and conservation zones. As a result, protections are not sufficient or consistently applied at a regional level.

Through Oregon's Statewide Planning Goal 5 - Significant Natural Resources - jurisdictions are required to create a natural resource conservation program that, at a minimum, complies with the Goal's provisions (OAR 660-023). Oregon's Goal 5 does not explicitly establish habitat connectivity as a function of habitat quality. While Goal 5 does list "wildlife migration corridors" as a type of wildlife habitat (and therefore natural resource), these areas are specific to migratory paths.

Title 13 of Metro's Urban Growth Management Functional Plan - *Nature in Neighborhoods* – is Metro's Goal 5 implementation program. It lists two performance objectives that include indicators of habitat connectivity. Title 13 also lists the use of "Habitat Friendly Development Practices" as an *Implementation Objective*, which include five distinct "design and construction practices to minimize impacts on wildlife corridors and fish passage".

The Multnomah County Comprehensive Plan lists inventorying and protecting wildlife corridors in Policy 5.26 and Policy 5.27. The Washington County and Clackamas County Comprehensive plans do not address habitat connectivity in any capacity. The Portland Watershed Management plan lists habitat connectivity as an action to help achieve aquatic and terrestrial habitat enhancement.

The Portland 2035 Comprehensive Plan supports habitat connectivity in the Design and Development Chapter (Policy 4.77) and the Environment and Watershed Health Chapter (Policy 7.10). In addition, Portland's most recent Natural Resource Inventory (2012) includes connectivity in their model for assessing habitat quality, assigning high, medium, and low connectivity values.

Portland's Transportation System Plan (TSP) briefly notes a need for coordination between habitat connectivity and trails projects (Policy 8.59). The TSP also includes "Design with Nature" policies, which mention habitat connectivity as an example. The Regional Transportation Plan (RTP) only mentions habitat connectivity within the context of protecting water features.

The Forest Park Conservancy's Five Year Strategic Action Plan (2018) addresses regional habitat connectivity through their second Goal - "*Protect and improve connectivity between Forest Park, the Tualatin Mountains, the Coast Range, the Willamette River, and the Columbia River Gorge*".

Other Resources including Equity Plans and Environmental Justice requirements:

- Statewide Plans:

    - Oregon's Conservation Strategy (Oregon Department of Fish and Wildlife 2006,2016)
    - Washington's Comprehensive Wildlife Conservation Strategy (Washington Department of Fish and Wildlife 2005)
    - Environmental Protection Agency Equity Action Plan (EO 13985)
    - Department of Environmental Quality 1997 Environmental Justice Law
    - Oregon Diversity Action Plan
    - Oregon House Bill 4077
    - Oregon Department of Environmental Quality Environmental Justice Law
- Regional Plans:
    - The Intertwine Alliance's Portland-Vancouver Regional Conservancy Strategy (Intertwine Alliance 2012)
    - Metro Regional Transportation Plan (Metro 2018)
    - Metro Equity Strategy
        - Parks and Nature Equity Strategy- includes environmental equity section
        - Planning and Development Equity Strategy
- City and County Plans
    - Actions for Watershed Health: 2005 Portland Watershed Management Plan (City of Portland 2005)
    - City of Portland and Multnomah County Climate Change Preparation Strategy: Risk and Vulnerability Assessment (City of Portland and Multnomah County 2014)
    - Clean Water Services Health Stream Plans (Clean Water Services, 2005)
    - Greater Forest Park Conservation Initiative (Myers et al. 2013)
    - Portland 2035 Comprehensive Plan (City of Portland 2018)
    - Portland Urban Forestry Management Plan (City of Portland 2004)
    - Vancouver Comprehensive Plan 2011-2030 (City of Vancouver 2011/2020)
    - Portland Parks and Recreation Five-Year Racial Equity Plan
- Community Plans
    - Living Cully Community Energy Plan (Living Cully 2018)
    - The Portland African American Leadership Forum: The People's Plan (PAALF 2017)
    - Tyee Khunamokwst "Leading Together:" Environmental Justice Framework (NAYA-CCC-OPAL 2017)

Strategic Action Plan Equity Integration Report

Regional Habitat Connectivity Working Group

July 15, 2022

This report is the work of Michael Yun and Andrew Tillinghast at Knot, and Anita Yap at MultiCultural Collaborative. The authors acknowledge the contributions of RHCWG's JEDI sub-committee, especially the project team Theresa Huang and Janelle St. Pierre, and workshop liaisons Leslie Bliss-Ketchum, Jennifer Karps, Catherine de Rivera. Key input was received from Lori Hennings among other members of the Steering Committee, and all workshop participants.

knot
Designers committed
to the ecology of ideas

MultiCultural
Collaborative

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A | Summary of Findings

As a collaborative effort between numerous municipal and regional agencies, non-profit organizations, and individuals, the Regional Habitat Connectivity Working Group (RHCWG) seeks to promote ecological connectivity in the greater Portland-Vancouver area. While drafting their Strategic Action Plan (SAP), the group identified the need to bring in external support to actualize their commitment to equitable processes and outcomes for the region's people as well as its ecology. With a newly drafted JEDI (Justice, Equity, Diversity, and Inclusion) Statement of Intent as a primary driver, RHCWG engaged Knot and MultiCultural Collaborative to audit the draft SAP, facilitate internal engagement sessions, make recommendations for changes, draft a Community Engagement Framework, and produce a geospatial dataset based on indicators of community vulnerability. This report represents the results of this process.

The highest-level message that this report seeks to deliver is that—despite what is still the prevailing assumption among many practitioners of conservation—the movement to respond to the biodiversity and climate crises is inextricably connected with movements to expand civil rights, reduce income inequality, and achieve social justice. White supremacy and the unsustainable exploitation of natural resources are two sides of the same coin, and it is becomingly increasingly clear that there is no addressing one of these problems without addressing the other. 215 years of settler colonialism and systemic racism have been inscribed upon the region's landscape itself, directing the distribution of environmental amenities and burdens across our communities, and delineating barriers and corridors affecting the movement of plants and animals. At the same time, the momentum that is building in these movements separately gains orders of magnitude more efficacy and meaning when pursued together.

It is in this spirit that this report presents a series of tools to empower RHCWG as an organization to do the hard work of self-examination, and to build effective new strategies to make good on its commitment. The report presents a Racial Equity Lens that defines terms and poses a series of questions to help cross-examine our reflexive tendencies towards conducting business as usual. Initial summary responses are provided to give context and set a baseline from which to measure the success of the implementation process. A series of actionable Recommendations are structured to address components of the SAP. The Appendix includes a Community Engagement Framework, including Key Process Steps for the two phases of engagement that have been envisioned. Finally, the report outlines the methods and intent of the Community Vulnerability Index, a custom spatial dataset intended to integrate into various components of RHCWG's strategies.

Implementation of these recommendations will require individuals within the group to take initiative and get outside of their comfort zones of expertise; to be creative, self-aware, and accountable; and to maintain the patience and dedication to see this process through. If they do, RHCWG as an organization, its ability to deliver on its stated goals, and the human and non-human communities of which we form a part will all benefit greatly.

The following are shortened versions of the Principal Recommendations for each of the major SAP components, and represent the best summary of our findings:

Strategic Action Plan Overall

Incorporate Environmental Justice as an essential component of RHCWG's vision to ensure that the work results in positive ecological and social outcomes that redress histories of inequity and systemic racism and align with the priorities and goals of Communities of Color.

Data, Research, and Science

Integrate Environmental Justice focused spatial data into RHCWG's modeling processes to identify focal communities for engagement, to further understand the spatial relationships of vulnerabilities and burdens with existing biodiversity corridors, and to prioritize management actions within and beyond habitat connectivity zones.

Outreach, Education, Engagement, and Advocacy

Engage the region's most vulnerable communities using the tools and strategies of the Engagement Framework and subsequent Engagement Plan, magnify their voices, listen to and understand their priorities, and allow those priorities to influence action and decision making.

Conservation, Management, and Stewardship

Use the results of engagement to direct investment and identify opportunities to improve habitat connectivity through actions that align with community priorities, including projects that restore urban tree canopy, reduce urban heat islands, improve the region's green infrastructure, incorporate habitat-friendly elements into site design, and mitigate contamination of land and water.

Planning & Policy

Focus the pool of policy issues on those that offer the greatest potential to deliver intersectional co-benefits, addressing both systemic inequity and habitat connectivity, and leverage the political power of RHCWG members and associated agencies to effectively advocate for policy outcomes that advance environmental justice.

Outcomes & Benefits

Work with community to collaboratively develop a set of desired outcomes and incorporate justice by centering an understanding of the existing inequitable distribution of connectivity benefits, framing the desired outcomes around an active intent to redress the region's history of systemic racism.

B | Introduction

Organizational background

In 2016, the Regional Habitat Connectivity Working Group (RHCWG) formed in order to map and conserve biodiversity corridors in the Portland-Vancouver region. The need for this work was identified by the 2012 Regional Conservation Strategy (RCS), which is considered a foundational document by the broad coalition of public, private, and nonprofit organizations known as the Intertwine Alliance, the organization that authored the Strategy. The RCS places the establishment of biodiversity corridors as a key strategy in conserving the region's biodiversity. It also recognizes conservation in developed areas and working lands as important components to include in regional conservation planning, both for the preservation of biodiversity as well as the benefit to people by means of supporting equity and community health and fostering a sense of stewardship.

RHCWG represents a regional partnership of over 40 public agencies, academic institutions, parks districts, non-profits, consultants and watershed councils, and numerous community members. These members have contributed substantial in-kind and financial resources to accomplishing the group's goals, especially in funding connectivity modeling efforts.

RHCWG's current emphasis is the completion of a Strategic Action Plan (SAP), which establishes a systems understanding of regional habitat connectivity via the Open Standards for the Practice of Conservation (CS) and proposes a theory of change including strategies for influencing outcomes in the direction of a conservation target.

With a draft of the SAP completed, RHCWG members recognized that their understanding of the role of people in regional connectivity was inadequate–especially those that have been systematically marginalized and disenfranchised. Work on the SAP was effectively put on hold in order to invite consultants to conduct an audit of their work and recommend a process for Equity Integration. RHCWG drafted a Statement of Intent that recognizes the disproportionate burden that Black, Indigneous and People of Color (BIPOC) communities carry as a result of systemic racism, links the SAP's success with its ability to incorporate the needs and desires of affected communities, and commits to engagement and collaboration throughout their processes. This led to the development of an Request for Qualifications (RFQ) for this work, and a special Justice, Equity, Diversity, and Inclusion (JEDI) sub-committee. The Statement of Intent was considered an expression of RHCWG's commitment, and the Equity Integration was planned in accordance.

Process

Equity Integration process and structure

This Equity Integration process is a starting point for RHCWG's efforts towards incorporating measures to support justice, equity, diversity, and inclusion into their work. The meaningful integration of JEDI principles is not an endpoint, but rather an emergent property of an organization's processes, only possible when it is conducting itself in consistency and integrity with those principles. The questions posed in the effort to enact them must be asked over and over again, and the tools crafted in the process will continue to be applied dynamically to the work even after the initial period of planning is complete.

Between December 2021 and April 2022, the consultant team in close coordination with the Equity Integration project team conducted a series of sessions at multiple levels of RHCWG, starting with a presentation of the plan for the process at the last quarterly meeting of 2021. The project team held conferences with the Steering Committee and JEDI sub-committee, and conducted a Power Analysis workshop to inform a high-level Engagement Framework, and facilitated a series of five sub-group workshops organized around chapters of the Strategic Action Plan. A preparatory session with RHCWG liaisons was held before each workshop.

The intention of these workshops was twofold. They allowed the consultant team to obtain information on the context and intent of SAP chapters, gathered diverse input and opinions from members of the working group, and sought consensus on directions forward. These data points are then taken as primary sources from which to reflect and develop recommendations. At the same time, the workshops were intended to increase literacy around JEDI topics, initiate conversations that can continue into implementation, and create subject-specific champions within the organization.

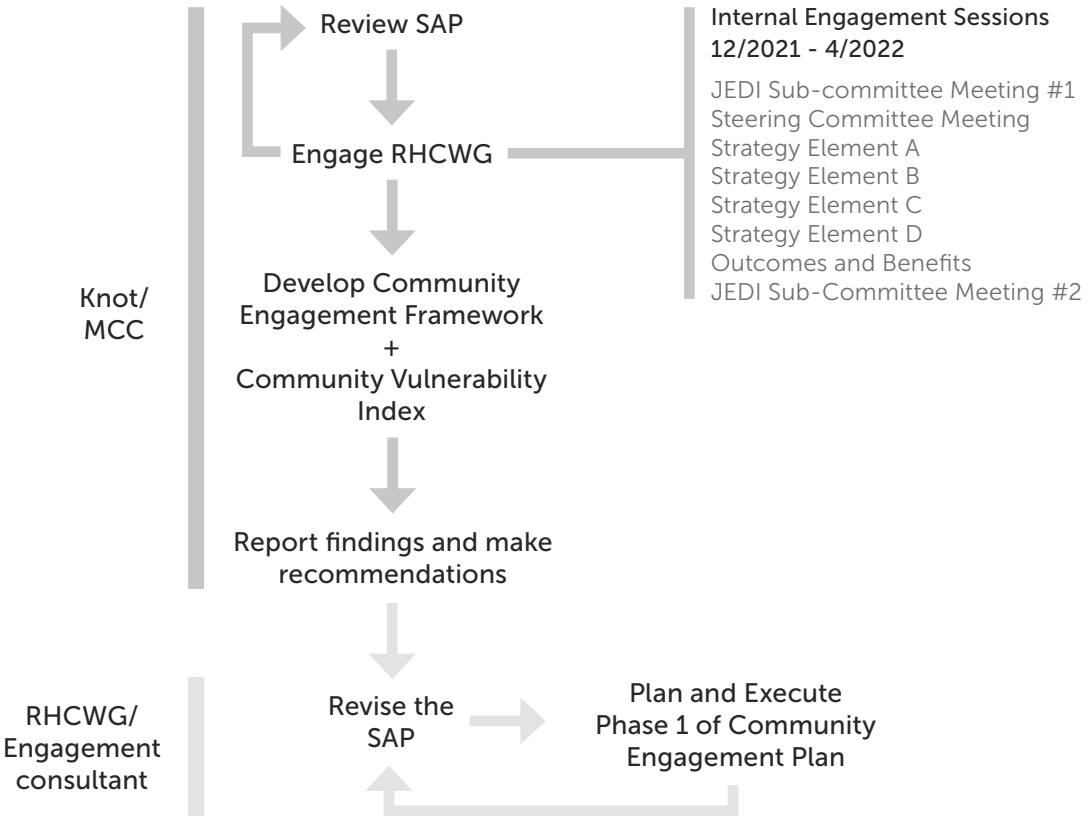


Figure 1. Flow diagram of the Equity Integration process

Evaluating SAP Elements within a JEDI framework

As a tangible outcome of the Equity Integration process, this report and the associated tools are intended to give the organization the ability to begin to deliver on its JEDI Statement of Intent (included in full in the Appendix) through recommendations for revisions to the Strategic Action Plan, integration of spatial data on communities in the region into the analytic process, and a Community Engagement framework.

The first tool is the foundation of the integration process: the Racial Equity Lens that defines terms, sets out high level plan elements, and poses a series of questions relevant to the SAP and its implementation. The Racial Equity Lens should be considered a guiding document and a reference to be applied in different contexts and levels of organization. While the Equity Lens questions inform all of the subsequent steps to varying degrees, the report will first address each of them at a general level as a way of setting a benchmark.

The next section of the report is structured around our recommendations for integrating JEDI into the SAP, with one primary actionable recommendation and a series of sub-recommendations for the document as a whole and each chapter. These recommendations are intended to clarify and prioritize RHCWG's implementation of the Equity Integration's results. An understanding of the chapter's content, description of the internal participatory process during the Equity Integration, and the rationale for recommendations is included in order to provide additional context.

The report then appends several stand-alone elements that are independent of any one chapter of the SAP. The Engagement Framework will help the organization in its planning for subsequent engagement strategies and messaging, and includes the results of the Power Analysis exercise conducted with RHCWG's JEDI sub-committee in February, 2022. Next, a narrative of methods and intent followed by a series of maps describe a new spatial data product produced by the consultant team, which models Community Vulnerability across the RCS region, and which will be delivered in parallel with this report. Finally, a reference section includes resources and references and sources cited.

Building on RHCWG's previous work

RHCWG has a tremendous amount of work to build on, coming both from the independent efforts of group members and by the group itself. The Working Group has developed an understanding of regional habitat connectivity as a system in the form of the Open Standards Framework for Conservation (CS), through which it has articulated a conservation target, threats to that goal, and strategies to remove those threats, all of which are reflected in a Miradi results chain and are now being described in its Strategic Action Plan (SAP). It has developed a geospatial model of habitat connectivity relying on surrogate species representing a range of habitat types and a method of delineating priority Habitat Connectivity Zones (HCZs). It has conceived of strategies for outreach and education, and for positioning the group to advocate for connectivity in planning and policy.

We also want to acknowledge that the group has taken significant strides toward making its processes and the outcomes of its work more equitable. Statements such as those that emphasize support for social justice and the need for engagement with a diverse set of stakeholders are found in various sections of the SAP.

RHCWG members have conducted research and published work[1] that expands on the concept of wildlife habitat connectivity to include people via the ecosystem services and community benefits resulting from connectivity. A JEDI sub-committee has formed to integrate RHCWG's JEDI Statement of Intent into planning processes, and made the initiative to engage external consultants for this Equity Integration.

While the intentions of the RHCWG to incorporate justice, equity, diversity and inclusion are clear, it has not yet articulated a plan for how it will accomplish these goals. In some ways, the group's understanding of the system that determines landscape connectivity effectively prioritizes the environment over social needs, and its strategies for elements pertaining to management and outreach privilege the power of landowners and the expertise of ecologists over the lived experience of community members. As it stands, the draft Strategic Action Plan lacks mechanisms that would result in equitable processes and results.

The meaningful integration of JEDI principles does require foundational change, even as the substantial efforts that have been undertaken up to this point continue to have value. The tools resulting from this Equity Integration process can be thought of as an additional layer for the Open Standards framework. This lens empowers RHCWG to reframe, refine, and rethink work that has already been accomplished as well as to add missing components.

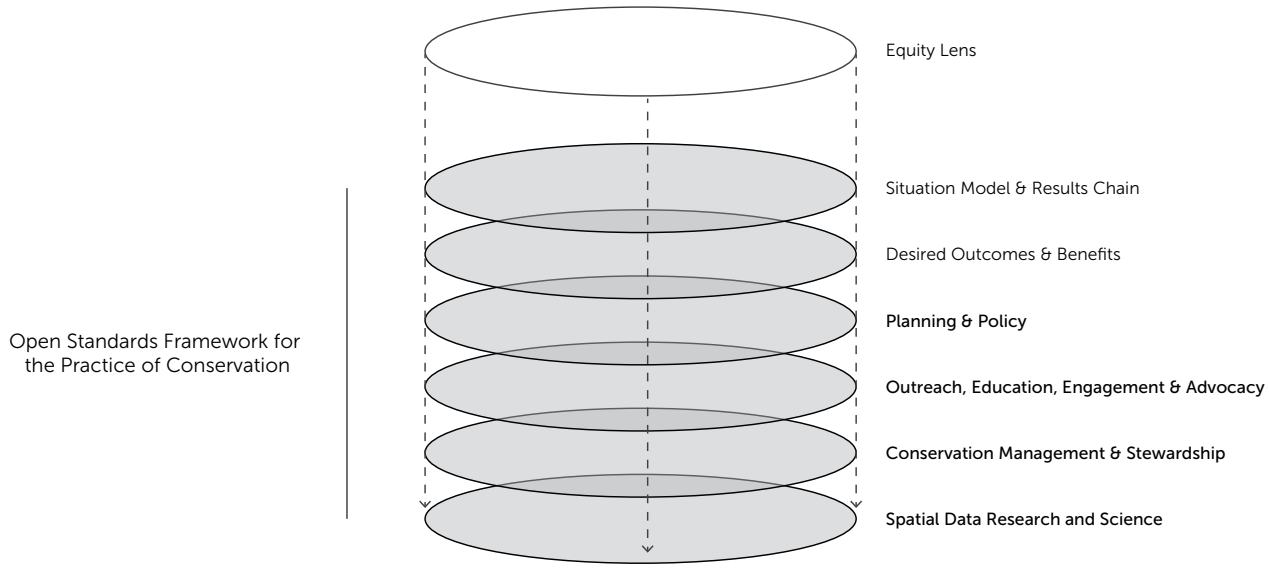


Figure 2. Equity Lens and CS Components
This diagram illustrates the relationship between the Equity Lens and the major components of the SAP. The Equity Lens acts as an additional layer that then integrates with and transforms the substantial work that has gone into developing each SAP component.

1 For example: Butler et al. 2022, Hardy et al. [in review]

C | The Equity Lens

RHCWG Justice, Equity, Diversity and Inclusion Statement of Intent

The following is an excerpt from the Statement of Intent authored by RHCWG in preparation for engaging consultants for the SAP Equity Integration, and forms a primary background and basis for evaluation. The complete Statement can be found in Appendix 1. JEDI Statement of Intent.

Black, Indigenous, and people of color (BIPOC) communities bear an inequitable burden from the impacts of our policy structures surrounding land development, neighborhood disinvestment, urbanization, gentrification, and ecosystem fragmentation as a result of systemic racism in the past and present. While other historically disenfranchised groups such as people with disabilities, LGBTQIA+ communities, women, elderly, young people, and low-income residents are all taken into evaluation, we recognize that BIPOC community members intersect strongly with each of those groups and experience deeper systemic inequality due to institutional racism. Because of this fundamental, race-based inequality, our efforts to address ecosystem fragmentation will employ a racial equity lens as our primary equity focus and k to redress environmental justice issues to maximize outcomes for all people and the environment.

Recommended Definitions for JEDI terms

MultiCultural Collaborative reviewed relevant local and national resources for helping the RHCWG to determine the best approach for providing a JEDI review and evaluation of their Strategic Action Plan. We recommend that RHCWG adopt a set of agreed upon definitions and terms to further refine their statement of intent and use an equity lens customized for the SAP.

Justice refers to a goal or vision for social change and requires a strategy to redress histories of violence, inequality, trauma, and the unjust treatment of groups. There are many different types of justice practices that offer different approaches to enacting social change (e.g., Restorative, Transformative, Reparative, etc. See Equity Lens questions 6 and 7 for more discussion)

Equity is present when one's identity cannot predict one's life outcomes. Equity takes into account systemic inequalities to ensure everyone in a community has access to the same opportunities and outcomes.

Diversity has to do with differences between people and experiences. Diversity is a relational property within or between groups, where one person or experience is different from another. Diversity is the range of human differences, including but not limited to race, ethnicity, gender, gender identity, sexual orientation, age, social class, physical ability or attributes, religious or ethical values system, national origin, and political beliefs.

Inclusion is the practice of valuing the unique experiences and contributions people have to offer. Inclusion recognizes that the most growth happens when these unique contributions are encouraged and supported. Inclusion is an ongoing commitment and goal where organizations create the conditions for diversity to thrive in a way that connects, respects, and values all members of the community. Inclusion rejects assimilation and suppression of differences.

Racial Equity is present when race does not determine or predict the distribution of resources, opportunities, and burdens for group members in society. A racial equity framework is an understanding of the root causes of racial disparities, an analysis of the structures that perpetuate these disparities, and the ability to deploy critical strategies to undoing those structures (i.e. community self-determination, shifting power, etc) in order to replace them with structures that produce equitable outcomes.

Key Themes for the Equity Lens Evaluation

1. Mission, vision, values
2. Data and spatial justice
3. Representation in decision making
4. Community engagement to guide programming/decision making/investments
5. Metrics for tracking success toward integrating equity goals
6. Justice and community benefits regarding repair and restorative practices

Questions for Evaluating the Strategic Action Plan

A racial equity lens is a set of questions to ask ourselves when we are planning, developing or evaluating a policy, program or decision. It helps assess if we are taking in the perspectives of the racially diverse people and communities we impact and whether our policies and programs are resulting in equitable or inequitable outcomes. An equity lens helps us see where challenges and opportunities exist, so that we can make intentional steps to ensure more equitable processes, decisions and outcomes for all individuals and communities.

Equity Lens Questions

1. Are our JEDI definitions embodied in each component of our SAP?
2. What are the historical racial inequities that we know about?
3. Who benefits and who is burdened by decisions?
4. Who is making decisions and is the decision-making process equitable?
5. Are the decision makers the people that are most impacted with the least amount of influence by the decision?
6. What data is being used? Is the data collected and analyzed using data justice practices?
7. Are restorative justice practices integrated into the process?
   If not, what should they be?
8. How will we keep ourselves accountable to communities most impacted?
9. How do we measure success using this racial equity lens?

Summary Responses to Equity Lens Questions

The set of 9 Equity Lens prompts are intended as a guiding set of questions for RHCWG to ask itself as it revises its SAP. These questions provoke self-reflection, challenge established patterns of thought, processes, and structures; and root the working group in the critical discourse necessary to enact meaningful change within its organization and processes. These high-level summary responses are a starting point and reflection on this particular point in time at the beginning of the JEDI implementation. As the organization evolves, it may be useful to return to this baseline as a point of comparison.

1. Are our JEDI definitions embodied in each component of the SAP?

The intent of this report and the workshops facilitated in order to inform it is to come to consensus on a clear set of terms, and to meaningfully integrate components into the SAP that work towards the realization of these terms. As evidenced by RHCWG's JEDI Statement of Intent and the decision to pause their planning for the Equity Integration, there is significant will to do so; however, the effort to embody the spirit of these terms is largely unrealized.

Justice, equity, diversity, and inclusion are a series of related and interconnected concepts, each with its own set of meanings where they relate to different organizational levels, from society as a whole to the individual. Diversity and inclusion are bedrock concepts for the operation of any organization, but the choice to work on behalf of justice, equity, and, adding in a related concept, anti-oppression, requires both strategy and action. That makes these terms especially relevant to revising a Strategic Action Plan, and this report especially emphasizes them.

Justice

When social benefits are discussed within the SAP, these benefits are framed as a byproduct of a traditional approach to conservation. This framing does not attempt to take into account the question of who is receiving these benefits, and whether or not histories of inequity and racism are being redressed when investments are made in specific places. In order to embody the definition of justice within the work, RHCWG needs to intentionally address the harms that have been inflicted by systems of power created and perpetuated by federal, state, and local governments in the United States to benefit and maintain white supremacy. These entities bear responsibility for slavery, genocide of Indigenous communities, Manifest Destiny, Jim Crow, exclusion from wealth accumulation through restrictive property covenants such as redlining, inequitable access to capital and credit, mass incarceration, and burdening community health and well-being through the siting of industrial facilities and toxic infrastructure. Members of RHCWG represent governmental agencies with the potential to distribute public resources, and which have a responsibility to mitigate these harms and traumas by prioritizing investment in historically marginalized, disadvantaged, and disinvested communities of color.

Equity

Equity will exist when everyone has access to the same opportunities and outcomes. In the context of RHCWG's work, opportunities and outcomes may, at least in part, be defined as experiencing the full suite of benefits associated with healthy, connected ecosystems and unburdened environments. Some of these benefits are spatially inexplicit (for example, the preservation of biodiversity in the face of climate change), but many have spatial relevance and people who live closer receive those benefits disproportionately. It is known that healthy, connected ecosystems and unburdened environments are not equitably distributed throughout our region and that race and identity can be used to predict access to the region's highest quality ecological resources and, conversely, proximity to environmental harms. Equity should be an overall screen for RHCWG's SAP, and should be a consideration at every stage, from the development of goals through to implementation and resource allocation. Those who have been most impacted by existing inequities should be intentionally involved in the process and

given a voice in decision making. RHCWG's work has the potential to positively influence the character of our region's landscape in the future, and distributing these positive influences equitably is essential.

Diversity and Inclusion

Diversity and inclusion are deeply important characteristics of groups, and environmental organizations are notoriously behind in efforts to increase diversity within their workforce and volunteer ranks[2]. It is essential to engage multi-culturally because BIPOC communities have been disproportionately impacted by environmental injustice and have historically held little power in environmental decision making. Fostering diversity and inclusion within the group provides a vehicle to give power to individuals who have gained important perspective through lived experience and who may offer critical insights that are challenging to see through the lens of the dominant culture.

The draft SAP already acknowledges the lack of diverse voices included throughout the process of the development of the SAP and in the working group overall, but does not offer a mechanism to increase representation within the group. Developing meaningful strategies to incorporate diverse voices is a necessary next step for RHCWG, and is essential in order to advance towards accomplishing it's JEDI goals.

Approaches to integrating diversity and inclusion may include; adopting measurements of success for diversity and inclusion and monitoring performance against those goals, removing internal and external barriers to achieving those goals, engaging BIPOC communities who hold the least power and have been the most impacted, assuring that diverse voices are included in data collection, analysis, policy, decision making, resource allocation, prioritization, and implementation. The Community Engagement Framework provides recommendations about how to equitably engage with community and how the RHCWG can assure that they are able and open to listening to people that are most impacted.

2 Taylor, 2014

Figure 3. People's Climate March, 2014
Image credit: Joe Brusky.

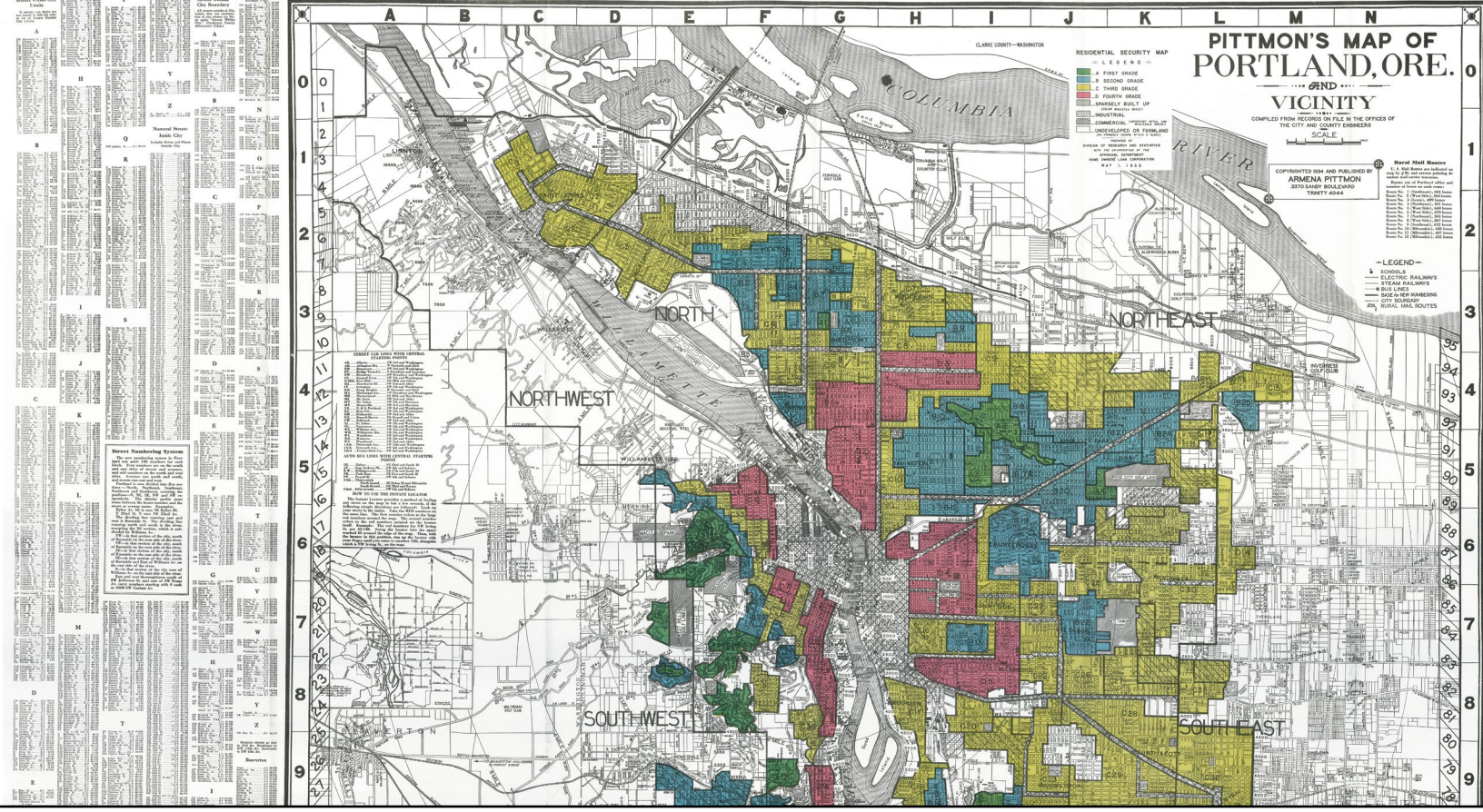


Figure 4. Redlined neighborhoods in Portland, 1934
Image credit: Mapping Inequality (2022) dsl.richmond.edu

2. What are the historical racial inequities that we know about?

Racial inequity is a foundational characteristic of the United States, which is based on a system of white supremacy that has consistently marginalized communities of color with unique and special harms to Black and Indigenous peoples. Racial inequity is also a fundamental factor that predicts patterns of landscape heterogeneity, including in the Portland-Vancouver region. Oregon and Washington both have histories of white supremacy (see Appendix 5. Oregon's Racist History Timeline on page 64). In the case of Oregon, total exclusion of non-white residents was enshrined in the state's constitution.

Settlement of the region was facilitated by the displacement of Indigenous peoples from their traditional territories through state-sanctioned violence, legal disenfranchisement, and concentration onto distant low-value reservation land. The region's economy developed based on extracting and exporting natural resources, particularly lumber, and the deep soils underlying the Willamette Valley and Puget Trough's prairies and savannas were rapidly converted to agricultural production. The build-out of critical infrastructure such as railroads and flood protection was made possible through the labor of Chinese immigrants who were excluded from the basic rights of civil society. In the 1940s, the Bracero program brought farmworkers from Mexico to work in Oregon's agricultural industry, opening the door to the establishment of both permanent residents and migrant families that shift with the seasonal labor needs of agriculture. This community is uniquely vulnerable to dangerous working conditions, housing scarcity, and food insecurity.

As the region's non-white population grew throughout the 20th century, de facto and de jure segregation was the rule, with BIPOC communities concentrated via redlining into areas that were significantly more at risk of exposure to environmental hazards, a patterns that largely hold to this day. These hazards include exposure to flooding; industrial contamination of land, water, and air; dangerous temperatures during extreme heat events; and lack of access to recreational resources. Furthermore, the cultural capital that BIPOC communities have built for themselves has often been subject to sudden and irreversible loss because these communities were concentrated in hazardous zones and targeted by urban renewal, highway and infrastructural development, and gentrification. The result is exacerbated wealth inequities, negative health and opportunity outcomes, and further degradation of eco-social integrity and connectivity.

The effects of systemic racism are evident in the emergent ecological structures of urban environments. Complex feedback loops occur within socio-ecological systems, and these feedback loops influence biological processes, shape landscape structure and drive evolution through phenotypic shifts, emigration and extinction[3]. Settler colonial culture and white supremacy are mechanistically related to ecological dynamics in urban and peri-urban environments where capitalism, development and industrialization drive environmental degradation while economic oppression and systemic racism constrain marginalized communities to the most burdened areas. Efforts to address ecological issues in urban and peri-urban environments necessarily address systemic racism because they are part of a dynamic coupled system.

Oregon and, later, Washington, have been credited with maintaining a robust planning environment, requiring urban growth boundaries and restricting unchecked sprawl into farm and forestlands. Cities and regional governments within the RCS area have been early adopters of green infrastructure, champions of urban tree canopy, and smart planners of multimodal transit systems. However, these decisions have historically been driven by top-down governments and stakeholder groups that have excluded people of color and other marginalized groups. Consequently, resources have been inequitably distributed, and ineffective community engagement has resulted in mismatches between project implementation and the needs of communities. Land use policies related to urban growth boundaries and housing density have fueled an economic system that encourages widespread gentrification and results in displacement of communities with fewer resources. Agencies and governments in charge of planning now find themselves trying to catch up with increasingly vocal and efficacious communities and their advocates.

The same dynamic is being felt within conservation planning efforts, where the movement's specific history requires a careful reexamination. The Conservation movement in the United States originated in the late 18th and early 19th century and was founded by white men who held deeply problematic views on race. Theodore Roosevelt was a firm believer in white supremacy, championed manifest destiny and supported Jim Crow. Gifford Pinchot, the first head of the US Forest Service, was on the advisory council of the American Eugenics Society from 1925-1935. Madison Grant, who worked with Roosevelt to create the national parks, national forests and refuge systems, wrote "The Passing of the Great Race", a book that influenced the Immigration Act of 1924 and was admired by Hitler prior to World War II4. These few examples illustrate a broader pattern in the way conservationist have historically viewed nature as a resource that was to be preserved for and enjoyed by privileged white communities at the exclusion of others. This history of bigotry demands intentional, honest reflection, and requires significant work to repair.

This legacy is echoed in the prevalence of anti-population growth and anti-immigration sentiments within conservation circles, and ecofascist ideas among extremists. Current events are requiring people with power and influence to think about how to do things differently. George Floyd's murder, racial and climate justice protests, racial violence and harassment, the COVID-19 pandemic, climate extremes, political unrest, war, and economic instability are current, interconnected issues that require us to seek solidarity between struggles for civil rights and movements for conservation. Rather than acting as an equalizer, climate change is increasing disparities, especially because of the contrasting economic capacity for resilience between dominant cultural groups and BIPOC communities. Strategies that might have seemed sufficient two or three years ago may not be successful now. Taking a progressive, collaborative and equitable approach that is responsive and resilient to changing social, political, economic and environmental changes is essential for RHCWG to have a collective impact.

3 Schell et al, 2020

4 Purdy, 2015



Figure 5. Community engagement workshops
From various workshops hosted by MultiCultural Collaborative. Image credit: MCC

3. Who benefits and who is burdened by decisions?

This question can act as a critical guide to RHCWG as it looks to prioritize investments across the region. RHCWG has been focused on benefits to natural systems. The extent to which human communities benefit or are burdened by the outcomes of these investments greatly depends on the nature of the actions taken and the process through which the actions are implemented.

In the broadest sense, any decision that results in increased regional habitat connectivity translates to benefits for people via the maintenance of biodiversity, the ecosystem functions that rely on that biodiversity, and the ecosystem services that support the health and livelihoods of humans. Members of RHCWG have been at the forefront of developing the scientific literature[5] on the benefits of habitat connectivity.

However, while some of these benefits derived from ecosystem function are diffuse and generalized enough to be enjoyed at regional, continental, or global scales (e.g., sequestration of carbon dioxide from the atmosphere), others are more local in their impact (e.g., temperature regulation, or access to natural recreation space). In the case of more generalized ecosystem services, society as a whole has the potential to draw benefits. Where these effects are more localized, benefits are more restricted to adjacent communities. In this case, systemic racism results in gross disparities between the level of access to these benefits.

Additionally, since different communities have different needs and priorities, what would be considered a benefit to one community has the potential to be a burden in another. Consequently, the only way to know what a community considers a benefit and what it considers a burden is to ask the communities affected. And since there are a range of potential actions that may be taken in order to support habitat connectivity in any one place, management and stewardship actions must especially be informed by meaningful engagement.

Operating under the assumption that habitat connectivity provides positive benefits where it is implemented, it still must be kept in mind that benefits and burdens are felt relatively to one another. Therefore, communities that are not the beneficiaries of investment are burdened relative to those that are, and this disparity can exacerbate existing systemic inequities. In any given time period, there is a limited amount of investment available, and as a function of that, some communities will participate and others will not be given that opportunity. Moreover, given the intensity of development pressure in urban areas, preservation of ecological amenities in one area may often mean the impacts of development are simply displaced elsewhere.

A few examples of benefits and burdens are: water quality and temperature reduction, heat island reduction, air quality improvements, financial benefits to property owners, and physical and mental health benefits related to access to nature. Lack of any of the benefits above relative to other areas becomes a burden to disinvested communities. Furthermore, some improvements can contribute to gentrification and displacement.

5 For example: Butler et al. 2022, Hardy et al. [in review]

4/5. Who is making decisions and is the decision-making process equitable? Are the decision makers the people that are most impacted with the least amount of influence by the decision?

RHCWG is a collaborative group with many agencies and organizations represented, each of which has their own decision-making processes. Many of the decisions being made to implement the strategies in this SAP will be carried out by other entities entirely, such as the owners and managers of private and public lands. Governance structures and decision making framework for the Working Group are not specifically articulated in the SAP, and various members have taken on collaborative authorship of SAP elements while the steering committee oversees and coordinates these more individual efforts.

One way of answering this question would be to focus on diversity and inclusion within RHCWG. How well are BIPOC represented in RHCWG? Do POC hold positions on the Steering Committee or other decision-making sub-committees? What kind of diversity is found among authors of the research that RHCWG uses to inform its work? Lack of representation in these areas was one of the principal reasons that RHCWG initiated the Equity Integration process. If RHCWG can engage individuals from high impact/low influence communities to take on positions of power within the group, the process itself is much more likely to be a more equitable one.

This question is also related to the public participation process, and the extent to which decision-making power is extended to the public as a part of this process. As discussed further in the recommendations for Strategy Element C, the current SAP is missing opportunities to evolve the relationship between RHCWG and the public towards a more collaborative one. RHCWG has not initiated outreach to people that are most impacted with the least amount of influence by the decision, and meaningful engagement with those communities is essential for collaborative decision making.

Finally, since RHCWG is a science-driven organization, and some "decisions" are effectively made via a modeling process, choices about what data go into that process are important. The current modeling does not incorporate spatial representation of the most impacted communities, therefore excluding people from their outcomes.

Figure 6. Making their influence felt
Black United Front leader Ron Herndon at a School Board protest against the closure of Harriet Tubman Middle School, 1982.
Image credit: Steve Nehl, courtesy of Oregon Historical Society

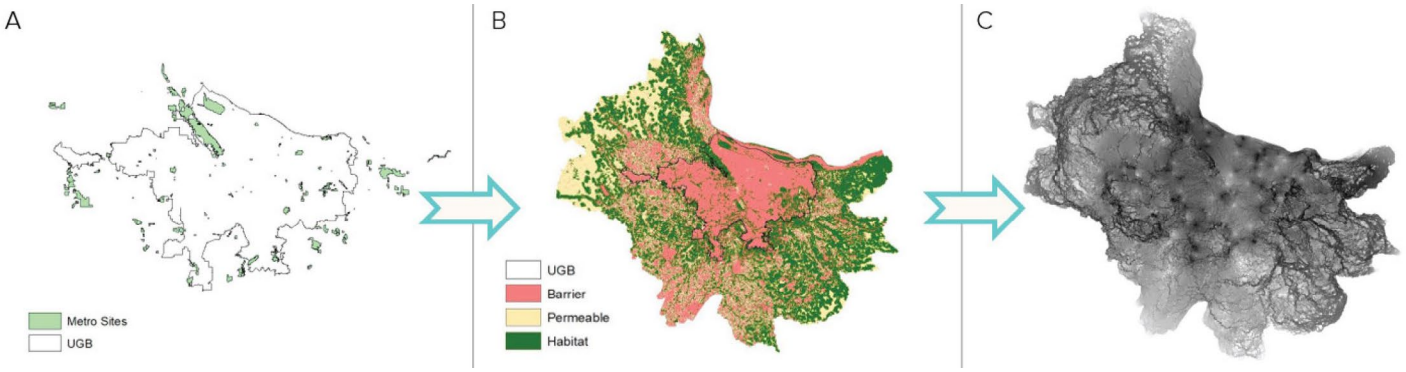


Figure 7. Habitat Connectivity Toolkit model process diagrams
Image credit: RHCWG / Metro (2018)

6. What data is being used? Is the data collected and analyzed using data justice practices?

RHCWG has invested significant time and energy into the development of data tools focused on understanding habitat connectivity throughout the region. These tools rely on a range of geospatial data to model habitat suitability for multiple sets of surrogate species, and predict connectivity for a network of habitat patches and corridors. Given that most of the input data relates to natural resources and geophysical landscape characteristics, there is a reasonable assumption that the data has not been collected in such a way as to impede upon individual privacy and self-determination of people in the region.

Conceptually, there can be tension[6] between the movements for environmental justice (which concentrates on redressing distributional inequity) and data justice (which concentrates on methods of data collection, the right to privacy, and self-determination). Spatial analysis for environmental justice typically benefits from more detailed, comprehensive, and accessible data, and has often relied on state and federal agencies such as U.S. Census Bureau, EPA, and state DEQ to provide this data on affected communities and environmental disamenities.

Data justice cross-examines the notion of extractive data practices, where communities are a resource that these government entities (and, even more so, commercial tech interests) draw from without offering agency in how the data is managed, interpreted, and used. In this view, many forms of data collection are seen as surveillance by powerful actors with a demonstrable history of repression, exploitation, and active maintenance of white supremacist systems. The emphasis within this community is on democratized data platforms where data is self-generated and subjects have inherent privileges on how it is to be used. An example in the RCS region is the stewardship of spatial data on sacred places and important sites for traditional land practices for Indigenous communities. By deferring to the Tribes and urban Indigenous communities decisions about if and how these kinds of data are made public, governmental agencies can enact some measure of data justice.

This tension can be especially difficult to resolve for regional efforts that require large, comprehensive datasets that are often only available through government and well-funded academic institutions. The U.S. Census Bureau, for instance, provides invaluable data on the distribution and dynamics of demographic and economic data through its decennial and American Community Survey (ACS) products. The categories used to define race and ethnicity have been problematic in the past, and there is evidence that communities of color are often undercounted in the Census. But survey design continues to evolve to more closely reflect the ways in which people define their own identities.

While fully decolonized data collection practices may not always be possible, it is always an essential step for data scientists to look for systematic bias in datasets and attempt to mitigate that bias affecting results. And it is always an option for scientists to incorporate meaningful engagement as a primary input into the study design, empowering communities to contribute authorship.

6 See Lourdes et al (2019) and Longdon (2020).

7. Are restorative justice practices integrated into the process? If not, what should they be?

Restorative justice is a practice focused on healing for both the victim and the perpetrator through the development of consensus and value sharing, and is an alternative to retributive justice which uses punishment as a means of repair.

Restorative justice is most commonly applied in the criminal justice realm, although it can be extended to wherever harm has been committed and retributive legal or regulatory mechanisms for redressing these harms are viewed as ineffectual. Restorative justice emphasizes participation, dialogue, accountability, and partnership between victims and perpetrators. The Restorative Justice Network defines the process as requiring three steps[7]: encounter (facilitated meetings between victim and perpetrator during which a safe space is maintained for all participants), repair (an expression of the victim's need for healing and the perpetrator's commitment to make amends), and transform (a turn towards action on how the particular circumstances can inform change in the greater society).

Environmental restorative justice may be thought of as an emerging philosophy and set of practices designed to improve the performance of environmental governance when regulatory bodies have failed. Forsyth et al, in their article "A future agenda for environmental restorative justice?"[8] emphasize that environmental restorative justice should be:

- Fundamentally oriented towards healing, often of multiple harms, including relational and physical harm to humans/more-than-humans, inclusive of nature
- Based on requiring direct (not delegated) participation of those with power to take responsibility and make changes, and those who have suffered harm (inclusive of more-than-humans)
- Based on storytelling and dialogue
- Dependent on identifiable harm, identifiable victims and identifiable individuals, groups or institutions who take responsibility for harm
- Geared towards ensuring accountability of those who have created harm to those who have suffered harm, to achieve relational justice

Given the historical and contemporary inequities summarized in Question 2 (pp. 11-12), how can RHCWG's work help to facilitate restorative justice for the human and "more-than-human" victims of environmental harm? There are certainly impediments to enacting this kind of justice, not the least of which is the requirement that those in power participate and take responsibility. That being said, there are also opportunities for RHCWG's work to contribute to restorative justice taking place in the region:

- During engagement with affected communities, emphasize listening.
- Empower communities to define their own sense of harms
- Act as a liaison or provide access to governmental agencies that share culpability for environmental harms
- Include habitat creation, remediation of toxic sites, and other forms of environmental repair as viable options for reconnecting habitats and as priorities for investments through the working group

7 Restorative Justice Network (2022)

8 Forsyth et al (2021)

8/9. How will we keep ourselves accountable to communities most impacted? How do we measure success using this racial equity lens?

The SAP should include components for measuring outcomes and mechanisms to maintain accountability. Without these components, it will be difficult to track progress toward desired outcomes and to identify opportunities for improvement. Developing relationships and engaging with impacted communities is a long term focus. Building trust with impacted communities requires investing time and humility to listen and understand people's lived experiences, and these communities can help RHCWG identify ways to evaluate outcomes. Ideally these metrics assess the relative co-benefits of conservation and restoration to the communities most impacted, and diversity and inclusion metrics related to participation in planning and implementation. The group will need to set quantitative, measurable targets for the proportion of investments that are allocated towards the region's most vulnerable communities.

As part of implementing the recommendations of this Equity Integration for the SAP, RHCWG will need to determine how they will hold themselves accountable. Some ways to measure accountability are included in the recommendations for the overall SAP, as well as in the Community Engagement Framework. Success in using the Racial Equity Lens will be seen when outcomes contribute to delivering justice and redressing systemic inequities.

Figure 8. The Vanport Flood
The 1948 flood that swept through Vanport, home to a high concentration of Black and Native American residents, displaced nearly 18,500 people. Many were unable to find housing elsewhere in the segregated region. Image credit: Oregon Historical Society.

D | Recommendations

Overall SAP

Understanding

RHCWG's Strategic Action Plan is a high-level framework that articulates the organization's conservation goals, describes the group's understanding of the threats to achieving its goals, and outlines strategies to mitigate or remove those threats. It is organized around the strategy elements of the Open Standards for the Standards of Conservation (CS) framework, with additional chapters that introduce the SAP, discuss Outcomes & Benefits, and portray other CS elements such as the Situation Model, Results Chains, and Theories of Change. Based on the way that the CS framework and its components are defined, the SAP is highly focused on the goal of regional habitat connectivity, with a particular emphasis on wildlife corridors.

Outside of the CS framework, additional sections in the SAP make commitments to justice, equity, diversity, and inclusion, and describe the benefits to people that broadly result from regional habitat connectivity. It is the goal of this JEDI integration work to provide avenues to take action towards those commitments.

Principal Recommendation

Incorporate Environmental Justice as an essential component of RHCWG's vision and the Conservation Standards model to ensure that the work results in positive ecological and social outcomes that redress histories of inequity and systemic racism and align with the priorities and goals of Communities of Color.

Rationale

The history of systemic racism in the United States has created landscape patterns which disproportionately burden marginalized communities of color with increased environmental harms and fewer high value ecological resources. The inequitable distribution of these burdens increases vulnerability and contributes to a wide range of stressors and negative life outcomes for marginalized and disinvested communities and limits habitat connectivity through the loss of landscape permeability.

As a partnership of government entities and partners with the power to guide investment to enhance ecological quality and improve habitat connectivity, it is essential that RHCWG include environmental justice as a central component of both their process and outcomes. Failing to do so could lead to the perpetuation and exacerbation of current inequities by focusing investment in areas that are already well served with ecological resources, and continuing the disinvestment and marginalization in areas which are not.

Incorporating Environmental Justice as an essential component of RHCWG's vision and the Conservation Standards model will reframe the resulting benefits, direct pressures, contributing factors and associated strategies to address both ecological and social benefits.

Additional Recommendations

Work to maintain a consistent through-line between Strategy Elements, and ensure that desired positive ecological and social outcomes are meaningfully connected to the process at each stage.

Rationale

The current Strategic Action Plan draft compiles contributions from numerous sub-groups focused on the development of specific chapters and strategy elements. This is understandable due to the collective nature of the working group, however there is a need to meaningfully connect each element to ensure that the process supports the desired outcomes and benefits. We recommend identifying specific relationships between each strategy element and the desired outcomes and benefits, especially those that are focused on equity, justice and other social benefits, and documenting the ways that they are supported by process steps.

Explicitly commit to going beyond a focus on conserving only the highest quality existing biodiversity corridors by prioritizing actions which help to restore habitat connectivity in areas with the highest levels of ecological burden and social vulnerability through a range of actions which align with the goals and priorities of the community.

Rationale

While the draft Strategic Action Plan doesn't specifically exclude restoration in urban environments as a potential outcome of work, there is a strong narrative and process focus on existing corridors and large habitat patches. Since the occurrences of existing high quality ecological resources are largely spatially inversely correlated to communities that have the highest levels of environmental justice need, in order to achieve desired environmental justice outcomes, it is necessary to explicitly commit to allocating resources to areas that may not have existing corridors or large habitat patches if they have high levels of vulnerability and the potential to improve regional habitat connectivity. Actions to improve permeability of the matrix (see Figure 11. Intensive/extensive connectivity actions) in urban environments align with goals identified in the Regional Conservation Strategy and could include actions such as the restoration of the urban tree canopy, targeted habitat friendly green infrastructure projects, the reduction of urban heat islands, lot level restoration, backyard habitat certifications, and the integration of habitat into new developments and park space.

Develop specific measures of success in RHCWG's process to evaluate progress towards the integration of Justice, Equity, Diversity and Inclusion goals.

Rationale

Effectively measuring success is necessary to verify the efficacy of RHCWG's JEDI integration effort. We recommend that RHCWG develop a set of benchmarks that can be easily measured and will effectively describe progress towards key JEDI integration goals. This recommendation aligns with the adaptive management approach outlined in the Conservation Standards framework. A list of suggested ideas for qualitative and quantitative measurements from the community engagement framework follows:

- % of priority populations engaged in relationship building with the goal of moving them along the spectrum of engagement (Inform, Consult, Involve, Collaborate, Empower)
- Number of priority population members included in decision making and participation with RHCWG committees
- % of resources allocated, including staff time, funding, and projects focused in high vulnerability population areas
- Tracking public health outcomes from a baseline
- Tracking gentrification and displacement based on public investment and creating strategies for anti-displacement, community benefits and community stabilization
- The evaluation of social and ecological impacts of conservation and restoration investments

Data, Research, and Science

Understanding

As a science-based organization, this strategy element is at the heart of RHCWG's mission, and the end to which much of the working group's efforts have been directed up to this point. Spatial modeling of the region's habitat connectivity based on land cover suitability for select surrogate species has been developed collaboratively by RHCWG members and entities including Metro, Portland State University, and Samara Group. This modeling and associated process represent components of the Habitat Connectivity Toolkit (HCT) that is designed to identify core habitats and Habitat Connectivity Zones (HCZs), prioritize fieldwork for barrier assessments and further investigation of spatial data within these zones, and eventually recommend locations for actions that preserve and improve effective connectivity. Strategies refer to prioritization based on proximity of opportunities within HCZs to BIPOC communities. In addition, the chapter describes strategies for sharing connectivity data with partners and to inform engagement processes, as well as maintaining an up-to-date research library.

Participatory process

A preliminary discussion with liaisons Leslie Bliss-Ketchum and Catherine de Rivera was held Wednesday, March 9, and a workshop with the chapter sub-group took place Thursday, March 10, attended by four other RHCWG members: Eric Butler, Laura Guderyahn, Lori Hennings, and Rachel Wheat. The format for the workshop was similar to the other sub-group workshops, with the Equity Integration consultant team presenting framing material, facilitating discussion, and making preliminary recommendations. The framing section reviewed elements of the Equity Lens, and presented peer-reviewed research that emphasizes the fundamental role that systemic inequality plays in the spatial distribution of connectivity. Discussion for this element was active, with the group sharing background and updates on the work, and moving towards a common understanding of how the element's strategies could be augmented in order to achieve equitable outcomes using data-driven tools.

Principal Recommendation

Integrate Environmental Justice focused spatial data on Community Vulnerability and Environmental Burdens into RHCWG's modeling processes to identify focal communities for engagement, to further understand the spatial relationships of these vulnerabilities and burdens with existing biodiversity corridors, and to prioritize management actions within and beyond habitat connectivity zones.

Rationale

The Data, Research and Science chapter of the SAP describes spatial data for core habitats and habitat connectivity as "the foundation for RCWG's Strategic Action Plan and related implementation", and the working group has focused time and energy on the development of a set of connectivity mapping tools that provide insight into the distribution of the region's highest priority biodiversity corridors. Given the substantial import of data to the groups decision making process, we recommend that RHCWG complement the Habitat Connectivity Toolkit with Environmental Justice focused spatial data describing attributes related to community vulnerability and environmental burdens.

In order to identify opportunities to engage impacted communities and invest in actions that realize intersectional benefits, it is necessary to understand the spatial distribution of the area's most vulnerable communities. As part of our work product for this project, we are providing a regional community vulnerability assessment that can be used as a basis for the next round of work. See details about this data in the Community Vulnerability Index methodology in the Appendix of this report.

In addition to data related to community vulnerability, we recommend incorporating data on the distribution of Environmental Burdens into RHCWG's prioritization and decision-making processes. Environmental burdens like urban heat islands, toxic sites, respiratory hazards and noise pollution impact both people and ecosystems, and understanding their distribution provides insights into the areas that have the greatest need for investment and mitigation. Used in combination with the Community Vulnerability index, these two datasets can provide a fairly robust understanding of where actions focused on advancing environmental justice should be targeted.

According to Tobler's first law of geography, "Everything is related to everything else, but near things are more related than distant things." Justice and equity can take on many forms, but for work that is centered on the spatial distribution of ecological resources, understanding the way those resources relate to environmental justice focused spatial attributes is of high importance.

Additional Recommendations

Expand existing connectivity models to include estimates for connectivity potential, recognizing that areas that don't have high levels of existing connectivity could be important stepping stones between regionally significant habitat patches if habitat restoration and creation is implementation.

Rationale

RHCWG's Habitat Connectivity Toolkit in the SAP focuses on understanding the existing distribution of biodiversity corridors as related to the needs of multiple sets of surrogate species. A set of resistance surfaces based on habitat suitability have been developed, and these can be used as inputs into Circuitscape model runs which will simulate current flowing across the resistance surface from a source (or set of sources) to a ground (or set of grounds). The Circuitscape outputs will illustrate the effective resistance of current flowing across these surfaces, highlighting portions of the landscape that have a higher likelihood for the surrogate species of interest to travel between patches. The results of this modeling effort are intended to guide field work and focus investments. There is a likelihood that the priority focal areas resulting from this approach will have a spatial inverse correlation to the areas that have the highest level of environmental justice need and, therefore, simply combining these two model types as part of a prioritization tool would likely have a neutralizing effect. One approach to address this issue would be the development of a habitat connectivity potential model component. This component would use the core habitat areas identified by the HCT and model the potential for connections between them regardless of the existing quality of the matrix.

Engage Communities of Color to review the data used to ensure that data sources, models and applications support data justice best practices.

Rationale

Data justice is an important component of the Equity Lens used in the evaluation of the Strategic Action Plan. While much of the data used by RHCWG is geospatial in nature, the community vulnerability index leverages Census and American Community Survey demographic data to identify the region's most vulnerable communities. Engaging with community to have conversations around the way the data is being used in the process of planning and decision making would help to ensure that data justice practices are being applied.

Include an Anti-Displacement Assessment as a component of the Data, Science and Research Strategy Element.

Rationale

Investing in marginalized and disinvested communities is a primary tool for actualizing justice in public space, but doing so in a way that prevents displacement and allows those communities to enjoy the benefits of that investment is essential. We recommend developing an anti-displacement assessment for the Intertwine Region to better understand potential displacement risks associated with conservation, habitat restoration, habitat creation and other actions that may be supported by RHCWG.

Outreach, Education, Engagement, and Advocacy

Understanding

Broadly, this element has been composed as a set of strategies whose aim is to garner support for RHCWG's conservation goals via education, outreach, and policy advocacy. These strategies are generally located higher up in the Situation Model, addressing contributing factors such as lack of awareness on the part of the public and absence of policies to support connectivity in the execution of regional planning. In this draft, the element largely focuses on developing communications and advocacy resources. According to workshop participants, the chapter has been through one rewrite to expand into engagement and advocacy, and to include a focus on equity throughout all strategies.

Participatory process

A preliminary discussion with liaison Jennifer Karps was held Monday, March 28, and a workshop with the chapter sub-group took place Tuesday, March 29, attended by six other RHCWG members: Erin Abernethy, Leslie Bliss-Ketchum, Katie Gavares, Theresa Huang, Ted Labbe, and Fran Warren. The format for the workshop was similar to other sub-group workshops, with the consultant team presenting framing material, facilitating discussion, and making preliminary recommendations.

The group shared background and updates on the work, and discussion centered on investigating the unmet potential the chapter has to deliver on JEDI goals. Participants recognized that the chapter retains some outmoded assumptions and is missing a description of the feedback process that engagement requires. They shared challenges they have experienced in their own jurisdictions, including the difficulty of establishing relationships with communities, disconnect between community priorities and conservation priorities, and concerns about the top-down nature of bureaucratic operations. There was discussion around defensive attitudes within the wildlife conservation community, and the recognition that humans and non-humans are interdependent within their shared ecosystems, and finding co-benefits is critical.

Principal Recommendation

Utilize the results of the Community Vulnerability assessment and Power Analysis exercises to identify the region's most vulnerable communities, engage these communities using the tools and strategies of the Engagement Framework and subsequent Engagement Plan, magnify their voices, listen to and understand their priorities, and allow those priorities to influence action and decision making.

Rationale

As it is currently constructed, this strategy element focuses heavily on education and branding, and provides little opportunity for community to directly engage with RHCWG's work to offer feedback and insight which can be used to shape decisions and focus efforts. In order for RHCWG to successfully integrate Justice, Equity, Diversity and Inclusion into their work, there needs to be significant opportunities for community to engage in the process, describe their priorities and influence decision making.

Engaging with the region's most vulnerable communities should be the highest priority because those communities have the highest level of need for investment. We recommend using the results of the Power Analysis and Community Vulnerability Index to identify priority communities for engagement. See these sections in the Appendix.

Additional Recommendations

Restructure the SAP so that this element comes second, between Data and before Conservation, Management and Stewardship.

Rationale

The community should have a role in identifying the potential range of actions, management and stewardship approaches, policy positions and desired outcomes and benefits of RHCWG's work, therefore we recommend re-ordering the strategic action to more closely reflect the recommended sequence. We recommend using the results of the community vulnerability assessment to identify priority communities for engagement, therefore positioning engagement subsequent to the Data, Science and Research strategy element is reasonable even though the engagement should begin prior to the completion of the strategic action plan.

Pair action and investment with engagement, and collaborate with the community to define and pursue desired outcomes.

Rationale

Any potential action should be coupled with additional community engagement to make sure that acquisitions, site improvements, stewardship and management are delivered with community input and in ways that align with community priorities. See the Community Engagement framework section of the report for details on this phase of engagement.

Conservation, Management, and Stewardship

Understanding

This element outlines strategies to address many of the factors that most directly contribute to disruption of regional habitat connectivity, including protection and restoration of habitat, with an emphasis on working with landowners within priority HCZs. Its first priority is to query ownership data for land parcels within HCZs, and to categorize and rank these parcels according to criteria such as landscape importance, current and future land use, and existing relationships, as well as to identify specific connectivity issues. It sets out goals for a landowner resource library and on-the-ground conservation projects including management strategies for existing landowners, permanent and temporary protection strategies, the facilitation of restoration through providing support such as grant funding, and an adaptive management strategy to monitor efficacy and change course when needed. Finally, it calls for the implementation of "natural features" throughout the landscape, with an emphasis on pollinator habitat.

Participatory process

A preliminary discussion with liaisons Theresa Huang and Janelle St. Pierre was held Friday, March 11, and a workshop with the chapter sub-group took place Monday, March 14, attended by four other RHCWG members: Nicole Ahr, Eric Butler, Carole Hardy, and Kevin O'Hara. The format for the workshop was similar to the other sub-group workshops, with the Equity Integration consultant team presenting framing material, facilitating discussion, and making preliminary recommendations. The framing section reviewed elements of the Equity Lens, and presented peer-reviewed research that emphasizes the fundamental role that systemic inequality plays in the spatial distribution of connectivity. Discussion for this element was active, with the group sharing background and updates on the work, and investigating the unmet potential the chapter has to deliver on JEDI goals. Group members recognized the limitations inherent in the chapter's emphasis on land ownership as the primary focus for implementation.

A number of ideas centered around the need to more fully understand community characteristics in prioritized connectivity areas. These included mapping of Indigenous lands and vulnerable communities, a broader definition of who the stakeholders are, and identification of where existing grassroots efforts and community planning are taking place. While land ownership is a key piece of information for effecting change in management, it is equally important to recognize how landscapes function for the neighboring communities; for example, in working rural landscapes, removing an excessive amount of agricultural land from production can lead to displacement of farm families. In cities, community gardens on undeveloped lots can have a role in reducing food insecurity while acting as small habitat patches within the urban matrix. Strategy B4, which focuses on incorporating natural features into the broader landscape beyond sites managed specifically for conservation, was seen as a prime opportunity to deliver on JEDI goals.

Principal Recommendation

Use the results of engagement to direct investment and identify opportunities to improve habitat connectivity through actions that align with community priorities and redress inequitable distribution of ecological resources through projects that restore tree canopy, reduce urban heat islands, improve the region's green infrastructure, incorporate habitat-friendly elements into site design, and mitigate contamination of land and water.

Rationale

This recommendation focuses on the need to engage and listen to marginalize communities and allow the results of that engagement to meaningfully influence the direction and outcome of RHCWG's work. Understanding how improving habitat connectivity through Conservation, Management, Stewardship and Restoration actions intersect with the goals and needs of our region's most vulnerable people is an important fulcrum upon which environmental justice can be leveraged and advanced.

Limiting RHCWG's work to a strict focus on the conservation of existing high-quality ecological resources risks reinforcing the status quo of inequitable distribution of these resources and their associated benefits, and fails to redress the history of injustice that was influential in the development of these inequities. It is necessary for RHCWG to expand the scope of actions to include a broader category of investment with the potential to respond to existing inequities through, in part, efforts to redistribute these resources and mitigate past environmental harms through repair. This approach will help to facilitate the realization of intersectional co-benefits; projects which results in both ecological and social uplift.

The Regional Conservation Strategy highlights numerous approaches to achieving these goals, including; watershed-based approaches, restoring the urban tree canopy, green streets, integrating nature into site design and backyard habitat creation. These ideas provide a starting point for thinking about how RHCWG's work may intersect with the needs of vulnerable and marginalized communities, and should be further expanded during engagement and the completion of the strategic action plan.

Additional Recommendations

Shift focus away from landowners as the only important stakeholder in conservation, restoration, management and stewardship and expand toolkit development to include tools for use by broad coalitions of people and organizations who live near, have influence over, draw benefits from, and are burdened by conditions within priority connectivity areas and throughout the matrix.

Rationale

Developing relationships and working with landowners to improve habitat connectivity in the region is a practical strategy that works within current systems of power in order to achieve desired ecological outcomes but this focus is problematic from a justice and equity perspective. The idea of land ownership, as is commonly understood in the United States, is fundamentally western, imperial and colonial. This idea has been used as a tool of oppression against Black, Indigenous and other People of Color throughout the history of this country, starting with the forceful removal of Native Americans from their homelands and restrictions against Black American land ownership during and after slavery through to racially restrictive property

covenants that remain common in deeds and land titles to this day[9]. The history of inequitable property ownership rights is a primary driver for contemporary racial wealth gaps which show that average White households have 10 times the wealth of Black and Indigenous households[10], a profound difference which impacts health, welfare, education and other major life outcomes. Extending the definition of key stakeholders, and the resulting focus of toolkit development, to include those who have not benefitted from the concept of land ownership and have been further harmed by the inequities it has created is essential from a justice and equity perspective.

Build resource libraries to document best practices and opportunities for workforce development and community-driven conservation and restoration plans.

Rationale

Supporting community-led conservation and restoration initiatives, and workforce development opportunities offers additional strategic approaches to advancing justice and equity within the Conservation, Management, Restoration and Stewardship strategy element. Community-led conservation and restoration initiatives give power back to the community by supporting their vision, and offering autonomy in decision-making and project execution. Workforce development provides job skill training, career development opportunities, network connections and direct financial benefits to community members looking for career advancement. Workforce development is an important vehicle for advancing equity because directly distributes financial resources to communities in need and because it can have positive impacts on longer term life outcomes. Green workforce development can also provide intersectional co-benefits for RHCWG through knowledge sharing, mutual mentorship and the advancement of conservation objectives realized in project execution. Develop resource libraries to document best practices and opportunities for these community focused strategies.

Add the term "Restoration" into the strategy element title.

Rationale

Habitat restoration and habitat creation are important tools in the effort to advance environmental justice because they offer specific means for environmental repair in communities that are burdened by degraded environmental conditions. Including the term in the strategy element title lends weight to this potential work outcome and puts it on even structural footing with Conservation, Management and Stewardship.

9 Welsh (2018)
10 Bhutta (2020)

Planning & Policy

Understanding

Planning and Policy is a focal element in the SAP, as a primary means through which RHCWG can influence habitat connectivity at a regional scale. Strategies in this section work to mitigate contributing factors located throughout the Situation Model. The SAP specifically calls out land use, transportation, utility, farm, forest plans and planning processes in urban and rural settings, and summarizes relevant planning where habitat connectivity is explicitly or implicitly incorporated. It recognizes that many of these planning efforts are not focused on natural resource protection, much less habitat connectivity, and yet they can have a profound effect on the effective habitat connectivity of the region. Strategies include improved collaboration between agencies and natural resource practitioners; an inventory of policies, codes, investments, and capacity; incorporating habitat connectivity as a guiding principle for regional and local planning efforts; and developing tools for decision-making and project design.

Participatory process

A preliminary discussion was held with the JEDI Integration project team, including Theresa Huang and Janelle St. Pierre, on Monday, April 4, and a workshop with the chapter sub-group took place Wednesday, April 6, attended by five other RHCWG members: Marcia Sinclair, Brandan Crawford, Lori Hennings, Eric Butler, Leslie Bliss-Ketchum, and Ted Labbe. The format for the workshop was similar to the other sub-group workshops, with the Equity Integration consultant team presenting framing material, facilitating discussion, and making preliminary recommendations. The framing section reviewed elements of the Equity Lens, and presented peer-reviewed research that emphasizes the fundamental role that systemic inequality plays in the spatial distribution of connectivity.

The group discussion generally recognized that the strong planning environment for conservation in the region has been ahead of planning for equity, but there are recent encouraging developments. Recent housing and transportation legislation and policies (e.g., HB2001, HB2003, and DLCD's Climate Friendly and Equitable Communities rulemaking) have formalized the imperative to include engagement, consider community characteristics, and assess gentrification risk as a standard part of planning and development. Since the chapter was drafted, this environment has changed a lot, and participants agreed that it needs to be updated in light of these changes. Another point was that the draft version of this chapter takes a very broad approach, and that RHCWG's goals would be better served by a more focused set of strategies that can prioritize the groups efforts for greatest efficacy.

Principal Recommendation

Identify and focus the set of policy issues on those that offer the greatest potential to deliver intersectional co-benefits, addressing both systemic inequity and habitat connectivity, and leverage the political power of RHCWG members and associated agencies to effectively advocate for policy outcomes that advance environmental justice.

Rationale

RHCWG has substantial political power as a group, with members representing over 40 agencies, non-profits, community activisits, and consulting organizations who operate at local, regional and national scales. The current approach outlined in Strategy Element D focuses on elevating the importance of habitat connectivity in policy planning efforts throughout the region, and positions habitat connectivity as oppositional to other policy priorities. We are concerned that thinking about habitat connectivity as a policy objective that is incompatible with other interests' risks leveraging RHCWG's political weight against policy that could have substantial social benefits. There are many urgent policy concerns at the intersection of social and environmental justice which have the ability to address both habitat connectivity as well as social welfare. We recommend focusing RCHWG's political advocacy on the sub-set of policy issues which will result in intersectional co-benefits for both vulnerable communities as well as habitat connectivity. The Regional Conservation Strategy identifies a number of issues which exist at that intersection, these include but are not limited to; increasing the urban tree canopy, integrating habitat into new development, mitigating the impacts of highway planning and public infrastructure, reducing barriers to affordable housing, addressing houselessness, extending access to education and green workforce development.

Additional Recommendations

Join coalitions by positioning RHCWG as an ally to those advocating for environmental justice in planning and policy.

Rationale

Joining existing coalitions working on environmental justice would provide an opportunity for RHCWG to leverage its political power in support of urgent and pressing issues without having to take on the burden and challenges of organizing campaigns from the ground up. There are many active movements that may benefit from RHCWG's participation including active local groups advocating for climate, environmental and racial justice.

Use the outcomes of Community Engagement to identify policy issues that are the most important to the region's most vulnerable communities and to inform RHCWG's policy stances.

Rationale

The most direct strategy for identifying policy stances that align with the region's impacted communities' priorities and goals is to engage with them, hear about their policy priorities and use that information to guide decision making.

Outcomes & Benefits

Understanding

In contrast to the other main chapters, which are focused on a single Strategy Element as defined in RHCWG's CS Framework, the Outcomes & Benefits chapter was a later addition to the SAP. Its composition came out of a different context and process from other chapters, and paralleled two benefits papers published by RHCWG members Carole Hardy, Eric Butler, Leslie Bliss-Ketchum, and Catherine de Rivera. With the recognition that the outcomes at the end of the CS situation model lacked a strong sense of definition, the chapter set out to introduce common terminology and make more holistic connections between threats and benefits with the broader goals of the SAP.

An important distinction here is the choice of referring to benefits of connected ecosystems rather than ecosystem services (ES), with the recognition that ES commodifies the relationship between humans and nature in a way that is fundamentally incompatible with Indigenous worldviews that see this relationship as sacred, familial, and irreplaceable. The chapter also describes four interrelated types of connectivity (Habitat, Geophysical, Eco-social, and Landscape Connectivity), which situates wildlife habitat connectivity as one part of a more broadly understood system. The chapter briefly articulates a vision for the SAP to support racial justice and economic viability by seeking alignment with diverse stakeholders and facilitating equitable outcomes.

Participatory process

A preliminary planning session was held on April 8, 2022, with the consultant team and RHCWG's JEDI Implementation project team (Theresa Huang and Janelle St. Pierre), and the full workshop was held April 11, 2022, with an additional 9 RHCWG members participating (Lori Hennings, Carole Hardy, Alejandro Orizola, Nicole Ahr, Leslie Bliss-Ketchum, Antonia Machado, Jennifer Karps, Erin Abernethy, and Eric Butler). The format for the workshop was similar to the other sub-group workshops, with the Equity Integration consultant team presenting framing material, facilitating discussion, and making preliminary recommendations.

The framing section reviewed elements of the Equity Lens, and presented peer-reviewed research that suggests a disconnect between agencies working to promote urban ecosystem services and the priorities of the communities they serve, and suggesting possibilities for tailoring program emphasis and messaging to better align with those priorities.

Because the chapter is not structured around CS Strategies like the other elements, the discussion was somewhat more open-ended. Substantial attention was paid to the way in which the chapter reflects parts of RHCWG's situation model, and at what level JEDI goals should be incorporated into that model. The newest Connectivity Benefits Framework paper (Hardy et al, forthcoming) was raised as an example of integrating risk into the discussion of ecological benefits.

Principal Recommendation

Work with community to collaboratively develop a set of desired outcomes with intersectional benefits and incorporate justice by centering an understanding of the existing inequitable distribution of connectivity benefits, acknowledging the relationship of this distribution with the region's history of systemic racism, and framing the desired outcomes around an active intent to redress that history.

Rationale

Currently the chapter discusses the resulting benefits of connected ecosystems using four categories of connectivity; habitat connectivity, geophysical connectivity, eco-social connectivity and landscape connectivity. The chapter then describes a number of associated benefits ranging from ecosystem services, like protected air and water quality, to social benefits such as access to nature and the reduction of heat islands. The list of benefits stops short of addressing justice in that the benefits are discussed in a universal manner without acknowledging that some people experience more of these benefits than others, and without contextualizing them within the history of injustices that has led to contemporary inequities. We recommend integrating justice into the framing of outcomes and benefits by acknowledging that the benefits of habitat connectivity are not equally distributed and there is a need to actively address those inequities through action.

Additionally, working with community to collaboratively define the desired outcomes and benefits is essential. Doing so will ensure that the SAP aligns with community priorities and needs, and meaningfully shares power by allowing community input to influence the direction of work. While it seems reasonable to assume that certain outcomes, such as clean air and water, are priorities for all people, there may be other more pressing community needs that deserve attention through this work which will only be identified through engagement, careful listening and power sharing.

Additional Recommendations

Bring content from this chapter into the introduction and integrate relevant components into each strategy element to link the desired outcomes and benefits to the process.

Rationale

Justice, Equity, Diversity and Inclusion are identified in this chapter as a priority outcome, with specific language describing the importance of designing solutions that consider the needs of diverse stakeholders, integrating nature within the built environment, engaging diverse stakeholders and using community needs to prioritize actions. The chapter starts by stating that "the goal of this SAP is to improve resilience of environmental and equitable socio-economic systems, protecting biodiversity and supporting justice". These statements are in alignment with many of the recommendations made throughout this report. There is a need to take these goals and more deeply integrate them into each preceding strategy element so that the process described throughout the SAP will result in desired environmental justice focused outcomes and benefits.

E | Community Engagement Framework

Equitable Engagement Approach

Part of this assessment is a community engagement framework to guide RHCWG in refining goals and actions for the SAP, assist with developing materials for engagement and outreach, and build community buy-in for conservation and restoration opportunities. This will facilitate long-term participation in the group and partnerships with BIPOC community groups.

Through the Community Engagement Framework, RHCWG will gain a better understanding on how to:

- Build trust with diverse communities;
- Develop authentic relationships with community leaders;
- Provide feedback loops to participants;
- Create measurements of success and track progress;
- Build diverse grassroots support for RHCWG priorities;
- Develop practices of continuous improvement.

This section provides background information on equitable community engagement, the results of an initial Power Analysis, and Key Process Steps that serve as a basis for developing and creating an Equitable Community Engagement Plan.

There is a range of potential spatial outcomes that are associated with connectivity actions, as there is a range of ways these actions may intersect with disadvantaged and marginalized BIPOC communities. Identifying areas where actions will impact the region's most vulnerable communities is necessary in order to target outreach and engagement. Understanding how areas of high priority for regional connectivity intersect with disadvantaged or marginalized BIPOC communities will help to identify priority communities for engagement who have the most potential interest in the outcomes of these actions.

The Community Vulnerability Index identifies the distribution of communities with intersectional disadvantages throughout the Intertwine Region. For detailed information, see the Equity Integration Report's Recommendations for Data, Research, and Science, and the appendix section on the Community Vulnerability Index.

Our team recommends that a workshop for a broader audience within the RHCWG to complete a Stakeholder Power Analysis which will identify a spectrum of stakeholders who will be impacted by RHCWG actions and their level of power in relationship to these actions. Understanding how stakeholders are distributed on this matrix is an important component for understanding how to make the decision-making process more equitable. This analysis will help to ground members of the RHCWG in who and how they engage with a JEDI approach to understanding power dynamics in the community, their priorities and to improve relationship building.

Power Analysis Workshop

A Power Analysis was conducted virtually using a Miro Board that is similar to a "sticky note" exercise commonly conducted in person. The stakeholder's names were placed on a "sticky note' with the darker colors reflecting the level of priority of the stakeholder. Participants placed the stakeholders on the Power Analysis grid based on their knowledge of influence and impact. The focus to assure that the stakeholders that are impacted the most with the least amount of power are highlighted in the power grid.

Participants were then asked to prioritize up to 6-8 stakeholders with a star, with directions to consider stakeholders that they would like to engage and also stakeholders that they think would be influential in making progress towards success and equitable outcomes.

The outcomes from the Power Analysis workshop are shown below. Analysis and strategies for engagement is included based on relationships, priorities and level of engagement. For more background information on the process for conducting a Power Analysis, including the worksheet that was the source for this exercise, see Appendix.

Figure 9. Initial Power Analysis board
Screen capture of the board co-created by RHCWG's JEDI sub-committee

Analysis of Priority Stakeholders and Strategies for Engagement

Highly Impacted/High Influence

APANO: High relationship/consult/collaborate

Verde: High relationship/consult/collaborate

APANO and Verde both are well established community based organizations that represent segments of the Asian Pacific American community and the Latino community in the Cully neighborhood. They are familiar with the program and have staff the many RHCWG members work with regularly. Strategies for working with these organizations is to:

- Encourage these organizations to bring in other members of their community that have not been involved with the program. Options for serving on advisory boards, participating in focus groups or educational programs, participating in events.
- APANO/Verde staff to provide direct feedback and influence on the SAP regarding impacts on environmental justice and community disparities.
- Encourage young leaders in these organizations to participate in RHCWG subcommittees and participate in leading educational programs

The Blueprint Foundation: Medium relationship/collaborate

The Blueprint Foundation is a relatively new organization doing really great work. As such, there are opportunities to deepen relationships.

- Offer to support (financial, volunteer, materials, food) to their current programming or organization
- Seek opportunities that build trust and focus on longer term relationships and not transactional opportunities

Neighborhood Associations in EJ areas: Low relationship/consult

Portland's Neighborhood Associations are well established organizations. There is criticism that these associations do not represent the voices of all the neighbors and renters, low income people, racially diverse participants, and others are not represented and included as active participants. However, these associations provide an opportunity to understand that segment of the community as a political stakeholder in the RHCWG strategy. Strategies for engagement will take a lower level of effort and different messaging and method of engagement.

- Present/conduct a workshop at regular meeting to gain feedback
- Attend and/or table at an event (farmers market, neighborhood event) in their neighborhood, offer to sponsor or volunteer
- Invite members to your organization's event and offer a table or an opportunity participate
- Ask members to assist with engaging other neighbors in the community to attend events or participate in meetings
- Provide flyers, info sheets or purchase newsletter space to provide information to mailers
- Send event and announcements to the neighborhood email list

Highly Impacted/low Influence

These stakeholders were added during the workshop and the subcommittee did not assign a relationship, priority or level of engagement prior to the workshop.

These stakeholders will need to take a more focused approach on engagement, because they are the most impacted with the least amount of influence. They have been and continue to be systematically excluded from participation due to laws, regulations, and systems.

Houseless people

In the Metro region there are many people living along habitat corridors and typically negatively impact the ecological environment. Strategies engagement include

- Providing support to organizations providing direct services. Donate food, materials, financial, volunteer.
- Offer opportunities to assist with surveys, mutual aid, etc

Health compromised people

This could be a challenging group to identify and engage. Options for developing relationships include:

- Public health clinics. Offer to support needed services, events and other resources
- Hospitals, clinics, public health organizations, health insurance providers. These stakeholders could also include seniors, people with disabilities, and other health issues. Organizations such as AARP, disability access organizations. Offer to support employee wellness program events, community events and sponsorships.

Green Workforce

There are a few organizations that are focusing on greenwork force within the region. And supporting their work. Strategies suggested for working with The Blueprint Foundation is the same, including:

- Offer to support (financial, volunteer, materials, food) to their current programming or organization
- Seek opportunities that build trust and focus on longer term relationships and not transactional opportunities

Low income people

This is a broad category of people. Using the demographic GIS assessment could help identify areas focus for outreach and providing one way information. Likely the approach would be to access the neighborhood associations, as mentioned above as a first step. The strategies include:

- Present/conduct a workshop at regular meeting to gain feedback
- Attend and/or table at an event (farmers market, neighborhood event) in their neighborhood, offer to sponsor or volunteer
- Invite members to your organization's event and offer opportunities to participate
- Ask members to assist with engaging other neighbors in the community to attend events or participate in meetings
- Provide flyers, info sheets or purchase newsletter space to provide information to mailers
- Send event and announcements to the neighborhood email list

Title one schools

These schools are a particularly good stakeholder to build relationships. The schools strongly represent the demographics of the neighborhood.

- Supporting the schools in their curriculum, programs, events, with financial, materials, staffing and food. Earth Day and other opportunities to engage with students and parents

Levels of Engagement

The following list are general recommended equitable engagement approaches based on level of engagement:

Inform

- Email listservs. Provides one-way information. May not reach intended audiences.
- Social media. Facebook/Next Door. Provides information and opportunity to receive comments and dialog. Needs to be monitored and moderated. May not work for multiple organizations and government government agencies. May not reach intended audiences.
- Website/Blogs. This is a good way to share information and allow people to access background information.. May not reach intended audiences.
- Print newsletter articles or electronic news. May not reach intended audience.
- Door to door flyers/door hangers, tabling at events, presentations to community groups. Good way to provide information and reach individuals to inform about project and have conversations for continuing participation. May not reach intended audiences.

Consult

- On-line surveys. Provides opportunity to collect feedback. Typically, a 10% participation rate is considered a good response rate. May not reach intended audiences.
- Door-to-door canvassing or tabling at events with paper surveys or interviews. This tactic has been proven successful in reaching focused participants, such as renters, seniors, people that English is not their first language. Facilitators assist participants with filling out surveys. Time consuming.
- Focus groups/coffee klatches/small group discussions. Good opportunity to develop relationships for focused audience. Need to have consistent approach to facilitation, agenda and feedback loop to participants. Best practices include language access, stipends for participants, food, childcare. Needs more resources, time, budget and logistical support.
- Interactive workshops in different languages. Highly interactive workshops that are inclusive and address language differences can be very effective either online or in person.
- Community workshops and open houses. This method is becoming less popular for equitable community engagement. Typically, these meetings are attended by self-selected individuals and, unless focused recruitment is conducted ahead of time, will not provide a diverse viewpoint of the community. Using language interpretation devices and language interpreters and providing food and child care are important for

community meetings. Reaches an audience that is comfortable and familiar with this type of government style participatory format.

Involve

- While conducting in-depth focus groups and community conversations, the RHCWG could create small focused advisory groups for the project. Through these groups, members can develop relationships with stakeholders, and stakeholders could become ambassadors for and co-creators of the project, process and outcomes.
- Community Engagement Leadership Academy. There is an opportunity to build a broader base of informed and engaged community members through a program such as this. Several government organizations, such as the cities of Beaverton and Portland, provide resources for a cohort leadership program for participants to learn about city government and community engagement.
- Student involvement. Students at nearby schools provide an excellent opportunity to engage with projects that range from art/placemaking projects, walks audits, advocacy training, architectural/design projects, maker projects, map projects, photovoice, etc. Having youth voices at the table and learning to engage and advocate at the political level is often fun and exciting for students. The work can be used as a model or theme for the project and can have far ranging reach and impact on decision makers and community members.
- Engaging students also engages their parents, families and guardians. Opportunities to highlight student projects or presentations provides the option for engaging parents during the same time. Focus groups, surveys and participation in workshops, could be led by students for additional engagement with adults.

Partner

- Partnering for equitable engagement and outcomes requires a high degree of relationship and trust. Developing shared decision making, resource allocation and ownership will take time and will be an investment that will support RHCWG priorities and policies. Strategies include:
- Co-applying for a grant with outcomes that are mutually beneficial
- Identifying properties, projects, and priorities for restoration and conservation
- Political support and advocacy with elected officials
- Grass roots organizing to support strategic priorities

Empower

- Community control of the land, resources and decision making outside of governmental organization is rarely seen. Examples could include: purchase and restoration/ conservation of habitat corridors by members of the community.
- Creating a RHCWG Community Advisory Committee for decision making and guidance and accountability for implementing the SAP.

The following pages present Key Process Steps for Community Engagement, incorporating many of the elements from this framework tailored to the two initial phases of Community Engagement envisioned for RHCWG.

Key Process Steps for Community Engagement

Based on the current stage of Strategic Planning and our understanding of the full arc of RHCWG's work, we recommend two phases of community engagement. An initial phase of engagement should take place after RHCWG completes an initial round of SAP revisions based on the recommendations made in this Equity Integration Report but prior to completion of the SAP (Strategic Action Plan Engagement), and a second phase of engagement should take place prior to implementation of actions (Neighborhood and Site-Specific Engagement prior to Implementation). The following section describes key process steps and high-level considerations for both phases.

Phase 1 - Strategic Action Plan Engagement

Goal

Engage the region's marginalized BIPOC communities to understand their priorities and concerns, offer them power in helping to revise RHCWG's Strategic Action Plan and set a collaborative vision which results in intersectional benefits, improved habitat connectivity and environmental justice.

Focal Communities

- Focus on engaging the region's most vulnerable communities, as identified by Community Vulnerability assessment and Power Analysis results
- In rural areas, prioritize engagement with the Indigenous community and other Communities of Color with relationships to the land

Timing

Engagement can begin subsequent to initial SAP revisions based on this audit and proceed until the SAP revisions are completed.

Content

Detailed content to be developed during the next phase of work, but may include:

- Presentation of RHCWG's vision and values
- Presentation of SAP element summarized for ease of communication
- Opportunities for Community members to discuss their challenges and priorities, and identify opportunities for work resulting in intersectional benefits
- Presentation of a range of restoration, management and stewardship action typologies and hear feedback on community preferences.
- Identification of community policy priorities.

Messaging

Messaging will be developed during the next phase of work but should include:

- Providing translations for written or online materials
- Engaging with community members to test messaging and content for language and cultural relevance
- Providing different messaging content and complexity based on stakeholder needs and expertise.
- The messaging should address why this is important to the individual/organization, how this impacts them and what RHCWG is wanting to learn from community.

Techniques

Consider range of engagement techniques, based on desired level of engagement and relationship. Overall high-level considerations include:

- Community workshops/focus groups (in person or online) with hourly compensation for participants
- Coordinating engagement across jurisdictional boundaries along priority corridors, including resources, budget and staff relationships.

Results

A collaborative vision for Strategic Action to improve habitat connectivity that aligns with the priorities and needs of the region's marginalized BIPOC communities.

Phase 2 - Neighborhood and Site-Specific Engagement

Goal

Engage local communities prior to implementation actions in order to hear specific concerns, needs and desires related to the specific neighborhood or sites being considered, and share power with the community to collaboratively develop a plan for the resulting acquisition and site improvements.

Focal Communities

This phase of engagement should target communities directly adjacent to the areas of interest and those with meaningful ties to the neighborhood or site.

Timing

- After regional prioritization and during acquisition planning that any partner organization undertakes.
- After site acquisition and before investment in restoration and/or site improvements that any partner organization undertakes.

Content

Detailed content to be developed during the next phase of work, but may include:

- Identifying neighborhood specific concerns and preferences for potential site acquisitions and improvement actions.
- Collaborative development of acquisition priorities, site improvement plans, and management and stewardship approaches.
- Build community advocacy for funding support.

Messaging

Messaging will be developed during the next phase of work but should include:

- Providing translations for written or online materials
- Engaging with community members to test messaging and content for language and cultural relevance
- Importance of the site for community, information about the project, site or neighborhood location.
- Specific information on the importance of habitat connectivity and potential co-benefits that may result from action.

Techniques

Consider range of engagement techniques, based on desired level of engagement and relationship. Overall high-level considerations include:

- Conduct community workshops (in person or online) with hourly compensation for participants, including translation and interpretation.

Results

- Site Acquisition Plan with community buy-in
- Site Management Plan / Site Design with community buy-in

F | Next Steps

Implementing the Recommendations

This report represents the substantially complete results of the Equity Integration process, and, with the delivery of these recommendations, it is incumbent upon RHCWG to take responsibility for integrating them into the SAP and the group's working processes.

This integration will need to have two initial phases. First, RHCWG should make revisions to the SAP based on the group's own understanding and response to the Equity Integration. This will be an important step so as to be prepared to accurately represent the group's intentions before embarking on community engagement. However, these revisions will need to result in a product that is still flexible and open enough to meaningfully incorporate input from community during the first phase of engagement, as described in the Community Engagement Framework (see the Framework and Key Process Steps in the Appendix).

Further recommendations on next steps will be to:

- Seek consensus on how to proceed starting from the JEDI sub-committee and radiating out through the Steering Committee and the entirety of RHCWG.
- Lean on the experience of strategy element liaisons and all of those who have directly participated in the workshops to become champions for implementation.
- Engage consultants with expertise in environmental justice and proven relationships with community partners to help plan, implement, and facilitate the Community Engagement Plan.

The Summary of Findings section at the head of this report emphasizes the great potential that a successful integration of JEDI principles would have for RHCWG, as well as some of the qualities that individuals will need to cultivate in order to reach that destination. Throughout this report, we have reiterated words like meaningful, substantive, integration, and process as a way to emphasize the ambition for this work to have a permanent and transformative effect in the way that RHCWG functions. There is no end result here, only an ongoing and continuous cultivation of practice oriented towards the realization of justice.

G | Appendices

Appendix 1. JEDI Statement of Intent

The following is the complete Statement of Intent authored by the RHCWG JEDI sub-committee in preparation for engaging consultants for the SAP Equity Integration, and forms a primary background and basis for evaluation.

Black, Indigenous, and people of color (BIPOC) communities bear an inequitable burden from the impacts of our policy structures surrounding land development, neighborhood disinvestment, urbanization, gentrification, and ecosystem fragmentation as a result of systemic racism in the past and present. While other historically disenfranchised groups such as people with disabilities, LGBTQIA+ communities, women, elderly, young people, and low-income residents are all taken into evaluation, we recognize that BIPOC community members intersect strongly with each of those groups and experience deeper systemic inequality due to institutional racism. Because of this fundamental, race-based inequality, our efforts to address ecosystem fragmentation will employ a racial equity lens as our primary equity focus and seek to redress environmental justice issues to maximize outcomes for all people and the environment.

The goal of the Regional Habitat Connectivity Working Group Strategic Action Plan (SAP) is to establish guidance for improving habitat connectivity within the Regional Conservation Strategy (RCS) geography. To be successful, the SAP must reflect the needs and desires of the BIPOC communities who will be affected by plan implementation.

The RHCWG is committed to co-creating a shared vision for improving regional habitat connectivity in collaboration with historically and currently disenfranchised communities. To achieve this shared vision, the RHCWG commits to engaging and collaborating with BIPOC communities throughout the region in a process that will:

- *Co-create a respectful, safe, and inclusive environment conducive to ongoing and meaningful participation where BIPOC community members are heard, feel that they belong in the process, and serve in leadership roles;*
- *Center the voices of BIPOC and other historically and currently disenfranchised communities and provide resources to support participation;*
- *Incorporate input from participants into the whole process;*
- *Institutionalize follow-up on commitments made during the process; and*
- *Remain open to new strategies as the process evolves.*

Through research and dialogue, this collaboration aims to achieve the following:

- *Identify the needs of communities that may be affected by habitat connectivity programs and policies, and seek opportunities to design, prioritize, and implement initiatives that address community challenges and restore habitat connectivity and function.*
- *Collaboratively identify how connectivity efforts may affect people where they live and work, and support community members in determining how connectivity programs and policies could best be implemented in their communities.*
- *Identify the intersectional goals, benefits, and/or challenges between different types of connectivity (habitat, landscape, geophysical, eco-social) for people and wildlife habitat.*

We are looking beyond individual acts to undo the legacy harm of institutionalized racism and the systemic barriers within our policies. We can't undo what has happened in the past. However, with continuous work we can move towards a more just system where racial inequities are avoidable. Incorporating racial equity into this work will improve and help avoid additional disenfranchisement and bring everyone further along in reaching our conservation goals. This will open doors to greater participation in environmental and conservation efforts and increase access to nature for all.

Appendix 2. Illustrative Diagrams

Eco-social Benefits Matrix

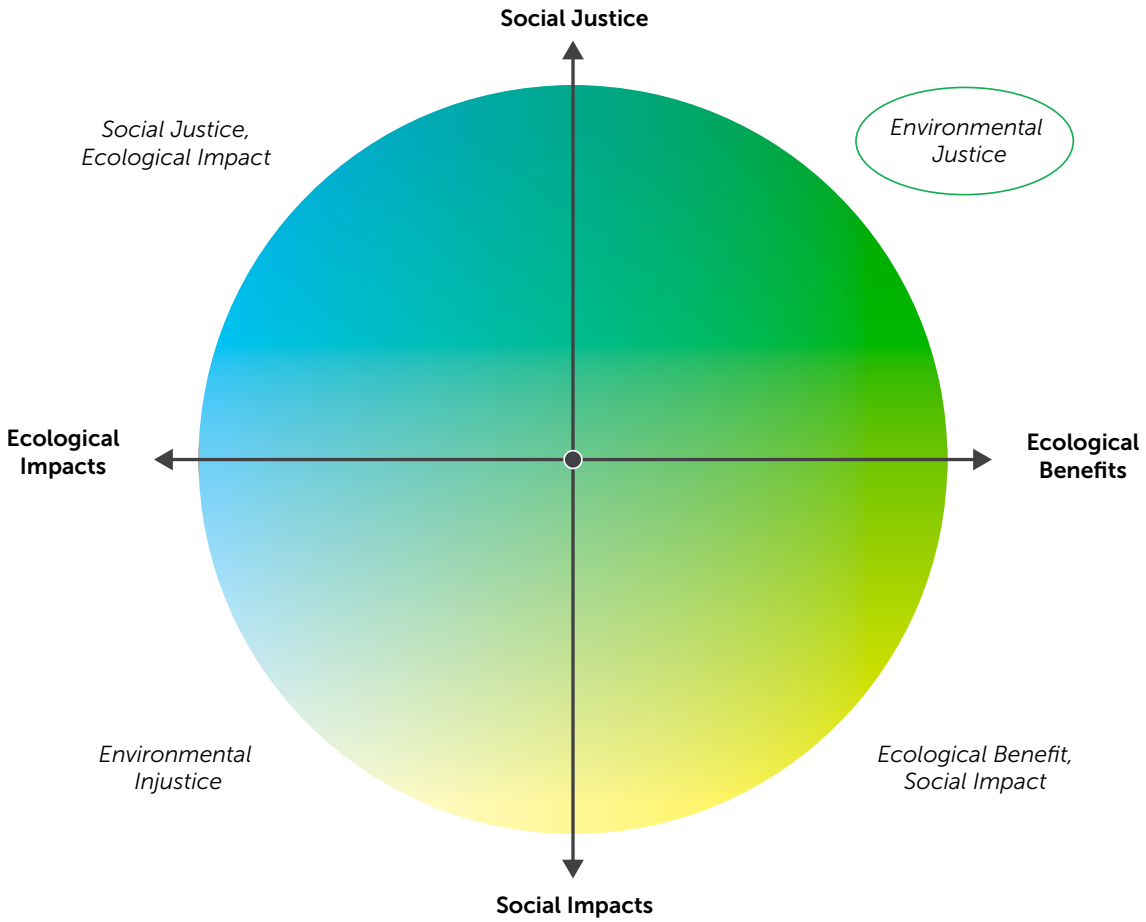
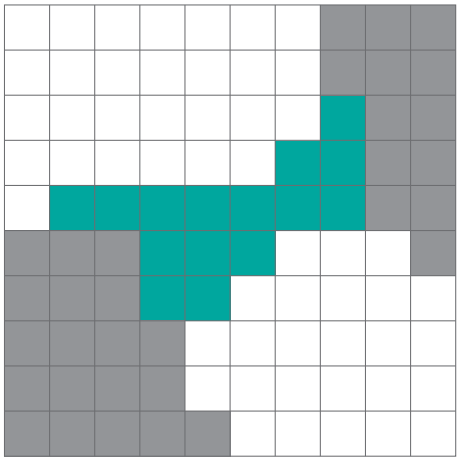


Figure 10. Eco-social benefits matrix
An eco-social model of benefits and impacts with a justice perspective. As drafted, the SAP's CS framework works on a single (X) axis, with strategies designed to move from center left (ecological impacts) to center right (ecological benefits). Our recommendation is to conceptually introducie a second (Y) axis that represents social impacts and benefits with an understanding of the current inequitable distribution (i.e., social justice). This reframing of the work would allow the group to design their goals and strategies to seek co-benefits between ecological and social goals, resulting in outcomes that deliver environmental justice.

Connectivity Action Typologies

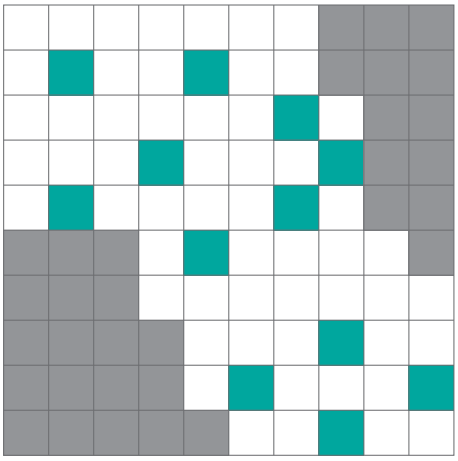
Intensive



Preserves existing habitat and makes direct connections between patches

- Restoration, management and stewardship within existing high quailty habitat
- Removal of barriers along known wildlife migratory corridors

Extensive



Increases permeability of the matrix

- Increasing the urban canopy through street tree planting and maintenance programs
- Habitat-friendly design integrated into new and renovated residential/commercial development and streetscapes
- Targeted green infrastructure utilizing native plant communities

Figure 11. Intensive/extensive connectivity actions
RHCWG's modeling is primarily focused on "intensive" connectivity (left). While there are some provisions for "extensive" connectivity actions (right) included in the SAP, emphasizing the viability of this type of work would give the group more opportunities to advocate for co-benefits for vulnerable communities and avoid exacerbating the inequitable distribution of ecosystem services.

Appendix 3. Power Analysis Background and Resources

Power Analysis Worksheet

Relationship
High = We've worked with them before and they are familiar with our agency and programs
Medium = We've know about their needs and have talked with them, but have not directly engaged with them
Low = We have not engaged with them and do not know anyone at the organization

Priority
High = We would like to engage with them
Medium = We would like to engage with them, but they already have resources to do some of the work
Low = They've already worked with our program and have received multiple grants

Level of engagement
Inform = One-way outreach, provide information
Consult = Provide feedback on programs, decisions
Involve = Work with community throughout process
Collaborate = Partner in decision making
Empower = Final decsion making

Strategies: What are some ideas about how to engage ?

Community and Culturally Based Organizaton/NonProfits/Public Agencies/School Districts	Relationship	Priority	Level of Engagement	Strategies	Comments
Albina Vision			Consult/ Involve	Planning Oppurtunities	
APANO	high	high			
Audubon	High	high	Empower	Support community programs	Steering committee
Bienestar			Consult		Affordable housing advocates and developers. Working on developing afforable housing in WA around city and county parks and lands. Could be helpful to provideinput on connectivity plans.
Blueprint Foundation	Medium/high	medium/high	Collaborate	Identify opportunties to support work on Connecting Canopies	Connection through UGI / too busy to be heavily involved but can consult for insights and may be interested in contributing to parts of decision making
Camp ELSO	medium				
Cascadia Behavioral Healthcare	low	high	collaborate/empower	work as a partner on interacting with houseless community, have them take leadership on facilitating conversations during implementation	
Central Cultural	low	medium	involve & collaborate	work with Centural Cultural to engage with communities on the West side who may be living in targeted EJ areas	
City of Beaverton	Medium	medium	Consult	Support community planning	Attends mtgs
City of Hillsboro	Medium	medium	Collaborate	Support community planning	Attends mtgs
City of Milwaukie	High	high	Empower	Support community planning	Steering committee
City of Portland	High	high	Empower	Support community programs	Steering committee
City of Wilsonville	Medium	medium	Inform		
City Repair	low				
Clackamas County	Medium	medium	Inform		
Clackamas SWCD	High	high	Collaborate	Support community programs	Active
Clean Rivers Coalition			Inform		
Clean Water Services	High	high	Empower	Evaluate power/ funding dynamic	Steering committee
Columbia Slough Watershed Council	Medium	medium	Inform	*Decide if we want a stronger connection to watershed councils	
Confluence Environmental Center	high				
Depave	high				
East Multnomah SWCD	Low	low	Inform	Engage with?	
Forest Park Conservancy	Medium	medium	Consult	Support community programs	Attends mtgs
Friends of Trees	Medium/high	medium	Consult	Support community programs	
Friends of Tryon Creek	Medium	medium	Inform	# Opportunities to connect with Friends/ Community groups	
Getting There Together Coalition	Medium		Inform / consult		Would be helpful to allign intersts as the coalition works on developing their platform for the future metro transporation measure. They also have an upcoming webinar on urban mapping as it relates to climate. Might be intersting to see what work they are interested in collborating on.
Green Workforce Academy	medium				
Greening of Schoolyards Collective			Consult/Involve	Integrate connectivity plans into school yard greenspace planning	
Hacienda CDC	low				

Figure 12. Power Analysis worksheet
Worksheet completed by JEDI sub-committee members in preparation for the Power Analysis.

Here Together			Consult		They are the implementation experts on Metro's housing bond, tracking and consulting on the cities investments on infrastructure/ capitol projects and social service programs. Many cities are using a envi sensitivity analysis when searching for 'vacant' plots to add different shelter options. The coalition could be a good resource on how to integrate habbitat connectivity into the housing bond implementation plans.
Hollywood Theater	low				
Human Access Project	high				
Intertwine Alliance	High	high	Collaborate	Develop regional collaboration	Active
IRCO	low/medium	high	involve	work with IRCO to connect with immigrant and refugee community on opportunities to involve and potential changes in neighborhood level.	
Johnson Creek Watershed Council	Low	low	Inform	*	
Living Cully	low	med	Consult/ Involve		
Metro	High	high	Empower	Evaluate power/ funding dynamic	Steering committee
Miracles Cafe	low				Recovery and wrap around services for Black Portlanders
Multnomah County	High	medium	Collaborate		Steering committee (new)
NACAC	low				Native American Community Advisory Council
Nature Conservancy	Medium	high	Consult		Attends mtgs
NAYA Native American Youth and Fami	high				
neighborhood associations in EJ areas	low	high	consult		
Neighborhood House	low				
Nesika Wilamut	Medium	low	Inform		
North Clackamas Park & Rec	Medium	high	Consult		Active
Oregon Dept of Transportation	High	high	Collaborate		Steering committee
Oregon Dept. of Fish & Wildlife	Medium	medium	Consult		Attends mtgs
Oregon Parks & Rec	Medium	low	Inform		
Pacificorp	Medium	medium	Inform		
POIC/RAHS	medium				
Port of Portland	Medium	low	Inform		
Portland Audubon	high				
Portland Parks & Rec	High	high	Empower		Steering committee
Portland Public Schools	high				
Portland State University	High	high	Empower		Steering committee
Regional Coalition for Clean Rivers and Streams	high				
Right 2 Survive			Involve		They facilitate conversations around the management of natural areas and how this management impacts there human, civilian constitutional rights of houseless communities.
Robert Surplock			Infrom	Planning Oppurtunities	Metro Regional Trails planner
Samara Group	High	High	Empower		Steering committee
Samara Group	High	high	Empower		Steering committee
Scappoose Bay Watershed Council	low	low	inform	*	
SEI Self Enhancement Inc.	low				Social services nonprofit serving Black youth and families in Portland
Teatro Milagro/Milagro Theater	low				
The Blueprint Foundation	high	high			
TORUS	medium				They bridge gaps between people and community by facilitating transformative experiences of language and culture exchange.
Trash for Peace/ Groundscore	high				
TreekeepersWC (Fran)	High	medium	Consult	#	Active
Tualatin Hills Park & Rec District	Medium	high	Consult		Active
Tualatin River Watershed Council	Medium	medium	Inform	*	Attends mtgs
Tualatin SWCD	Medium	high	Collaborate	Support community programs	Attends mtgs
Urban Greenspaces Institute	High	high	Empower	Support community programs	Steering committee
US Fish & Wildlife Service	High	high	Empower	Evaluate power/ funding dynamic	Steering committee
Verde	low/high	med/high	consult/collaborate		Verde serves communities by building environmental wealth through Social Enterprise, Outreach and Advocacy. Has a focus of helping low income and BIPOC residents
Village Gardens/Janus Youth	medium				
VOZ Workers' Rights Education Project	high				
Washington Dept of Fish & Wildlife	Medium	medium	Consult		
West Multnomah SWCD	High	high	Collaborate	Support community programs	Active
Will Cortez			Consult		Metro's parks ADA and beyond manager. Works closely with trails and access, could provide an interesting take on connectivity and planning.
Willamette Riverkeeper	Medium	medium	Inform		
Wisdom of the Elders	low	high	collaborate/empower	prioritizing potential conservation/restoration sites that are culturally significant, provide resources for traditional resources to the indeginous community	
Xerces Society	Medium	low	Inform		

Figure 12 (continued)

MultiCultural Collaborative

About the Power Analysis

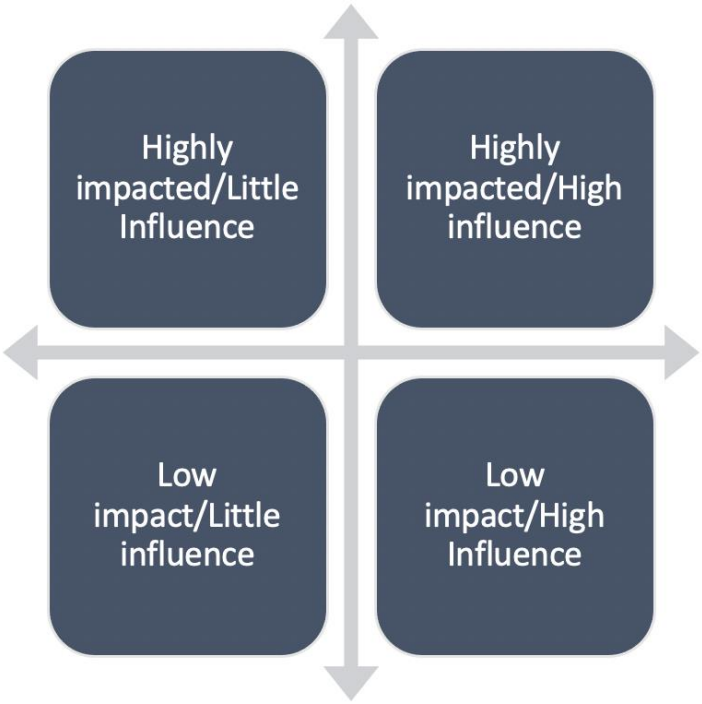
At the center of our approach, we will conduct a Power Analysis workshop with the RHCWG, and any other group to evaluate influence and impact on community stakeholders, relationship and engagement strategy.

What is a power analysis?

- A Power Analysis is an exercise to determine impact of a strategic plan, program, policy or project on a community. The Power Analysis helps participants to understand power dynamics for access to decision-making and resource allocation to members of the community most impacted with the least amount of power. Conducting a power analysis highlights the current power dynamics as they relate to racially diverse communities, low income and other systemically excluded communities and their access and ability to advocate and influence change.

- The Power Analysis can highlight groups or individuals that can focus strategies on for engagement, advocacy, and resources. The ultimate goal of a power analysis to create a more equitable approach to equitable engagement, decision making, internal programming, outcome measurements and continuous improvement.

RHCWG Community Engagement Framework 5/13/22
MultiCultural Collaborative & Knot Design



Impacted by Decision (Y axis): Impact is identified by having a positive/negative or missed opportunity to share in the benefit of a policy or plan.

Influence in Process (X axis): Defined by time, resources, information, familiarity with process and real or perceived ability to influence outcomes.

Figure 13. Power Analysis grid

Why is it important to consider power in conservation and restoration?

- Historical and current laws, regulations, practices and systems have excluded, and continue to exclude, a large segment of our community. Specifically, federal, state and local laws have excluded women, people of color, people with low incomes and other community members by making it difficult or impossible for them to vote, own land, marry, and have access to jobs, wealth, housing, health care and education.
- By recognizing power dynamics in communities and creating engagement, decision making and resource allocation to provide equitable access for those most impacted with the least amount of influence allows for opportunities for collective impact for the RHCWG.

RHCWG Community Engagement Framework 5/13/22
MultiCultural Collaborative & Knot Design

What are some examples of Power?

The definition of power, for this analysis can include:

- access to resources, such as technology, transportation, generational wealth from financial, property or social standing
- relationships with and among those with decision making authority
- fluency in English
- physical ability
- gender identity
- sexual orientation
- race and ethnicity

Figure 14. Wheel of Power/Privilege

RHCWG Community Engagement Framework 5/13/22
MultiCultural Collaborative & Knot Design

Conducting a Power Analysis

There are several steps in conducting a Power Analysis, they include:

1. Stakeholder analysis.
    a. Creating a list of stakeholders that are within the impact area of the program, this could include a range of organizations, individuals, institutions, specific geographic areas to houseless individuals and non english speaking communities and assessing relationship level.
    b. Conduct a demographic assessment to identify distribution of communities with intersectional disadvantages.
    c. Using the the information above, complete the worksheet below, with priority on stakeholders that are highly impacted with the least amount of power.`
    d. Determine level of engagement. Defined generally as:
        i. Inform: one way outreach, provide information
        ii. Consult: Provide feedback on programs/decisions
        iii. Involve: Work with community throughout proces
        iv. Collaborate: Partner in decision making
        v. Empower: Final decision making
2. Conduct the Power Analysis. Using the stakeholder list, place them on the Power Analysis grid within one of the quadrants.
    a. Choose up to 6-8 stakeholders as priority, because of limited resources, (time, staff, budget) the final engagement plan will need to assure that the Strategic Action Plan has an intentional focus on equitable engagement.
3. Develop a Community Engagement Plan. The plan will outline the stakeholders, priorities, impact and influence, level of engagement strategies for the project.

RHCWG Community Engagement Framework 5/13/22
MultiCultural Collaborative & Knot Design

Appendix 4. The Community Vulnerability Index

Goals for Model Design

The RHCWG Community Vulnerability Index (CVI) is a spatial dataset based on a probabilistically modeled distribution of those populations in the RCS region that tend to bear the greatest systemic burdens. The Index takes the form of a continuous, 1-meter raster grid where higher values represent the accumulation of factors associated with vulnerable communities. This continuous data product facilitates the identification of focal areas for investment and engagement, as well as comparisons between planning alternatives.

There are various approaches to equity and justice mapping and prioritization. Our approach emphasizes the following goals:

- The model results should be comprehensive to the RCS extents, and be equally able to describe demographic distribution in densely developed cities as in rural areas
- The model results should be nuanced and retain the complex heterogeneity of the human landscape rather than relying on arbitrary political and regulatory boundaries
- The model results should lead with racial equity, and center the unique harms associated with Black and Indigenous people

With these goals in mind, the CVI is designed around a dasymetric allocation of 2020 US Decennial Census ("Census") population counts, factored by 2019 American Community Survey (ACS) data, modeling the distribution of multiple, compounding indicators where they coincide with concentrations of the region's BIPOC population. Indicators are summed within a 1/2 mile radius from each cell to generalize the neighborhood characteristics, and put on a scale between 0 and 1.

Methods

The methods used to create the CVI were custom developed for this application. Figure 16 is a conceptual model of the assessment, and Figure 17 is the geoprocessing model of the final index. Dasymetric allocation is a process[11] by which spatial data such as population counts that were recorded as polygon features can be downsampled to a continuous grid (raster) using predictive variables. Once these variables are identified, an algorithm finds representative samples for each combination of variable classes and distributes the source data across the grid.

The allocation of the Census total population at the base of the CVI used a unique combination of building footprints, parcel-level land use codes, and building height as ancillary data. This allows a more precise and more nuanced distribution than methods employing land cover (e.g., the EPA's EnviroScreen allocation). These inputs have undergone extensive data management (including manual feature creation for floating houses and many residential developments constructed since the building footprint data was released) and reconciliation between land use

11 For more background information on dasymetric allocation, see U.S. EPA 2022.

Figure 15. Allocating population data
2020 US Census block total population (left), the CVI ancillary raster (right), based on building footprints.

codes and population data. This ensures that the downsampled values add up to the source data ("pycnophylactic integrity"). An example would be adding residential institutional zoned buildings for group quarters populations in prisons. The source population was also adjusted by subtracting student and non-institutionalized group quarters population.

Finally, all inputs were reconciled into 14 classes, and converted into the ancillary raster (the right side of). Allocation was done using the EPA's Intelligent Dasymetric Mapping toolkit with the only preset density being areas in the ancillary raster with non-residential buildings and away from buildings, which were set to 0. Population and occupied housing units were successfully allocated to 1-meter grids, resulting in respective counts per square meter.

This population density raster was then individually factored by the proportion of each census block associated in the Census and ACS data with a range of vulnerability indicators related to themes of poverty, education, access to health insurance, renter-occupied households, linguistically isolated households, country of origin at birth, and youth (see Figure 16. CVI model flow chart). Household metric rasters were then translated to population metric rasters by multiplying each by a "persons per household" raster (allocated total population divided by allocated households). This process results in a cell-by-cell population density for each factor, all of which are then summed together to indicate where vulnerability factors are compounded.

This compounded density is further factored by the BIPOC proportion of the total population for each census block, conceptually restricting the compounded data to its intersection with BIPOC communities. Allocated population densities of Black and Indigenous people are then added back again, effectively upweighting these groups in the index. Finally, the compounded, intersected, and upweighted density raster is generalized with a ½-mile focal statistics sum, and normalized between 0 and 1. See Figure 18 and the subsequent maps for the individual inputs, including disaggregated race/ethnicity distributions.

Suggested use

The most immediate recommended use for this data is to facilitate and focus initial efforts towards community engagement. By extracting the top 95th percentile and above from the CVI[12], we can map the highest concentrations of the region's "most vulnerable" communities, and design outreach and engagement strategies specifically for these communities. This results in 20 hotspots throughout the region (see Figure 28. CVI Top 95th Percentile), each of which will have its own unique and overlapping identities, and include community partners with different arrangements of impact and influence as charted on the Power Analysis exercise. Feature classes of this data will be included in the Equity Integration project dataset, but we emphasize that this extraction of the CVI is specific to the initial engagement planning, and it is not intended to represent all areas deserving of investment to redress systemic inequities. The continuous raster dataset (CVI) should be utilized for most other applications.

One method of further parsing out these multivariate identities would be to perform hierarchical cluster analysis to find statistically significant associations of the input vulnerability factors across the region or within focal engagement areas. This would be a valuable addition to our understanding of where and how different identities and vulnerability factors intersect.

In a more fundamental way, the Community Vulnerability Index is intended to be integrated into RHCWG's data and science practices, as recommended for Strategy Element A. It could be included as source data for the "Preliminary GIS Analysis" step of the Habitat Connectivity Toolkit, and used to evaluate the equity potential of any given HCZ, or to compare between different site-specific actions for prioritization of investments. However, it is unlikely that the highest values in the CVI will be found within HCZs as modeled, because population density and existing high quality habitat are generally inversely correlated. A model that incorporates connectivity potential given hypothetical habitat creation and restoration within developed areas could utilize CVI to build corridors with the most co-benefit to marginalized communities.

12 The CVI raster was preprocessed before calculating percentile values by setting as null all 0 values and values <0.005, which were plentiful in the parts of the region with little to no population. This gives summary statistics such as percentiles more meaning, since the dataset is restricted to values that are significant for the purposes of understanding the distribution of vulnerability indicators.

Model Flow Chart

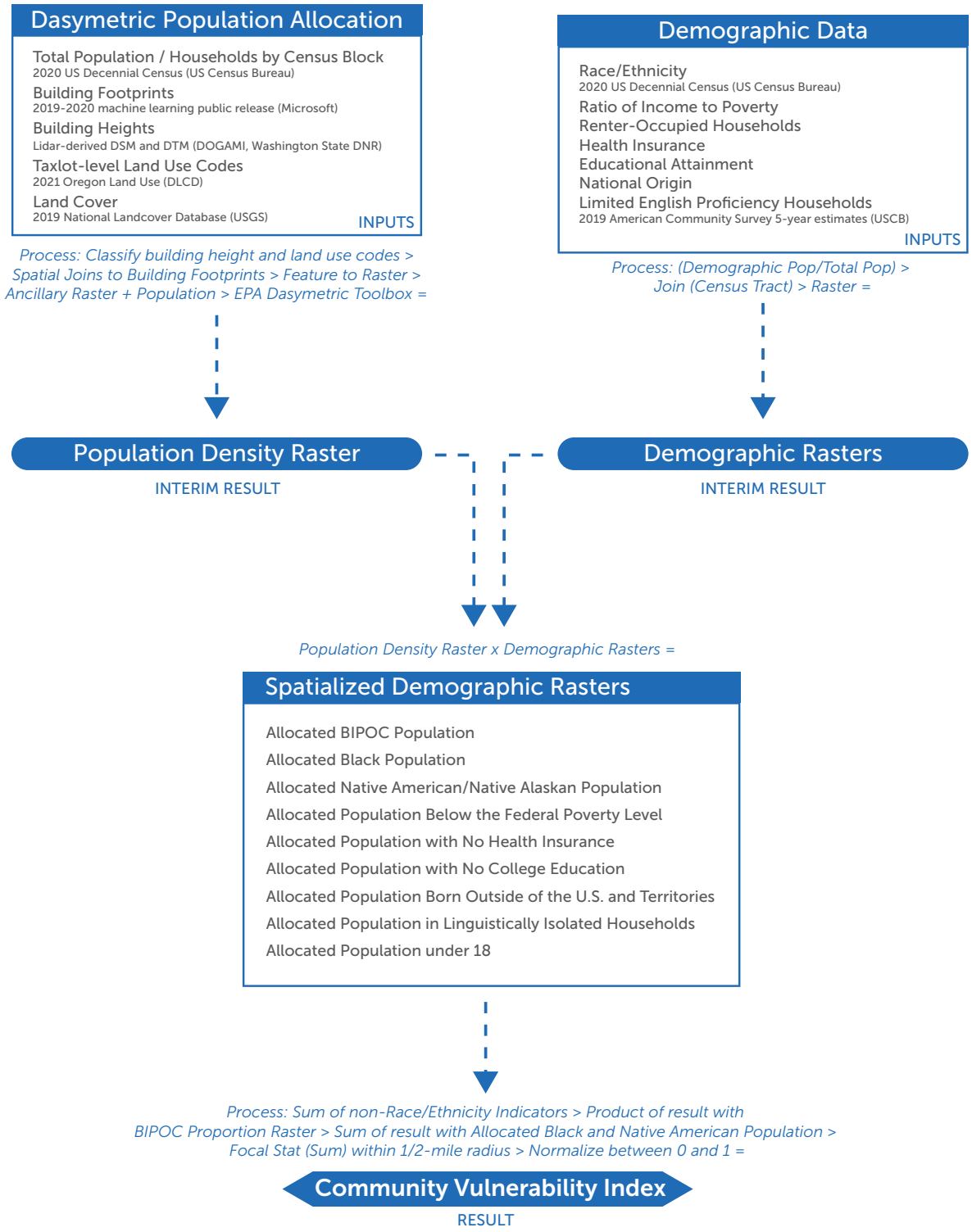


Figure 16. CVI model flow chart
Conceptual model of the final Community Vulnerability Index (BIPOC Intersectional / Black & Indigenous Upweighted)

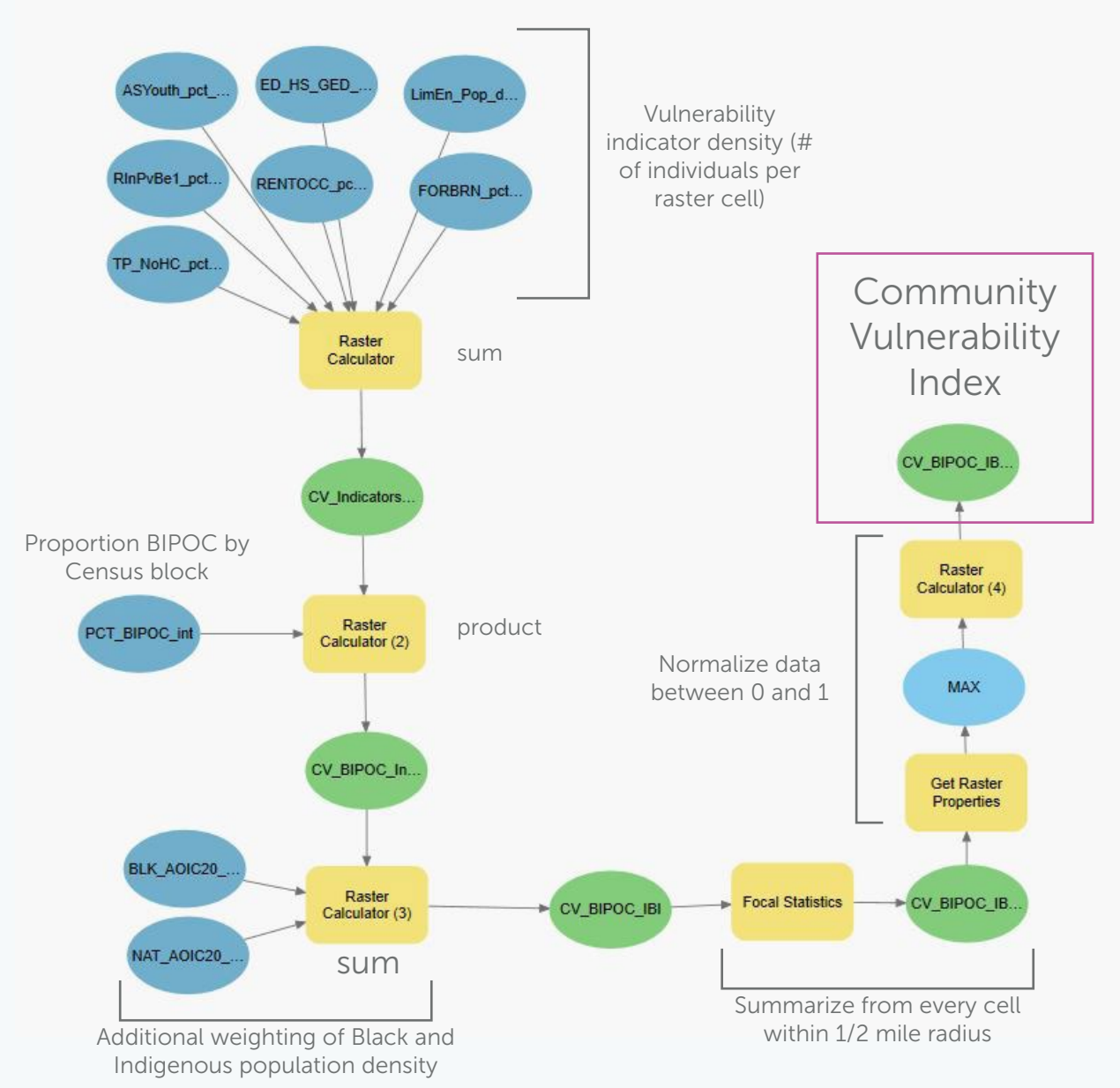


Figure 17. Final CVI indexing model
Describes how inputs were combined and indexed for the final Community Vulnerability Index (BIPOC Intersectional / Black & Indigenous Upweighted)

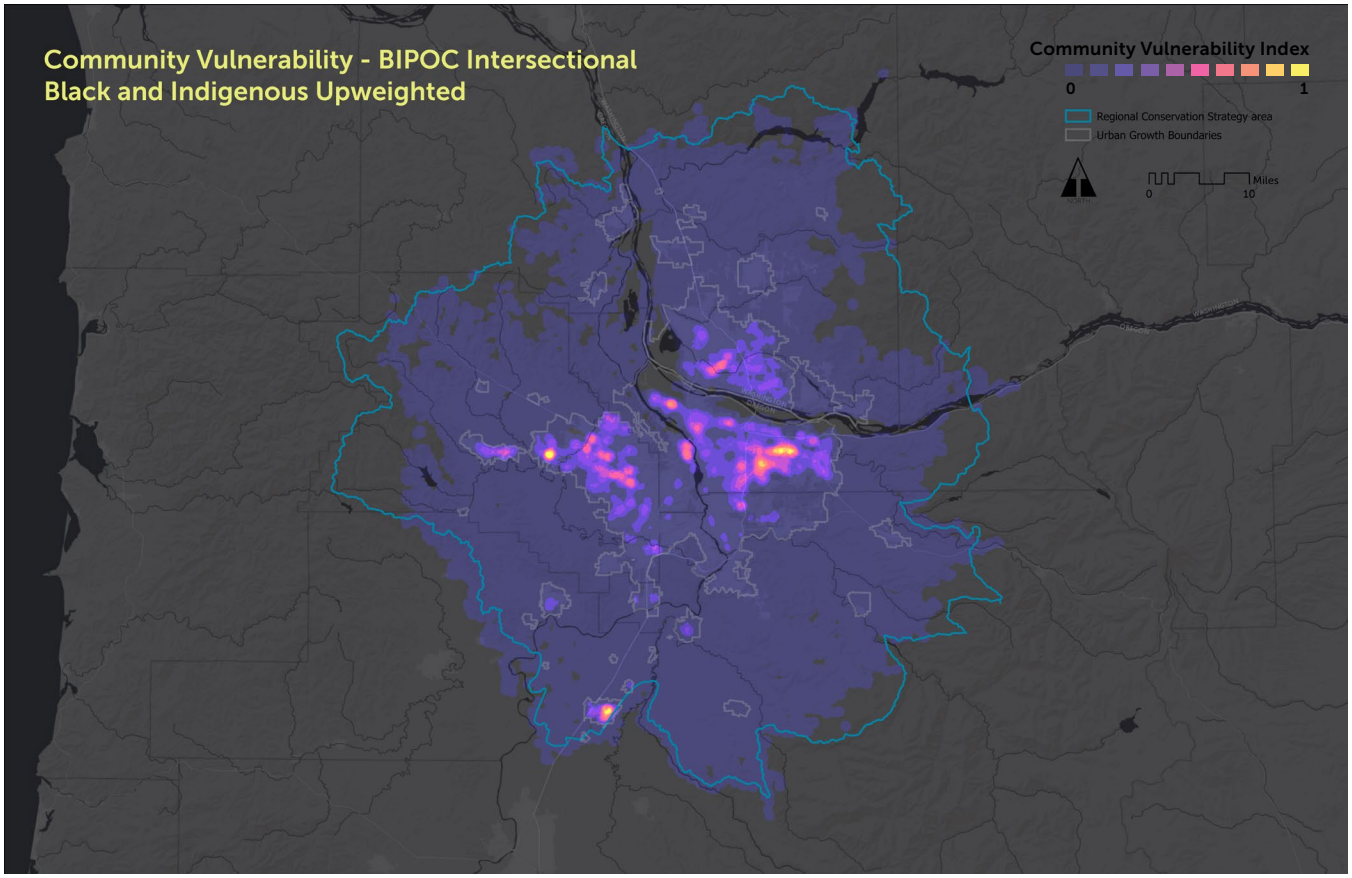


Figure 18. The Community Vulnerability Index

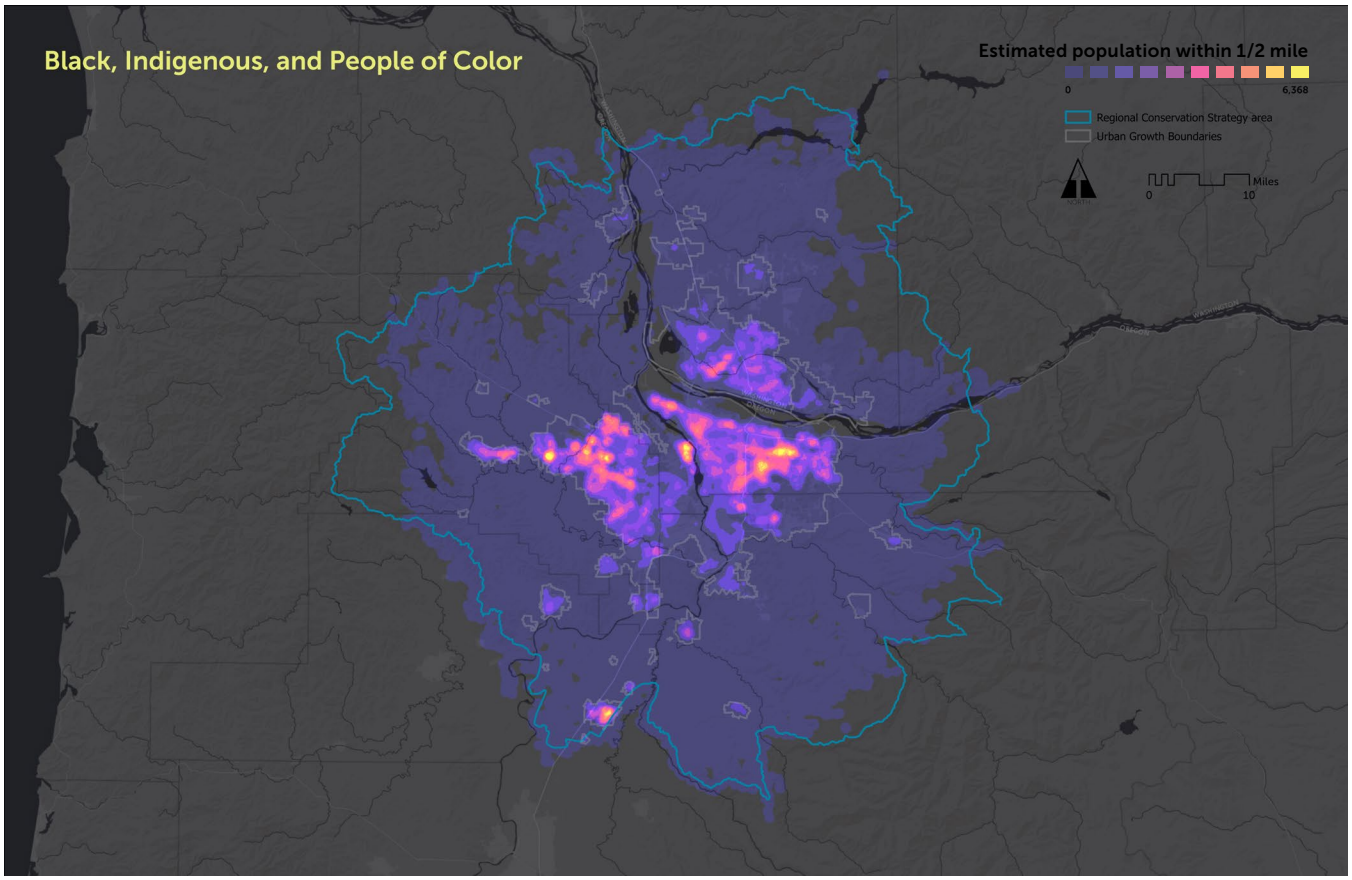


Figure 19. BIPOC residents

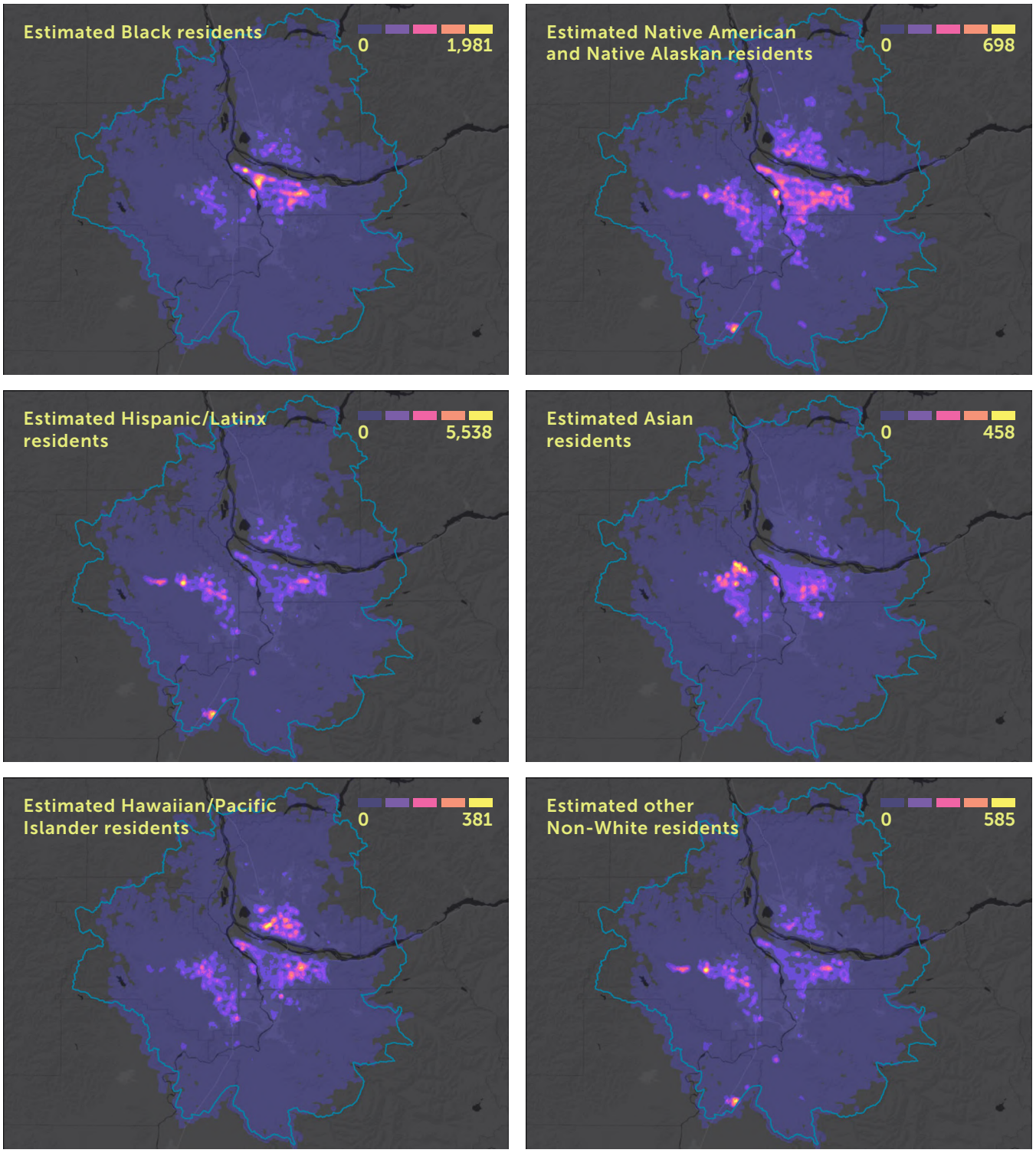


Figure 20. Residents by disaggregated race/ethnicity
Population counts within 1/2 mile are inclusive of identification with any other races/ethnicities

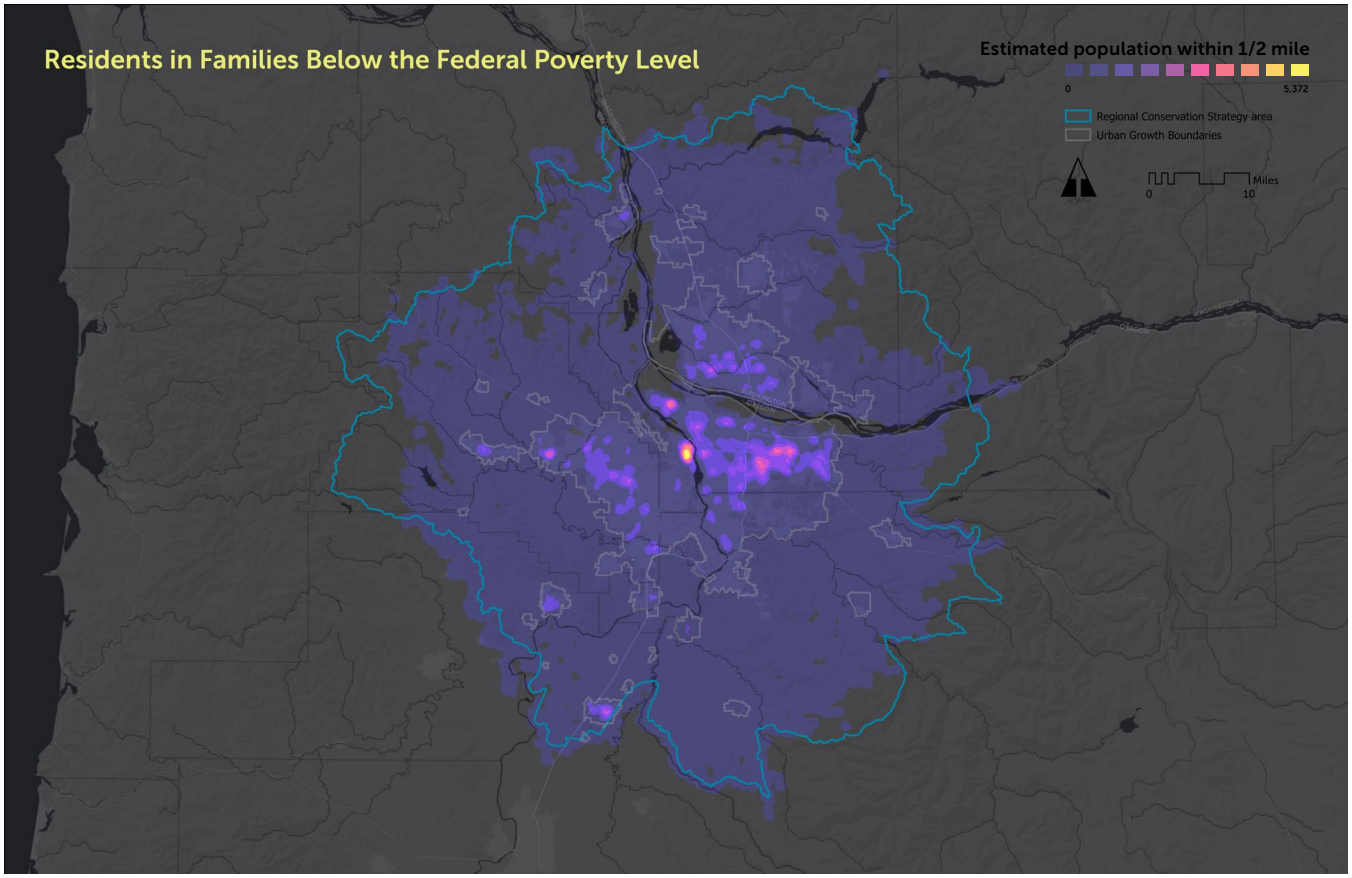


Figure 21. Residents in families below the Federal Poverty Level

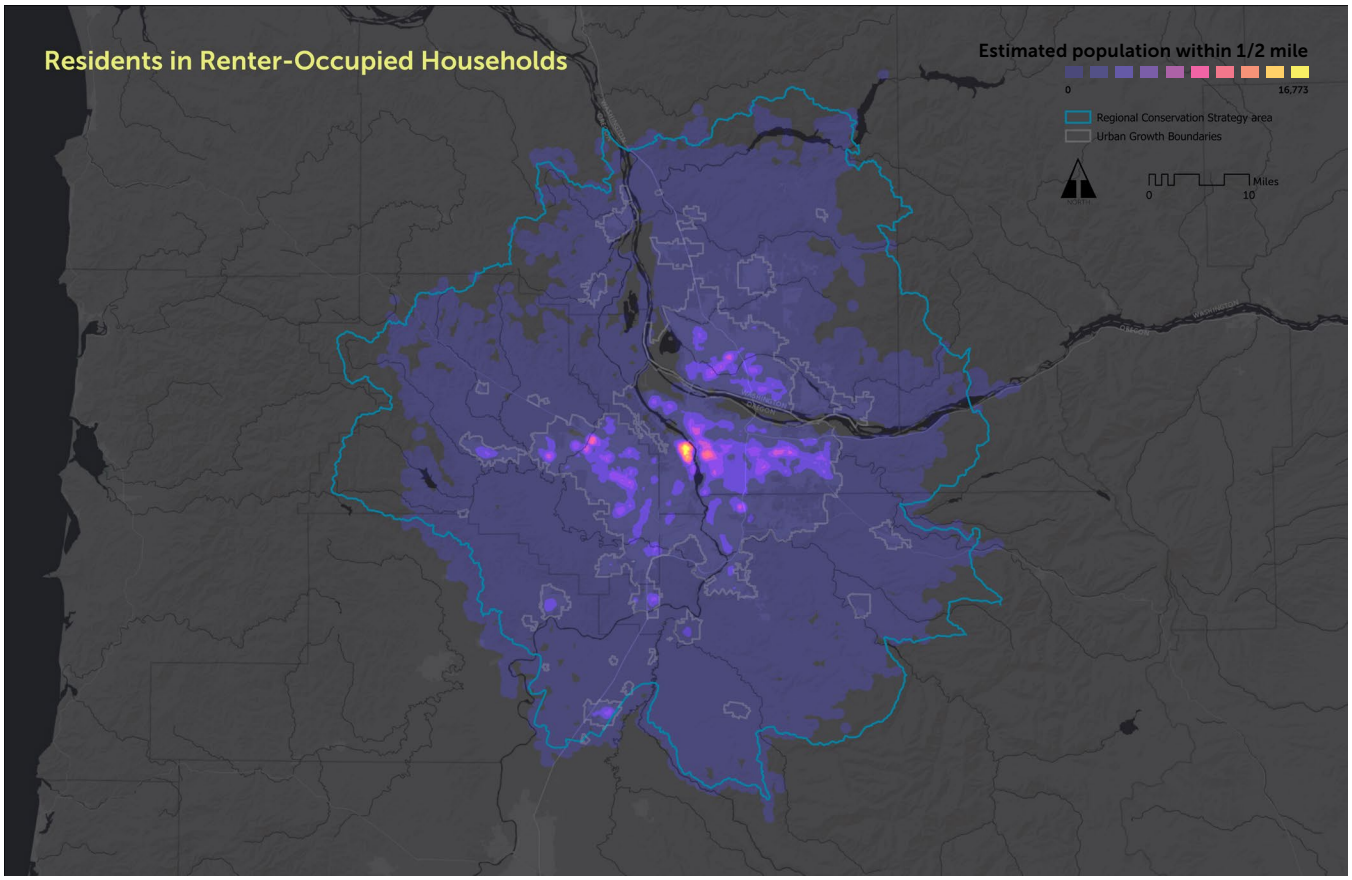


Figure 22. Residents in renter-occupied households

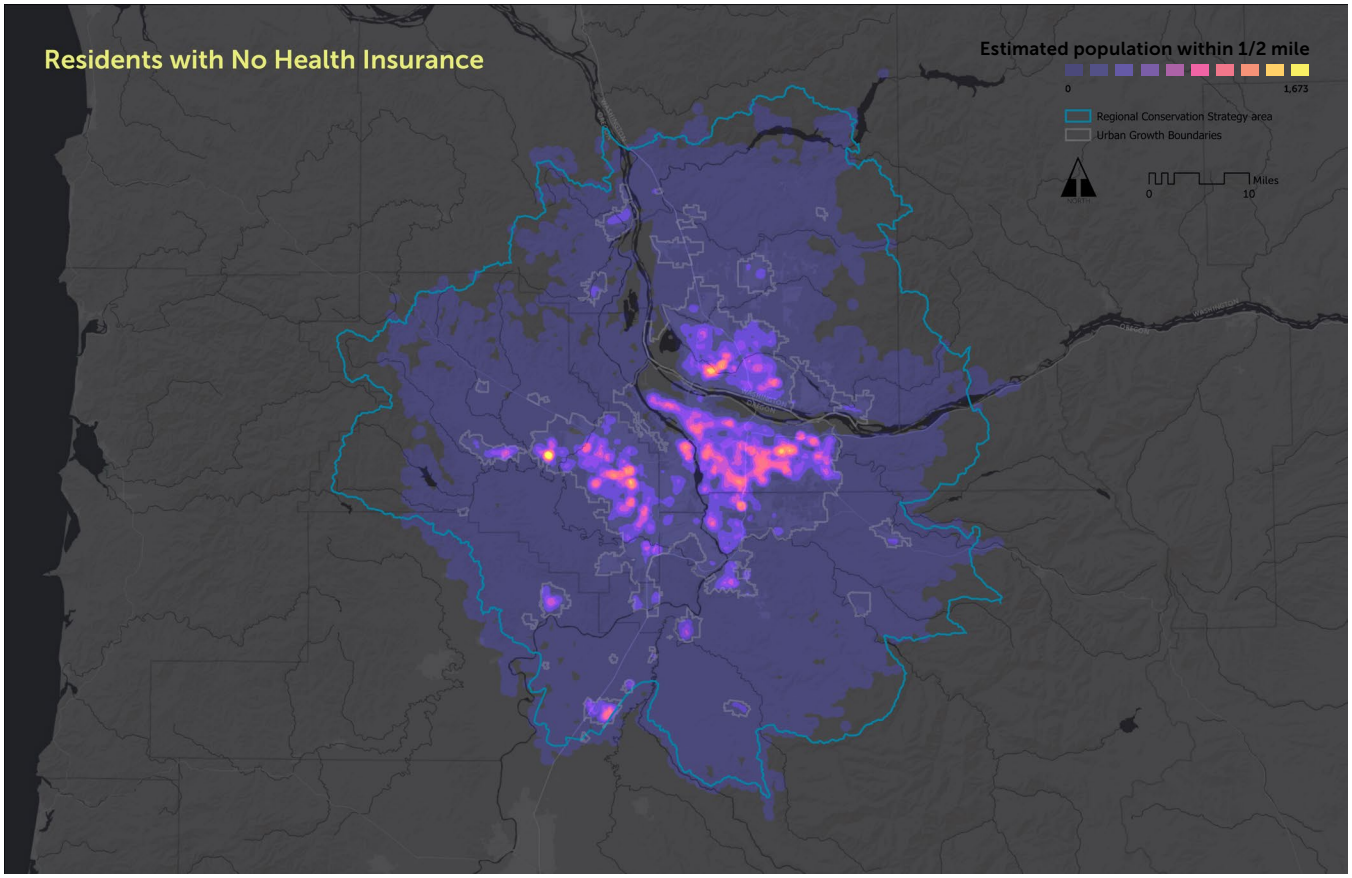


Figure 23. Residents with no healthcare insurance

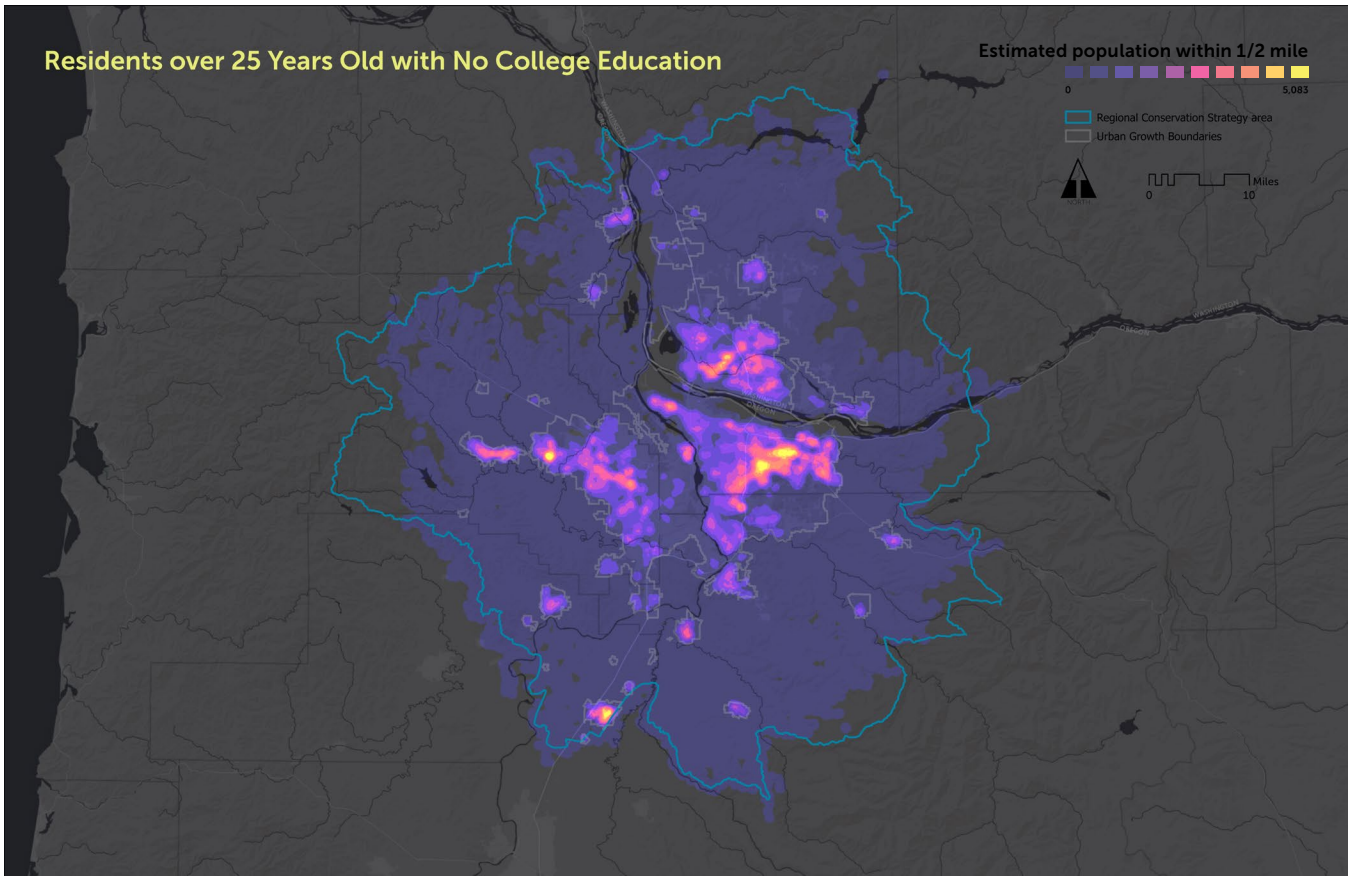


Figure 24. Residents without higher education
Allocated distribution of residents over 25 years of age with a high-school/GED education or less.

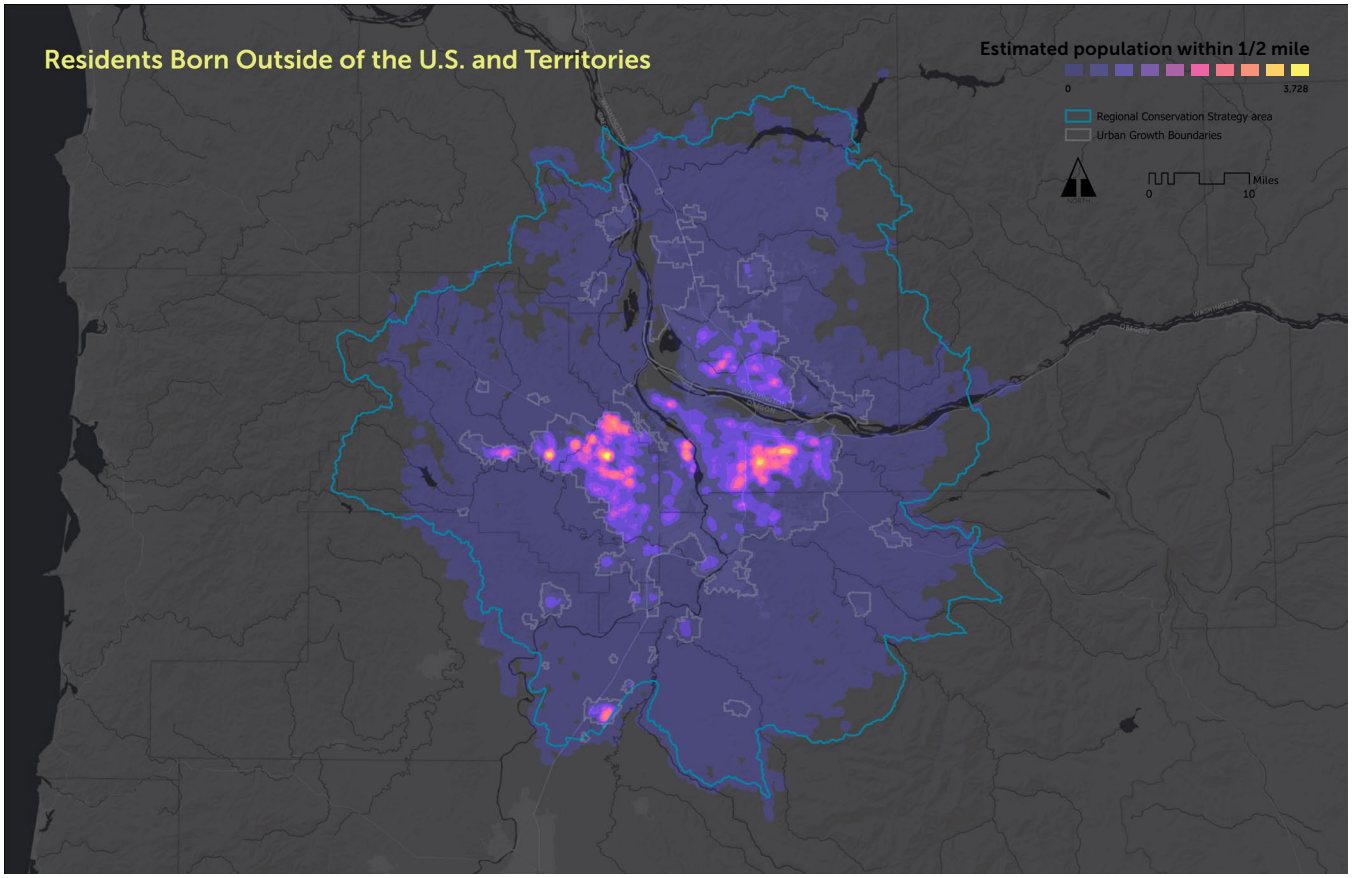


Figure 25. Residents born outside of the U.S
Does not include citizens born abroad. In effect, the distribution of first-generation immigrants.

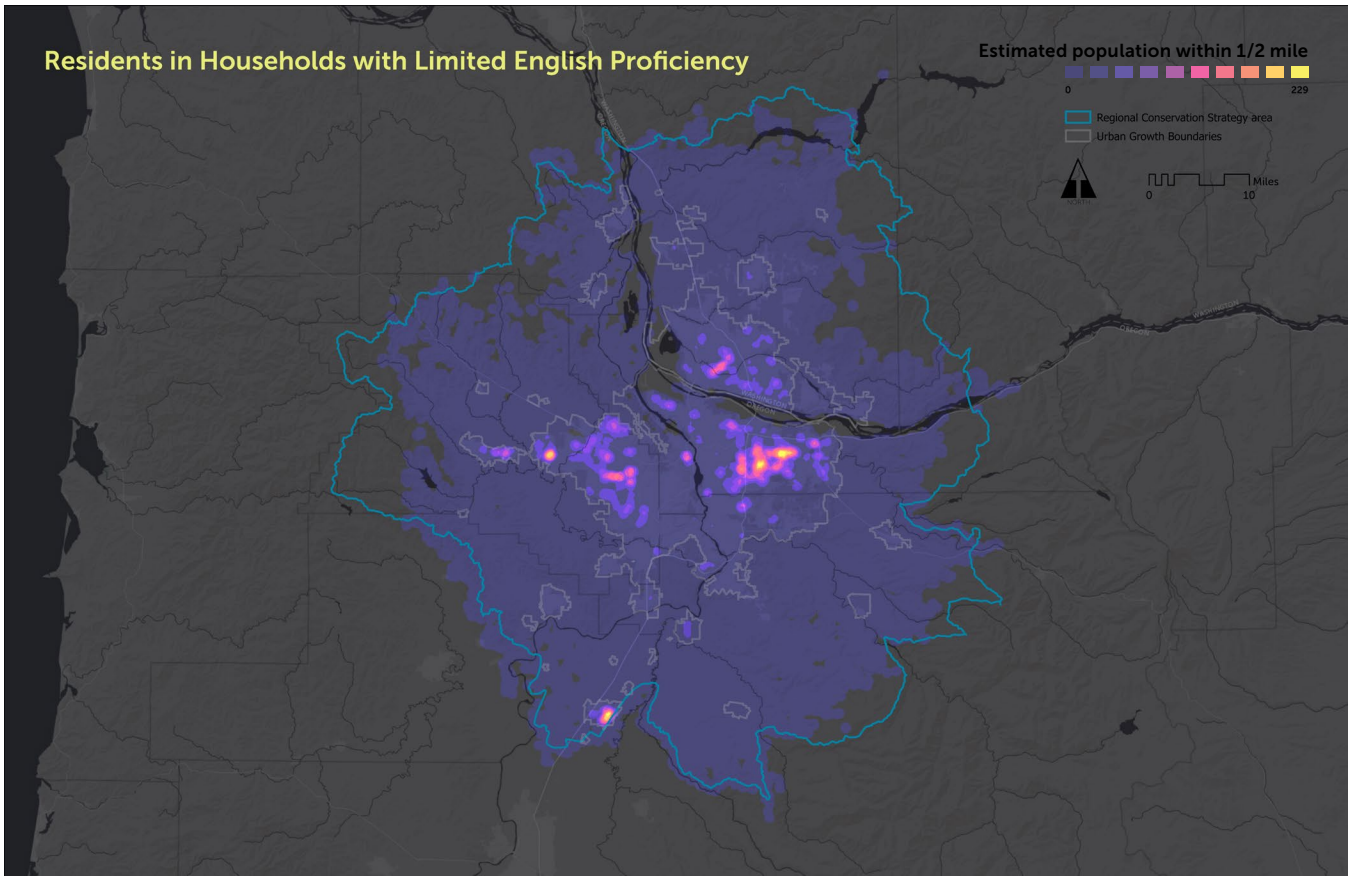


Figure 26. Residents in linguistically isolated households

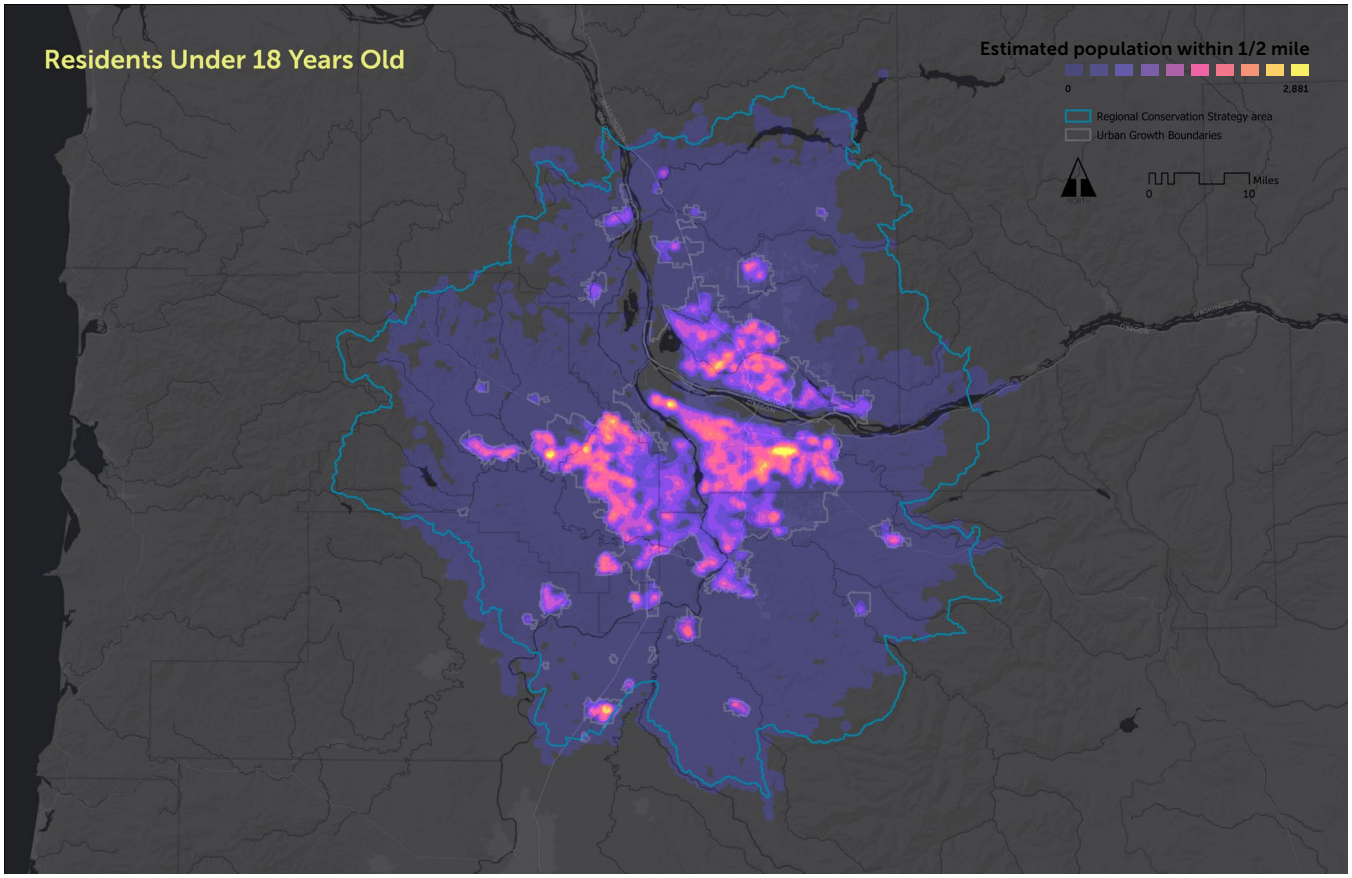


Figure 27. Residents under 18 years old

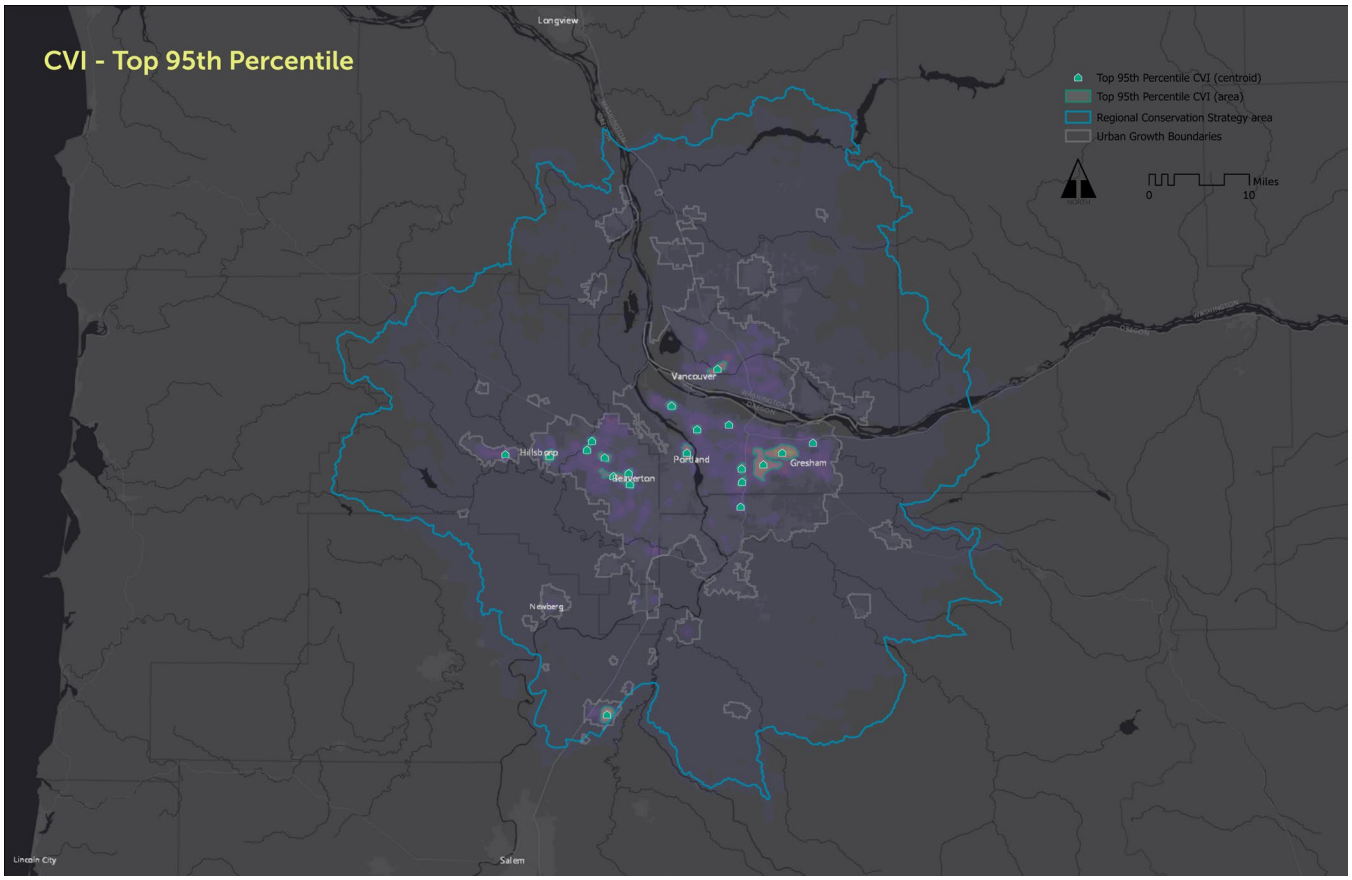


Figure 28. CVI Top 95th Percentile
Centroid point and area polygon features representing the top 95th percentile of the CVI, when bodies of water and areas with values <0.005 are removed from the data.

Appendix 5. Oregon's Racist History Timeline

Compiled from various sources. See footnote for references.

8,000 BCE (Before the Common Era). The first record of ancient human activity in Oregon came from archaeologist Luther Cressman's 1938 excavations at Fort Rock Cave in Central Oregon. He used radiocarbon dating to determine the age of 10,000-year-old sandals now on display at the University of Oregon Museum of Natural and Cultural History in Eugene

7,300 BCE. A 9,300 year-old nearly complete skeleton found on the banks of the Columbia River on the Washington-Oregon border in 1996 was dubbed the Kennewick Man. Battles between Indian Tribes and scientists for jurisdiction over the skeleton spawned lengthy court battles between dominant culture scientists and Indian tribes beliefs and religion.

1543. Spanish explorers sight the Oregon Coast north of the forty-second parallel near the Rogue River.

1792. Captain Gray and crew entered the Columbia River and named it. This expedition gave the U.S, claim to the Oregon Territory. Marcus Lopez, cabin boy of Captain Robert Gray, became the first person of African descent known to have set foot on Oregon soil. He was killed by Indians near Tillamook.

1805. York (William Clark's body servant—slavery's version of a valet) came west with Lewis and Clark's Corps of Discovery. The group was aided by a Shoshone woman, Sacajawea, in their travel to explore and document the Pacific Northwest. Their mission was part of U.S. expansion plans for the Louisiana Purchase and beyond. The southern and western boundaries of this land deal were undefined at the time. The journey supported the country's sense of "manifest destiny": the belief that the U.S. was justified and in fact ought to occupy and rule land from the Atlantic to the Pacific.

1844. Acts to prohibit slavery and to exclude Blacks and Mulattoes from Oregon were passed. The infamous "Lash Law," required that Blacks in Oregon – "be they free or slave – be whipped twice a year until he or she shall quit the territory." It was soon deemed too harsh and its provisions for punishment were reduced to forced labor.

1848-1879. Three decades of continuous conflict between whites and Indian tribes started with the Cayuse War continuing until the region's Indian tribes were forced onto and confined to reservations. Anson Dart, Oregon Territory's first Superintendent of Indian Affairs organized reservations on remote, semiarid land east of the Cascades. Tribes of the coast and Willamette Valley balked at the move. Efforts to obtain reservation land west of the Cascades ran afoul of the Oregon Donation Land Claim Act. It sanctioned homesteading without regard for the legal obligations to Indian titles to the land. Only a few remote parcels of land not yet encumbered by white claims were procured as reservation land.

1850. The Oregon Donation Land Act was enacted by the U.S. Congress to promote homestead settlement in the Oregon Territory; swelling the ranks of emigrants on the Oregon Trail. It granted

free land to “Whites and half-breed Indians” in the Oregon Territory. (The language of the act prevented non-Whites from claiming land in Oregon even if they had already settled here whether they had previous deeds to the land or not.)

Mid 1850’s Mexican mule packers dominated the overland trade routes between northern California and Southern Oregon. They supplied the Second Regiment Oregon Mounted Volunteers during the Rogue River Indian Wars. They played a very valuable role in communication and transportation of supplies.

1856. Rogue River Indian Wars ended with the surviving Native Americans sent to two newly created reservations: the Siletz and the Grand Ronde.

1857. Oregon residents voted against slavery but in favor of excluding “free Negroes” from the state. The state’s African American population faced either leaving the state or suffering southern-style segregation well into the 20th century. Meanwhile, a new exclusion law was added by popular vote to Oregon Constitution’s Bill of Rights.

1860’s: Large numbers of Asians, primarily Chinese, began to arrive mostly to mine and construct railroads. 1860’s Mexican miners joined the Oregon Gold Rush. One of the important technologies they brought with them was the Arrastre, a large but inexpensive, stone device for crushing quartz to remove the gold.

1862. Oregon adopted a law requiring all Blacks, Chinese, Hawaiians (Kanakas), and Mulattos (an archaic term referring to people of mixed ethnic heritage) residing in Oregon to pay an annual tax of $5. If they could not pay this tax, the law empowered the state to press them into service maintaining state roads for 50 cents a day. Also, interracial marriages were banned in Oregon. It was against the law for whites to marry anyone ¼ or more Black.

1866. Oregon banned all interracial marriages. The state’s ban on interracial marriages was extended to prevent whites from marrying anyone who was ¼ or more Chinese, or Hawaiian, and ½ or more Native American. It was previously illegal for whites and Blacks to marry.

1868. The Fourteenth Amendment, endowing African Americans with citizenship, passed in Oregon and throughout the county. A clause in the 14th Amendment, “excluding Indians not taxed”, prevented Native American men from receiving the right to vote. Though this amendment established full citizenship rights for people of Mexican heritage born in the U.S., often the Indian heritage of Mexicans was used to exclude and deny them rights.

1877. Nez Perce War was an armed conflict that pitted several bands of the Nez Perce tribe against the US Army. The conflict stemmed from the forced removal of the Nez Perce from ancestral lands win Wallowa Valley in Eastern Oregon. The war ended after a final five-day battle. The 418 Nez Perce who surrendered, including women and children were taken prisoner and set by train to Fort Levenworth,Kanasas. Chief Joseph gave his famous “I Will No Longer Fight Forever More” speech. Valley in eastern Oregon to white settlement. Idaho.

1879.Chemawa Indian Boarding School opened in Salem, Oregon as the third such boarding school in the nation. These schools were designed to assimilate Indian children into white culture and teach them vocational skills. Students were prohibited from speaking their tribal languages or practicing any of their traditional customs or culture. (This Indian School still operates in Salem, but without the extreme notions of assimilation of its original intent.

1882. Ignoring the crucial role Chinese immigrants played in constructing the infrastructure of the West, Congress passed the Chinese Exclusion Act. It suspended further Chinese immigration until

1884. The Oregon statewide railroad system was completed connecting all regions of the state. Oregon remained relatively isolated until this completion of the railroad network. The Central Pacific's Chinese immigrant workers received $26-$35 a month for a 12-hour day, 6-day work week and had to provide their own food and tents. White workers received about $35 a month and were furnished with food and tents. Chinese immigrant workers saved as much as $20 a month which many eventually used to buy land. The earned a reputation as tireless and extraordinarily reliable workers. 12,00 of the Central Pacific railroad's 13,500 employees were Chinese immigrants.

1892. It also made all Chinese immigrants ineligible for citizenship and barred them from several professions including mining.

1888. In a trial in Enterprise, Oregon, three men were acquitted of murder for the massacre of at least 34 Chinese gold miners. The ring-leaders fled the area and were never tried. Unknown is how much gold the gang might have plundered. Rumors put the figure from $3,000 to more than $50,000. The trial attracted little attention from the press, and Wallowa County folks swept the sordid saga under the carpet for more than a century. In 1995, a county clerk opened an old safe in the Wallowa County Courthouse and found a long-secreted cache of documents relating to the massacre.

1903. The Advocate started as a weekly newspaper for the "intelligent discussion and authentic diffusion of matters appertaining to the colored people, especially of Portland and the State of Oregon." It featured birth and death announcements, society news, and general good news about African Americans. Articles and editorials about segregation, lynching, employment opportunities and other issues helped keep the realities of "Jim Crow" laws and the pressing need for civil rights on the local, state, and national agenda. The newspaper challenged attempts to deprive black people of their rights, to deny Blacks their humanness, and to degrade their African cultural heritage.

1910. Oregon ranked 7th among states outside the Southwest with Mexican born migrant workers. Between 1910 – 1925, Mexican workers were contracted to work on sugar beet farms and on railroads. Farm workers marked the first Mexican families to settle permanently in the state. Oregon's agriculture relied on the large number

1914. The Portland chapter of the NAACP, the oldest continually chartered chapter west of the Mississippi River, was founded.

1917. The first Bracero program was an exception to U.S. immigration law. With “Food to Win the War” as a motto, farmers and railroads persuaded the U.S. Department of Labor to suspend until 1921 the head tax and literacy test for Mexican workers. These laborers were offered contracts to work in agriculture for up to 12 months. Many of these first Braceros did not return to Mexico as scheduled. There was not Border Patrol to regulate immigration until 1924. Some U.S. employers did not pay Braceros the wages promised so they had no money to fund their return trip.

1919. Portland Board of Realty approved a “Code of Ethics” prohibiting realtors and bankers from selling property in white neighborhoods to people of color or providing mortgages for such purchases.

1920s. In Bend there were at least 350 registered members of the KKK who regularly staged public rallies and parades through the main streets of downtown. E. D. Gilson, the former Mayor of Bend (1921-22), was at one time the local Exalted Cyclops, or chief officer, of the Klan. On multiple occasions in the 1920s hooded Klansmen set crosses ablaze on the top of Pilot Butte broadcasting their message of white supremacy to all of Central Oregon.

Oregon became the home to the largest KKK organization west of the Mississippi River with over 30,000 sworn members in fifty different chapters across the state. Prominent chapters were located in Portland, Lane County, Roseburg and southern Oregon.

1923. An Oregon WWI veteran was denied U.S. citizenship. The U.S. Supreme Court unanimously ruled that Bhagat Singh Thind could not be a naturalized citizen. Anthropologists defined people of India as belonging to the Caucasian race. A previous ruling had affirmed that immigration law referring to “white" meant “Caucasian” as it applied to denying citizenship to light skinned Japanese immigrants. In this case, Justice Sutherland argued that the "common man's" definition of “white” did not correspond to all "Caucasians". Even though Indians were considered “Caucasian” they were not “white”. Therefore, they could not be naturalized. Thus, the color of skin became the legal qualification for citizenship.

1926 – 27. Oregon repealed its Exclusion Law, which barred Blacks from the state, by amending the state constitution to remove it from the Bill of Rights. The Oregon Constitution was finally amended to remove a clause denying Blacks the right to vote and eliminating restrictions that discriminated against Black and Chinese voters.

1935. Oregon Law officially segregated Mexican students on the basis of being of Indian descent. It made clear to exempt “White Mexicans” those fair-skinned descendants of the Spaniards who do not have “Indian blood”.

1940. During WWII Oregon's African American population grew substantially – in Portland increasing from 2,565 in 1940 to 25,000 in 1944. Over 7,000 "non-white" workers were employed in the Portland shipyards. Although Kaiser had promised good jobs in the shipyards, local unions resisted integration. Many help-wanted notices specified "white only." After pressure from NAACP, the Kaiser Brothers, a federal inspection team and a reprimand from President Roosevelt, the unions compromised. More skilled jobs were opened to Blacks, but only for the duration of the war. Blacks were allowed to work in union-controlled shops and paid union dues but were denied union benefits. To accommodate the influx of workers, a new town was built in the lowland area adjacent to the Columbia River just north of Portland. First called Kaiserville and then Vanport, it was the world's largest housing project with 35,000 residents making it the second largest community in Oregon. With this rise in diversity in populations came signs throughout Portland: 'We Cater to White Trade Only."

1941. Residents of southern Oregon and northern California proposed creation of a new state, Jefferson. A group of young men gained national media attention when, brandishing hunting rifles for dramatic effect, they handed out copies of a Proclamation of Independence. It stated that the state of Jefferson was in "patriotic rebellion against the States of California and Oregon" and would continue to "secede every Thursday until further notice."

1942. After the attack on Pearl Harbor, all persons of Japanese heritage living in the western portion of Oregon (and all western states) were forced to move to camps by the Wartime Civil Control Administration. More than 4,500 Japanese Americans from western Oregon were sent to internment camps: 2/3 were American citizens.

1945. The former internees who did trickle back to their old homes were often met with open hostility by white neighbors. Some found their homes looted and their orchards vandalized while others endured boycotts of their fruits and vegetables or heard racial slurs or threats. A few were assaulted physically. Along with the many instances of blatant racism, intimidation, and hatred, some Oregonians welcomed and supported the returning Japanese Americans.

1948. On Memorial Day, a Columbia River flood left 39 people dead and obliterated all of Vanport. It had become a declining settlement as war-time workers were replaced and non-whites were encouraged to leave the area. They were not needed for the war effort. There was no direct action taken by Portland's Housing Authority to resettle flood victims as patterns of segregation were reinforced. Most displaced Blacks were forced to congregate in the Albina section of town or left they Portland area. There were no places to live and no more well-paying jobs now that WWII was over.

1954. Congress terminated federal aid granted by treaties with 109 tribes, dissolving the Klamath, Grand Ronde and Siletz reservations and sanctioning the selling of their tribal lands.

1956. Albina displaced. Voters approve construction of Memorial Coliseum in the Eliot neighborhood, resulting in the teardown of more than 450 Albina homes and businesses. At the time, four out of five people in this thriving, close-knit community are Black. Many are former inhabitants of Vanport because redlining policies limited where they could live. This same year, federal officials also approve highway construction funds that would pave Interstates 5 and 99 through South Albina, destroying more than eleven hundred homes.

1957. The mighty and picturesque Celilo Falls on the Columbia River east of The Dalles was destroyed with the construction of The Dalles Dam. The falls and a way of life for Indian tribes who had fished there for millennia disappeared. After 11,000 years, the oldest continuously inhabited community in North America ceased to exist.

1957. Lawmakers passed the Oregon Fair Housing Act, barring practices that had discriminated against African Americans in buying and renting places to live. This law made it illegal for property owners or their agents receiving any public funding to discriminate “sole because of race, color, religion or national origin.”

1964. The Civil Rights Act of 1964 outlawed unequal application of voter registration requirements. It also prohibited racial segregation in schools, in the workplace and by facilities that served the general public ("public accommodations.") It invalidated the “Jim Crow” laws, but attitudes and behaviors did not change just because of this federal law.

1965. Busing of African American students began in Portland as the major means to desegregate schools.

1967-69 Racial tensions escalated into riots in Portland’s African American communities. July 30, 1967. A political rally releases the frustrations of Black youth in Portland’s Albina neighborhood and the streets explode in an urban uprising, sparked by discontentment with treatment by the police. Between two and three hundred people throw bottles and rocks at cars, while a few hurl firebombs through store windows, causing $20,000 in damage at one grocery store and damaging dozens of others. On the first day of the Albina riot, Detroit, Michigan, also experiences devastating race riots that claim forty-one lives and cause damage estimated at more than $500 million. Another riot in the same Portland neighborhood happens in 1969.

1969. Kent Ford and others establish the Portland chapter of the Black Panther Party, with support from Reed College students. The Panthers run a free children’s breakfast program for five years, feeding up to 125 children a day. They operate the Fred Hampton Memorial People’s Health Clinic, which grows to twenty-seven doctors and becomes one of the longest-running Panther health clinics in the country. In 1970, they founded the Panther Dental Clinic. Portland Panthers experience the same targeting by law enforcement as Panthers nationally, and members of the Portland Panthers face multiple false arrests and trials.

1970's.Though no current concrete evidence that "Sundown Laws" existed on the statute books has been found in Oregon, there is a rich oral history. It describes signs and attitudes throughout Oregon well into the 1970's that warned Blacks and other People of Color to be out of town by sundown. James Loewen's book, Sundown Towns: A Hidden Dimension of American Racism, documents this practice throughout the United States.

Mid 1970's. Oregon Indian Education Association was formed. OIEA works to update and help implement the Oregon American Indian/Alaska Native Education State Plan. OIEA continues to help formulate state policy to eliminate stereotypical Native American mascots in Oregon public schools and keep native languages and cultures alive.

1972. Emmanuel Hospital Expansion. The Black community protests the expansion of Emanuel Hospital, funded by federal money earmarked for urban renewal. The expansion demolishes nearly three hundred homes in North Portland. Residents are given ninety days to move. Homeowners are compensated with a maximum $15,000 payment, and renters receive $4,000. The federal construction funds run out after the homes are demolished but before construction is finished. The expansion takes decades to complete.

1981. Two police officers dumped dead opossums at an African American-owned restaurant in Portland. The incident evoked ugly KKK imagery and touched off one of the most contentious disputes between police, city government and the public. Community protests result in two of the officers being fired, but the officers are hired by the police union. 1000 police and supports march in a "cops have rights too" rally. As a result, a citizen's committee to review police actions in Portland was created.

1982-84 Congress restored the Cow Creek Band of the Umpqua Tribe, Confederated Tribes of Grand Ronde Indian Community and Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians to federally recognized status. Most of the Tribal Lands were sold off earlier and were not returned or compensated.

1988-90. A 28-year-old Ethiopian student and father, Mulugeta Seraw, was fatally beaten in Portland by three racist skinheads. Mulugeta Seraw's father and son, represented at no cost by the Southern Poverty Law Center and the Anti-Defamation League, successfully filed a civil lawsuit against the killers and an affiliated organization. They won a civil case against White Aryan Resistance's operator Tom Metzger and his son John Metzger for a total of $12.5 million. The Metzgers declared bankruptcy, WAR went out of business and Metzger lost his home and went on welfare.

1990 — 1999. Gentrification in Albina. In response to complaints of neighborhood activists and the recommendations of a citywide task force report on abandoned housing, the City of Portland begins revitalizing the Albina neighborhood, using building code enforcement to confront the extreme level of housing abandonment. Whites buy homes, displacing many low-income Black families to relatively far-flung areas where they can afford the rents. By 1999, Blacks own 36 percent fewer homes in the neighborhood than a decade prior, while whites own 43 percent more.

1990. In Employment Div., Dept. of Human Resources of Oregon v. Smith, several members of the Native American Church lost their jobs and subsequently were denied unemployment benefits by Oregon because they tested positive at drug screenings after participating in religious use of peyote. The Supreme Court refused them First Amendment protection. Justice O'Connor in the dissenting opinion explained that “the First Amendment was enacted precisely to protect the rights of those whose religious practices are not shared by the majority and may be viewed with hostility."

1995. The Chicano/Latino Studies Program was established at Portland State University.

1995. CAUSA, Oregon Immigrant Rights Coalition was formed.

2000. Oregonians finally voted to remove all racist language from its constitution which still had a clause that read: “No free Negro or mulatto, not residing in this state at the time of the adoption of this constitution, shall come, reside or be within this state or hold any real estate. “ Though this and other discriminatory language was rendered unenforceable by federal laws and amendments to the U.S. Constitution, it was not until this election that removal of several examples of institutional racism and oppression was taken out of the Oregon Constitution.

2000-2009. Portland Police killings of Black people. Aaron Campbell, Byron Hammick, Kendra James, Jason Spoor, Lesley Paul, Scott Steward, Dupree Carter, Marcello Vaida, Tyrone Waters, Bruce Browne, Dwayne McClinton, James Perez and Vernon Allen are all Black Portlanders killed by PPB.

2010-2019. Keaton Otis, Aaron Campbell, Kevin Moffat, Darris Johnson, Denorris McClendon, Quanice Hayes, Terrell Johnson, Patrick Kimmons, and Andre Gladden are all Black Portlanders killed by PPB.

2008. Oregonians defeated Measure 58 that would have effectively banned all programs that support bilingualism for English language learners. It would have mandated students enroll in (undefined) “English immersion classes” for one to two years. After this time, the student would be prohibited by law from receiving instruction in any other language, regardless of the student’s, parent’s or teacher’s choice. The initiative exempted classes which “teach English speaking students a foreign language,” creating the possibility of an alarming inequality in state education policy.

2008. OSAA lists 16 Oregon high schools with mascots that many Indians feel ridicule their heritage.: Aloha High School: Warriors, Amity High School: Warriors, Banks High School: Braves, Chemawa Indian School: Braves, Lebanon High School: Warriors, Mohawk High School: Indians, Molalla High School: Indians, North Douglas HS: Warriors, Philomath High School: Warriors, Reedsport High School: Braves, Rogue River HS: Chieftains, Roseburg High School: Indians, Scappoose High School: Indians, Siletz Valley School: Warriors, The Dalles Wahtonka HS: Eagle Indians, Warrenton High School: Warriors. OSAA has no regulatory authority. Only the Oregon Department of Education can address this issue.

2009. To celebrate Oregon's 150th birthday, the Oregon Library Association selected the book, Stubborn Twig, about a Japanese American family in Hood River, for the statewide Oregon Reads program. The Oregon Library Association wanted to bring focus on and stimulate dialogue and study of Oregon's racial and immigration history.

2011. Housing Discrimination Audit. Portland housing audit finds discrimination in 64% of tests, African American and Latinos are quoted higher rents and deposits, given additional fees, not offered applications or often shown inferior units.

2014. The US Department of Justice opens an investigation on PPB's excessive use of force. The settlement agreement to the Police Bureau's use of force policy, training, response to people in mental health crisis and community oversight.
2017-2019. Unite Oregon and partners pass HB2355, requiring law enforcement agencies keep detailed records about the race, ethnicity and gender of traffic stops.
2019 data shows Portland Police searched African Americans at more than twice the rate of white motorists and pedestrians during a 12-month period.

2016. On January 2, 2016, an armed group of far-right extremists seized and occupied the headquarters of the Malheur National Wildlife Refuge in Harney County and continued to occupy it until law enforcement made a final arrest on February 11, 2016. Their leader Ammon Bundy, who participated in the 2014 standoff at his father's ranch in Nevada. Other members of the group were loosely affiliated with non-governmental militias and the sovereign citizen movement.

2019. An analysis of the adult criminal justice system in Multnomah County shows:
- Black people in Multnomah County are still 8.3 times more likely than whites to be in jail pending trial
- Black people are 4.8 times as likely as whites to have a case prosecuted
- Black people are 4.6 times as likely as whites to have a case resulting in conviction

2020. Southern Oregon wildfires raze close knit Latino community and thousands face housing crisis. The wildfire displaced thousands of community members, many of them Latino.

Sources:

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Forward Together presentation "Oregon Black History and Policing Timeline" https://forwardtogether.org/about-us/

9/2021

Anita Yap
MultiCultural Collaborative
Www.multiculturalcollaborative.com

Appendix 6. Racial Equity Lens Resources

- RHCWG Justice, Equity, Diversity and Inclusion Statement of Intent
- Metro equity planning documents

  Strategic Plan to Advance Racial Equity, Diversity and Inclusion
  https://www.oregonmetro.gov/equity-strategy-0

  Equity Baseline Report 2015
  https://www.oregonmetro.gov/sites/default/files/2015/12/31/Equity%20Baseline%20Report%2001172015%20small.pdf

  2018 Regional Transportation Plan - Transportation Equity Evaluation
  https://www.oregonmetro.gov/sites/default/files/2019/03/13/Transportation-Equity-Evaluation-Final-3.12.19.pdf

  Connect with Nature: planning parks and natural areas with communities of color
  https://www.oregonmetro.gov/sites/default/files/2019/10/08/Connect-with-Nature-Report.pdf

  Parks + Nature Racial Equity Diversity and Inclusion Action Plan 2018-2023
  https://www.oregonmetro.gov/sites/default/files/2019/03/13/Parks-and-Nature-Racial-Equity-Diversity-and-Inclusion-Action-Plan.pdf
- City of Portland Office of Equity and Human Rights: Shared City-wide Definitions of Racial Equity Terms
  https://www.portlandoregon.gov/oehr/article/581553
- The Diversity Center of Northeast Ohio JEDI definition
  https://www.diversitycenterneo.org/jedi-frequently-asked-questions/#:~:text=What%20is%20Justice%2C%20Equity%2C%20Diversity,people%2C%20things%2C%20and%20experiences.
- A Home for Everyone
  https://ahomeforeveryone.net/
- Racial Equity Tools
  https://www.racialequitytools.org/
- Government Alliance on Race and Equity
  https://www.racialequityalliance.org/
- Policylink
  https://www.policylink.org/
- Portland Audubon Equity Team
  https://audubonportland.org/wp-content/uploads/2020/07/Warbler-JulyAugust-2020-for-web.pdf
- Texas Hill County Conservation Network Justice, Equity, Diversity and Inclusion
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METRO WILDLIFE HABITAT CONNECTIVITY ASSESSMENT TOOLKIT

GUIDEBOOK

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Updated: April 2021

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Assessing Connectivity in Urban Systems

Habitat connectivity is critical for maintaining viable populations of plants and animals and is increasingly important in the face of urban growth and human development, as well as climate change pressures. Urban areas are known to support biodiversity and the Portland-Vancouver area is no exception. Boasting 338 different species of amphibian, reptile, bird, and mammals, as well as unknown numbers of invertebrates, this area has many species in need of connected habitats. The Portland-Vancouver region has the potential to provide north-south connectivity for wildlife between the Willamette Valley to the Puget Trough ecoregion, or conversely, it could serve as a thousand-square-mile barrier. Small scale decisions and planning that occur here can have large scale implications. The Metro Wildlife Habitat Connectivity Assessment Toolkit (Toolkit) was developed with the goal of providing detailed, empirically derived information to help support local decision-making for transportation planning and habitat management in and around urban areas to support connectivity efforts across the region.

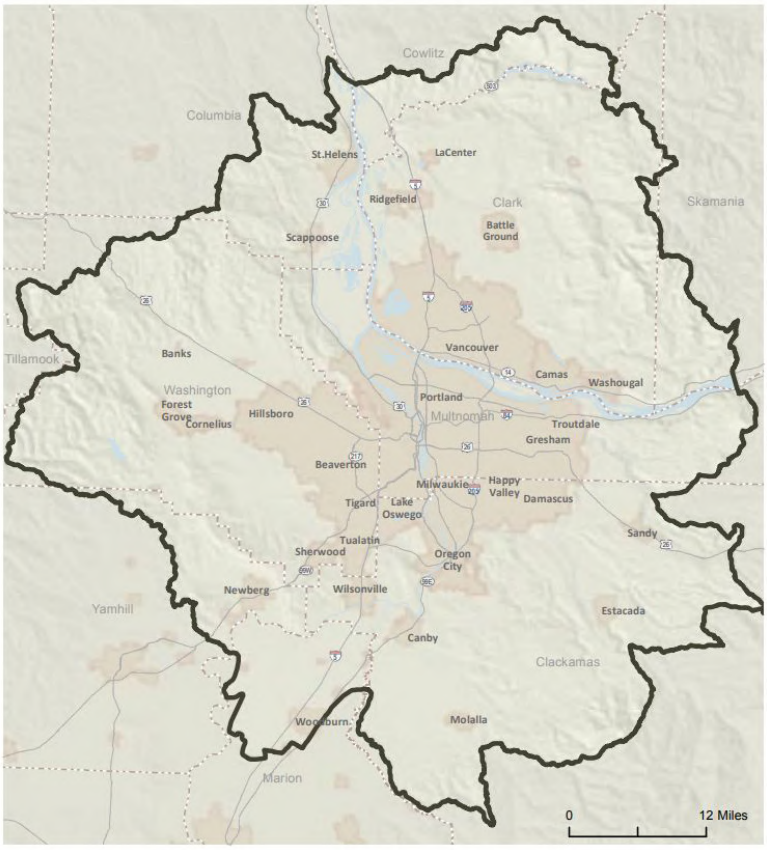


Figure 1. Area of application for the Metro Wildlife Habitat Connectivity Assessment Toolkit (Toolkit).

The geography of the Intertwine region includes over 2,800 square miles situated between the Coast Range and Cascade Mountains. Image sourced from the Regional Conservation Strategy for the Greater Portland-Vancouver Region (2012).

Previous to the launch of the Toolkit project, many connectivity assessments were done exclusively through spatial modeling, using techniques and tools such as least-cost path analysis and Circuitscape. Most efforts included little to no on-the-ground verification of model assumptions and typically spanned large geographic regions. With large spatial scales, the likelihood that the model will skirt urbanized areas entirely increases, and as such it is more difficult to identify inaccuracies in the GIS layers that compose the model. For example, a commonly occurring inaccuracy highlighted through work by graduate students at Portland State University, included multiple instances where open water was misclassified as asphalt (Temple 2020; Rogers 2017).

Large extent and data grid resolution, and a lack of on-the-ground verification, are critical issues creating inaccuracies in assessing connectivity in urban and urbanizing areas such as the Intertwine region (Figure 1). Rapid changes in land cover and a need for detailed information to support decision making around the commitment of resources for restoration, land acquisition, and barrier mitigation necessitate a more detailed and empirically driven approach. In addition to addressing these needs, the Toolkit project also recognizes the complexities of assessing habitat connectivity for a variety of species in the region.

The concept of habitat connectivity is a species-specific one. What may be considered suitable habitat for one species could be considered non-habitat, or even a barrier to movement, for another species. In order to best address the movement needs of the variety of taxa and individual species that are found in the Intertwine region, we developed and utilized a Goals Based Surrogate Species (GBSS) approach that utilizes statistical analysis, peer review, and explicit consideration for what landscape features a given species represents (Bliss-Ketchum et al. in progress). Using the GBSS approach we reviewed, and ultimately selected species that met the initial criteria of being closely associated with a given habitat type and being neither very rare nor overly common. The characteristics of the group of selected species were also considered for the goal of highlighting a range of mobility types and taxa, as well as providing variability in susceptibility to barriers. Additionally species were selected to represent key habitats of interest in the region, specifically wetlands, conifer-hardwood forests, and oak woodlands/oak savanna. Ultimately the surrogate species selected include the northern red-legged frog *(Rana aurora)*, rubber boa *(Charina bottae)*, southern alligator lizard *(Elgaria multicarinata)*, Swainson's thrush *(Catharus ustulatus)*, slender-billed nuthatch *(Sitta carolinensis aculeata),* American beaver *(Castor canadensis)*, Douglas' squirrel *(Tamiasciurus douglasii),* and western gray squirrel *(Sciurus griseus)* (Figure 2).

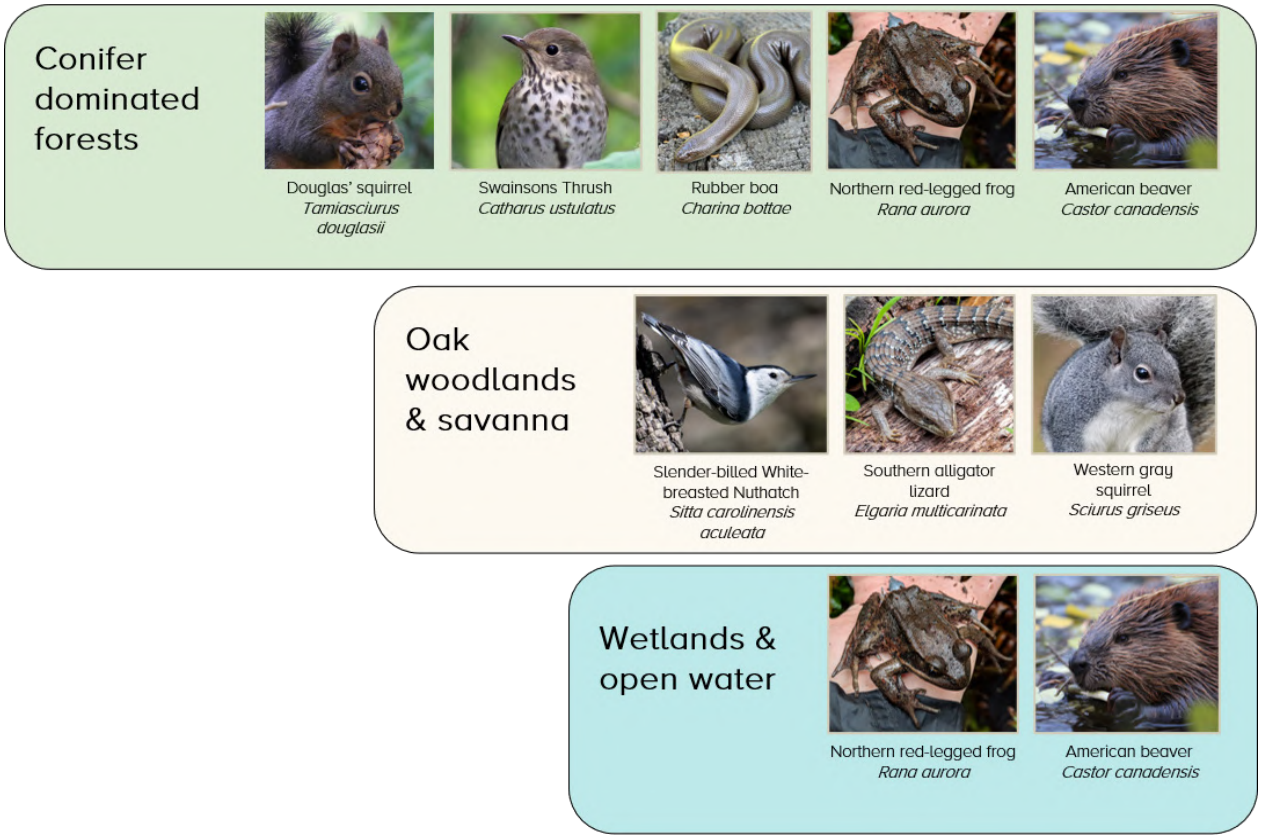


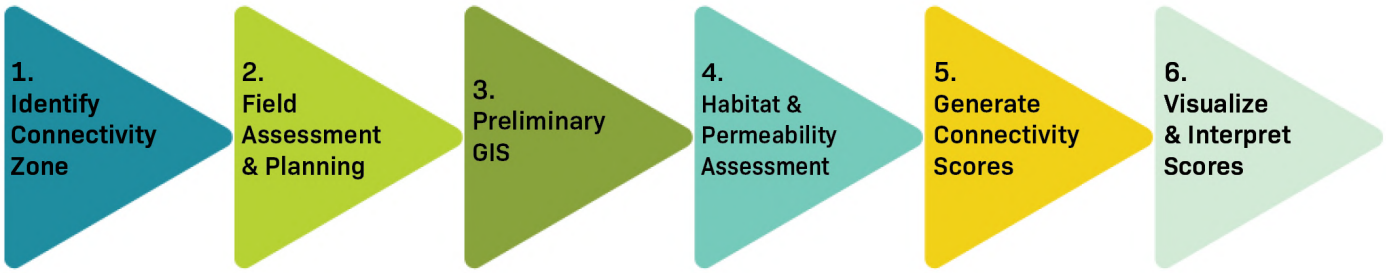
Figure 2. Selected Surrogate Species for the Metro Wildlife Habitat Connectivity Assessment Toolkit.

Surrogate species selections were made based on criteria including representation of key habitat types in the Intertwine region. Key habitats were identified as wetlands, conifer-hardwood forests, and oak woodlands/oak savanna. Species selected with the respective habitat association are shown here. Some species represent multiple habitat types and so are repeated in the figure.

Through managing the habitat and connectivity needs of these eight surrogates we will also, at least partially, be supporting the needs of an additional 139 species that co-occur in the Intertwine region (Appendix A). If additional or replacement surrogate species come under consideration more can be added as needed, for example in order to capture a habitat type or movement type that is not emphasized with the original surrogates but valued for local planning. Utilizing the GBSS process, we were able to apply species-specific movement and habitat use information to the development of the Toolkit.

The Metro Wildlife Habitat Connectivity Assessment Toolkit provides connectivity assessment at an actionable scale, establishes on-the-ground verification of modeling assumptions, and allows for the use of empirically derived species-specific data to inform planning and management action that supports species ability to access and utilize available habitat. In the following sections we will provide detail on the steps for applying the Toolkit process to a given connectivity area, from selecting the area to be assessed, collecting relevant GIS information, conducting field assessments, generating species-specific scores, interpreting the data, and applying various management options based on the results of the Toolkit analysis, type of land ownership, and objectives of the practitioner.

The Toolkit Process



1. Identify Habitat Connectivity Zone(s) of Interest

Implementation of the Toolkit begins with two major steps: 1. To identify Source Areas to connect, and 2. To identify possible Connectivity Pathways between the Source Areas (Figure 3). The identification of Source Areas can be done in a variety of ways, depending on the needs and objectives of the practitioner who is exploring connectivity assessment. In some cases an individual or agency may or may not already know which Source Areas they would like to assess. Below we describe options for identifying possible Source Areas, and once Source Areas are determined, how to proceed with identifying possible Habitat Connectivity Pathways. Details on GIS techniques to identify possible Habitat Connectivity Pathways can be found in Appendix B at the end of this document.

Identifying Source Areas/Region/Site of Interest

Source Areas can be identified by regions of special conservation interest, jurisdictional areas based on agency or ownership, research sites, and wildlife core habitat locations, among other ecological, landscape, and social factors. GIS and connectivity based modeling resources are available to aid in identification as needed. For example, a species driven approach to identifying Source Areas could use GIS tools to identify areas with the minimum viable habitat patch size for one or several surrogate species. Another approach is to identify Source Areas by jurisdictional management such as locations of publicly owned natural area properties. The example shown in Figure 4.A. illustrates existing Metro owned natural areas across the region, resulting in multiple possible Source Areas. Once Source Areas are selected, then the identification of potential Connectivity Pathways can begin.

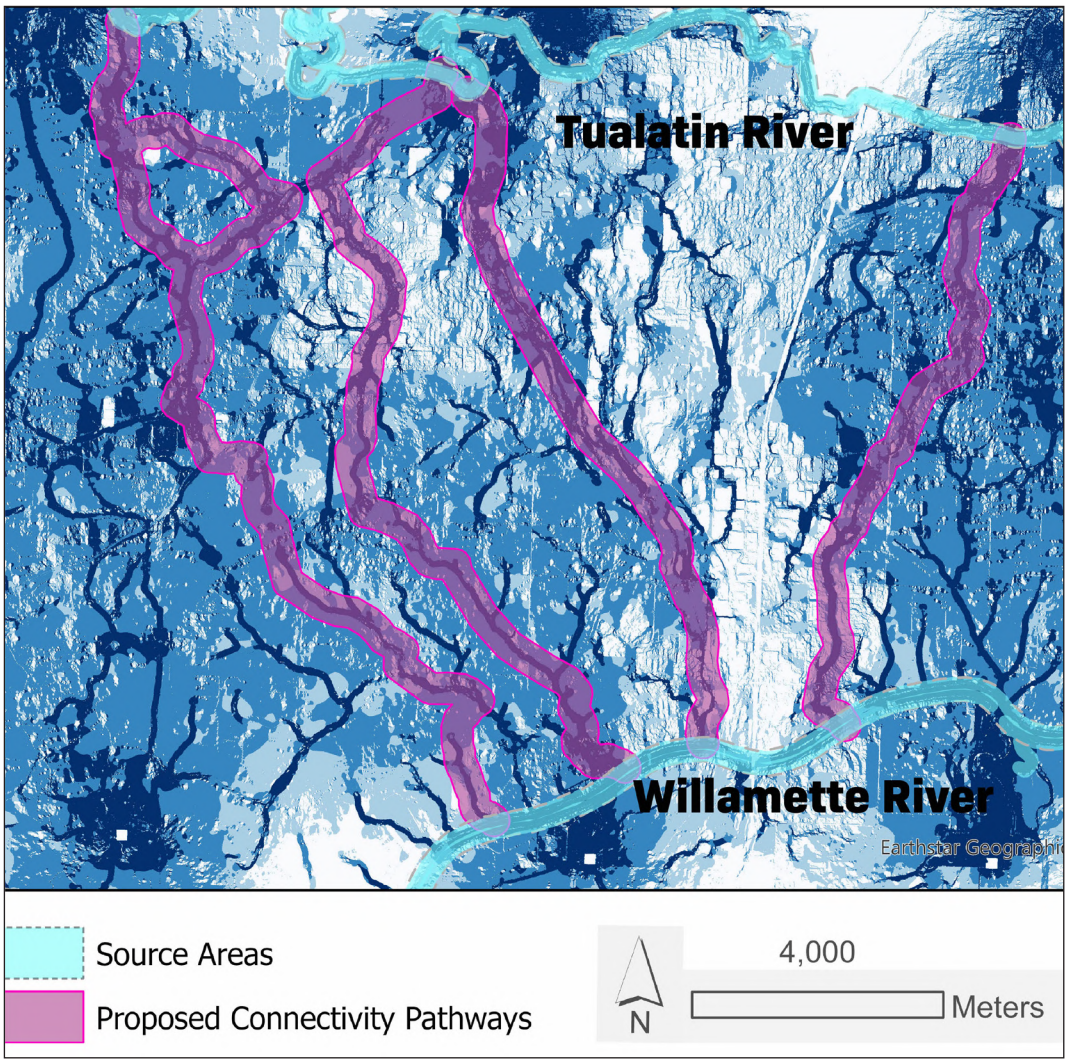


Figure 3. Source Areas and Habitat Connectivity Pathway Opportunities.
The Tonquin geologic area was an early test site for the Toolkit process. In this example we see the Source Areas, which were identified as the Tualatin River to the North, and the Willamette River to the South. Circuitscape Connectivity analysis was applied to this area, symbolized with darker blues showing concentrated current flow and lighter blues showing more diffuse current. The Circuitscape analysis was run using Habitat Permeability Models to provide the resistance layer, revealing four Connectivity Pathway opportunities symbolized here in purple.

Identifying Connectivity Pathways between two or more Source Areas

The region containing the Source Areas is used to define the spatial boundaries in which GIS derived landscape features are applied to create a Habitat Permeability Model (Figure 4.B). The Habitat Permeability Model uses empirically derived information about habitat use and movement capabilities of surrogate species to represent key habitats in the Intertwine region. The Habitat Permeability Model provides the foundation to generate a landscape resistance layer, a critical input in connectivity modeling such as Circuitscape and/or least cost path modeling. Applying the chosen connectivity model (Figure 4.C.) to the resistance layer surface will highlight possible Connectivity Pathways where a more detailed analysis of on-the-ground connectivity can be applied.

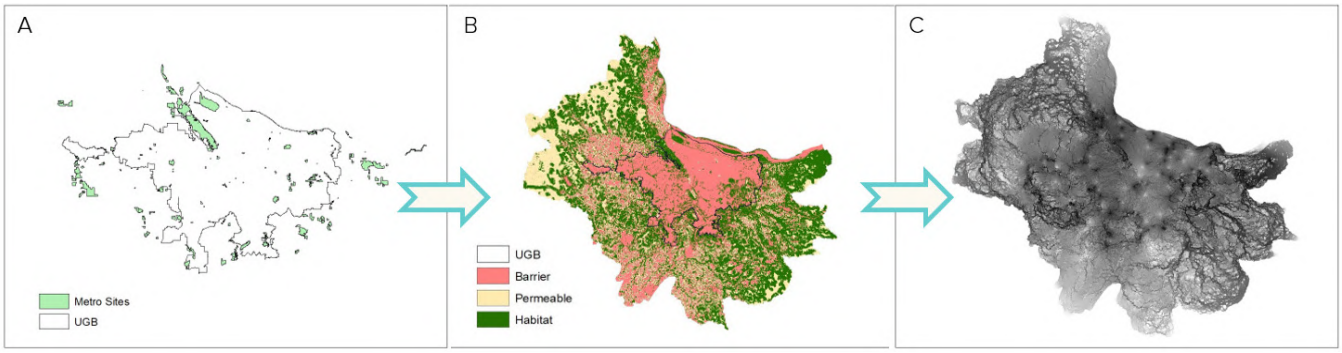


Figure 4: Source Area identification, resistance layers, and Circuitscape Connectivity modeling to identify potential Connectivity Pathways.

Source Areas (A) in this example were selected based on jurisdictional boundaries, specifically sites managed by Metro. Next, a GIS layer of the region was created by combining landscape features that had been categorized based on regional land cover data and habitat needs of the selected surrogate species. The resulting habitat permeability model (B) was then converted into resistance values based on permeability and barrier effects as the surrogate species moves through the landscape. The resulting connectivity model (C), derived from values in the habitat permeability model was generated by applying Circuitscape Connectivity modeling techniques to visualize hypothetical connections on the landscape and aid in connectivity prioritization. The connectivity model may also be used to re-prioritize Source Areas. The process can be completed in an iterative cycle based on management goals and/or hypothetical future land-use scenarios.

2. Field Assessment Planning

Once Habitat Connectivity Pathways between two or more Source Areas are identified, we can examine them in more detail and plan for field assessment activities. This process begins by reviewing recent land cover imagery to determine how many Habitat Connectivity Zones (HCZ) within a Connectivity Pathway are needed and if there are obvious features that should be described in more detail during field assessments (Figure 5). HCZs cannot exceed 500 x 500 meters in size, to accommodate line-of-site field analysis, and so the Connectivity Pathway is delineated based on this requirement. Additional considerations while identifying HCZ locations include obvious features such as roads or other barriers visible on aerial photography that should be assessed for permeability in the field. Detailed information on the field assessment planning process is available in Appendix C at the end of this document.

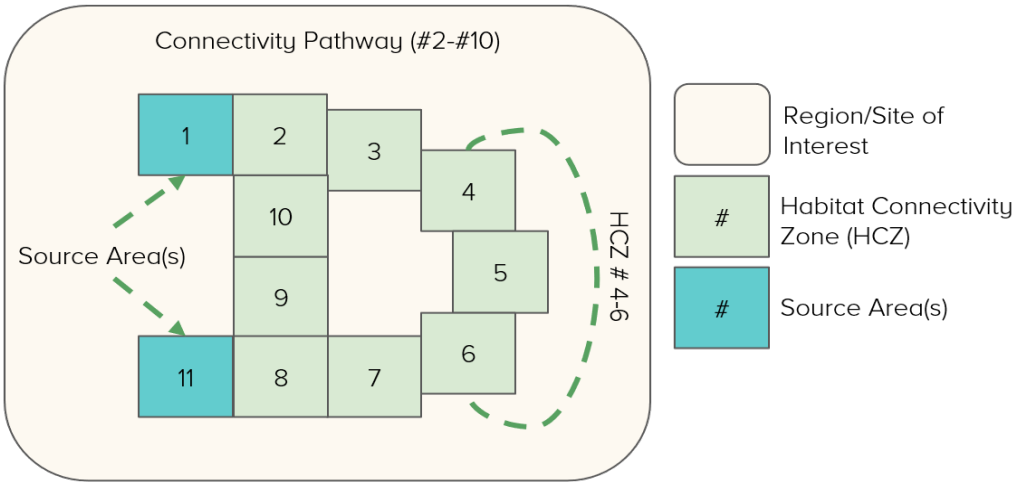
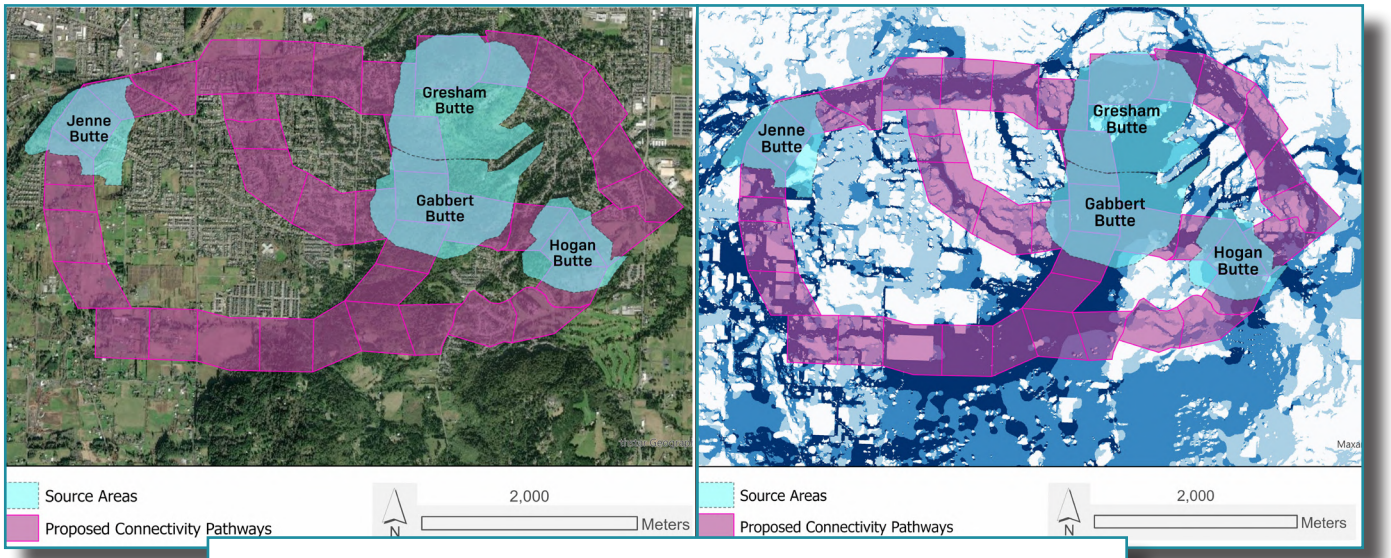


Figure 5. Assessment Areas for Habitat Connectivity Field Planning.

Simplified diagram of an Assessment Area of interest for field planning purposes. The Assessment Area is the overall study or management area which contains multiple Source Areas selected for exploring Connectivity Pathways between them. Within these pathways are multiple 500 x 500 meter Habitat Connectivity Zones (HCZ) that allow for detailed habitat and permeability assessment.



This image shows an example of a completed assessment area for habitat connectivity field planning in the Gresham Buttes area. Four buttes were designated as source areas, Jenne Butte, Gresham Butte, Gabbert Butte, and Hogan Butte. The Habitat Connectivity Zones (HCZs) were numbered and designated based on circuitscape analysis results for surrogate species and identified several possible pathways. Selecting the most likely pathways for all species resulted in the distribution of the Connectivity Pathway seen here. Specific landscape features such as major roads designated HCZ boundaries where appropriate, while maintaining the limitation of no more than 500m x 500m size.

3. Preliminary GIS Analysis

After the Habitat Connectivity Zones to be assessed have been delineated, we then use GIS analysis to identify the distribution of habitat and landscape scale parameters within each Habitat Connectivity Zone (HCZ) not easily detected on the ground. For example, identifying the distribution and percent land cover of agricultural areas, water features, and impervious surfaces in each Habitat Connectivity Zone. These data are then added to the habitat and permeability assessment forms so the information can be verified when surveyors are in the field. Detailed information on the preliminary GIS analysis process is available in Appendix D at the end of this document.

4. Habitat & Permeability Assessments

The field assessment planning information and completed preliminary GIS analysis can now be taken to the field sites so that habitat and permeability assessments can be completed. Collectively referred to as field assessments, this work verifies the accuracy of GIS data and provides information about features important to habitat connectivity but not currently available in spatial data layers. This includes documenting the presence and characteristics of a culvert or a fence, identifying the approximate proportion of native and non-native plants, documenting the presence of talus slopes or rock piles, etc. These assessments are done by line of sight visual verification. Ideally this is done with a walk through of the site but in cases when site access is limited because of private property restrictions, most surveys can be completed from roads or other public features that intersect the connectivity zone. In situations where part of a zone cannot be visually assessed, other tools such as aerial photos, Google Earth, or other satellite imagery can be used to support some verification, but will not be accurate in estimating small scale features and/or those that might be obscured by canopy layers, etc. Full habitat and permeability assessment sheets and the directions for filling them out can be found in Appendix E at the end of this document.

5. Generate Individual Species Connectivity Scores

Once on-the-ground assessments are completed, the field assessment values can then be used to generate habitat and permeability scores for each of the surrogate species, in each Habitat Connectivity Zone. These scores are generated by translating the relevant information into a species-specific 0-3 scale using each surrogate's scoring rubric. The rubric is built with 0 meaning the feature is a complete or near-complete barrier to movement for that species. A score of 1 means that the given speces may be able to move through it, but the feature contains little to no resources that might support the species. A score of 2 means that some habitat resources are available, and 3 meaning that the habitat features are of such good quality that it could be considered an area where the species could meet all life history needs. As new research is conducted that informs how our surrogate species utilize their environments, scorecard values should be updated to reflect these new data. Additional information and surrogate species scorecards are available in Appendix F at the end of this document.

These photos show examples of field assessment observations including line-of-sight habitat assessment point, and an under-road culvert permeability assessment point.

6. Visualize and Interpret Scores

Once habitat and permeability scores have been calculated for each species we can now visualize these data in a variety of ways depending on the goals and proposed management solutions available. If the Habitat Connectivity Zone is a linear feature, such as along a riparian corridor, it may be useful to view results in a bar or line graph to identify high and low scoring areas along the theoretical movement pathway (Figure x5). Scores can also be visualized in a GIS environment, using color tones or other visual cues to illustrate Habitat Connectivity Zones with greater or lesser habitat scores. Permeability values can also be visualized by outlining the feature that may be contributing to reduced permeability, such as a fenceline or road, then adjusting the thickness of the line to show the severity of the barrier impact (Figure x6). Additional information, and examples of score visualizations are available in Appendix G at the end of this document.

Applications of Assessment Results

Depending on the results of an individual connectivity assessment, there are a variety of decision points and management options available to support protecting and/or increasing the connectivity value of a given area or alternatively, supporting a shift in focus to a new area that may have better connectivity prospects. Individual entities may have different tools or capability in order to implement management options. A completed Toolkit assessment can support identification of next steps and with that identification to support collaborative efforts by multiple partner entities.

Consider Alternative Connectivity Pathways

If the habitat condition or resistance value is substantially high, would require significant cost or time to correct, and/or if agreements with private property owners are not tenable in a given Connectivity Pathway, an assessment of alternative Habitat Connectivity Zones can be conducted. Ideally, consideration for alternative Connectivity Pathways would be made at the “Identify Habitat Connectivity Zone(s) of Interest” phase of the Toolkit; however, there may be times when significant challenges to enhancing connectivity were not obvious until after the Toolkit was implemented and the scoring process completed.

Protecting Current Connectivity

If scores demonstrate the entire Habitat Connectivity Pathway is reasonably conducive to species movement, practitioners might consider options for maintaining the long-term viability, as well as future risks, to connectivity.

When entire Habitat Connectivity Pathways are precluded from risk of development due to public ownership and/or other conservation status, current connectivity function may be sustained through maintenance of current habitat condition and/or support of natural successional shifts in habitat structure.

When Habitat Connectivity Pathways include multiple land owners and/or multiple zoning status, these portions are likely to be at an increased risk of degradation. At times, it may be possible to consider land acquisitions in order to protect vital connectivity zones; however, such acquisitions can be an expensive and a potentially controversial action. Taking steps to communicate the importance of a given area for connectivity, coupled with working with the appropriate agencies, developers, and/or private landowners as early as possible can help to avoid future conflicts and develop strategies that support connectivity into the future.

Increasing Connectivity Value

Assessing the habitat and permeability of Habitat Connectivity Pathways provides guidance on the current condition of the given area. Habitat Connectivity Zones (HCZ) with low scores may be targeted for habitat restoration activities and/or barrier mitigation action as applicable. Partnerships and collaborative prioritization can support the work of increasing connectivity value and consideration for management actions such as barrier mitigation and/or habitat restoration.

Habitat Restoration Considerations

Public or private land ownership will provide different challenges to being able to apply restoration actions to a given Habitat Connectivity Zone. When restoration action is proposed for public lands, managers can develop restoration plans with consideration for the long term maintenance of current habitat condition and/or support of natural successional shifts in habitat structure.

When restoration action would bring the most connectivity benefit to a HCZ that is on private land, communication and relationship building is the key first step. Ideally, the land owner would already have knowledge of the need for habitat connectivity and be aware of the effort to enhance connectivity throughout the region. However there may be opportunities for additional information sharing on the topic. If the land owner is willing, work can begin to initiate restoration efforts. In some cases these actions can be incentivised with various types of recognition and/or tax programs that may serve to encourage participation.

Barrier Mitigation Considerations

Barriers to wildlife movement can take many forms, but the most obvious of these is the road network. Roads are managed by a variety of public entities that occur at several geographic scales. When a given road is identified as a barrier to a particular Habitat Connectivity Zone, work can be done to communicate the importance of the area to the relevant transportation entity. Opportunities may arise to enhance the “passability” of an existing culvert for wildlife and/or create new structures that will allow wildlife to safely cross the road barrier. Implementation of these opportunities is contingent upon the opportunities in the area as well as the willingness and motivation of the transportation entity in participating, though reaching out well before any scheduled transportation planning and retrofitting is key. Additionally, enhancing or creating passage options may be prohibitively expensive, unless an existing road project is proposed in the same area. Therefore it is critical to identify locations where road mitigation is needed as soon as possible with the hope that these areas can be flagged when future road work is planned for the area.

Roads, however, are not the only barrier to wildlife movement. Fences, structures, and the presence of domestic animals, among other things, may also prohibit wildlife from utilizing a given area in daily or migratory movements. These structures can occur on public or private property. Similar to opportunities for restoration on private land, barrier removal or mitigation efforts can be conducted with willing landowners that have knowledge of the importance of habitat connectivity and/or are provided with proper incentives.

Glossary

Assessment Area of Interest - The broader geographic area where connectivity strategies, management, or implementation of Toolkit steps are applied. The Assessment Area of Interest typically includes the Connectivity Pathway(s) and Source Areas.

Centerline(s) - The linear representation of a feature such as a riparian corridor/streamline, least cost path/ Connectivity Pathway, or other locations of interest . The Centerline is utilized in the Metro Wildlife Habitat Connectivity Toolkit to draw the boundary of the individual Habitat Connectivity Zones (HCZ) which are created by buffering an equidistant area on either side of a Centerline. This Centerline is a template to help maximize the natural land cover (often undeveloped or public greenspace cover) of the 500 x 500 meter HCZ.

Circuitscape (Connectivity) analysis or modeling - the connectivity modeling tool that was utilized in pilot studies of the Metro Connectivity Toolkit. The Circuitscape Connectivity models were paired with Metro Wildlife Habitat Connectivity Toolkit because of its analytical methods (using both quantitative and qualitative data) as well as its compatibility with demographic and genetic models for wildlife. This tool uses circuit-theory, which creates arcs between nodes along the path of least resistance, such as pathways permeable for wildlife movement. These tools were developed by McCrae et al. 2016; download the tools at (https://circuitscape.org/about/) or find the newest Julia coded tool with faster run-time at (https://docs.circuitscape.org/Circuitscape.jl/latest/) .

Connectivity Pathway(s) - The movement pathway that connects Source Areas. Pathways can be identified by practitioners or managers as areas of interest and later adjusted, measured, and/or delineated during the Toolkit process. Connectivity Pathway segments can intersect or meet at various points depending on the number of Source Areas and landscape complexity.

Habitat Connectivity Zone(s) (HCZ) - 500x 500 meter (or smaller) sections of the Connectivity Pathway designated for field assessment and scoring. HCZs can be assigned ordinal numbers (HCZ ID, HCZ#) which identify them as part of a connection to other HCZ and within the Connectivity Pathway.

Habitat Permeability Model - The Habitat Permeability Model uses empirically derived information about habitat use and movement capabilities of surrogate species to represent key habitats in the Intertwine region. The model is composed of several data layers representing various landscape features, such as canopy composition, proximity to water, and shrub density, among other species-relevant information. These data layers are further defined by their utility to facilitate movement for a given species and are assigned scores accordingly. For example,an American beaver (Castor canadensis) model would rely heavily on the availability of open water habitat and so the presence and density of open water features would receive the highest permeability value, with diminishing values as the quantity and quality of open water habitat decreased. Multiple habitat feature data layers can then be combined, in this case summed together, to create a Habitat Permeability Model. A habitat permeability model differs from a species distribution or habitat suitability model in that it is designed to illustrate how easy or difficult it will be for this species to move across the landscape. These models are less restrictive than traditional species distribution or habitat suitability models, recognizing that wildlife will often move through otherwise unsuitable habitat to reach higher quality habitat areas.

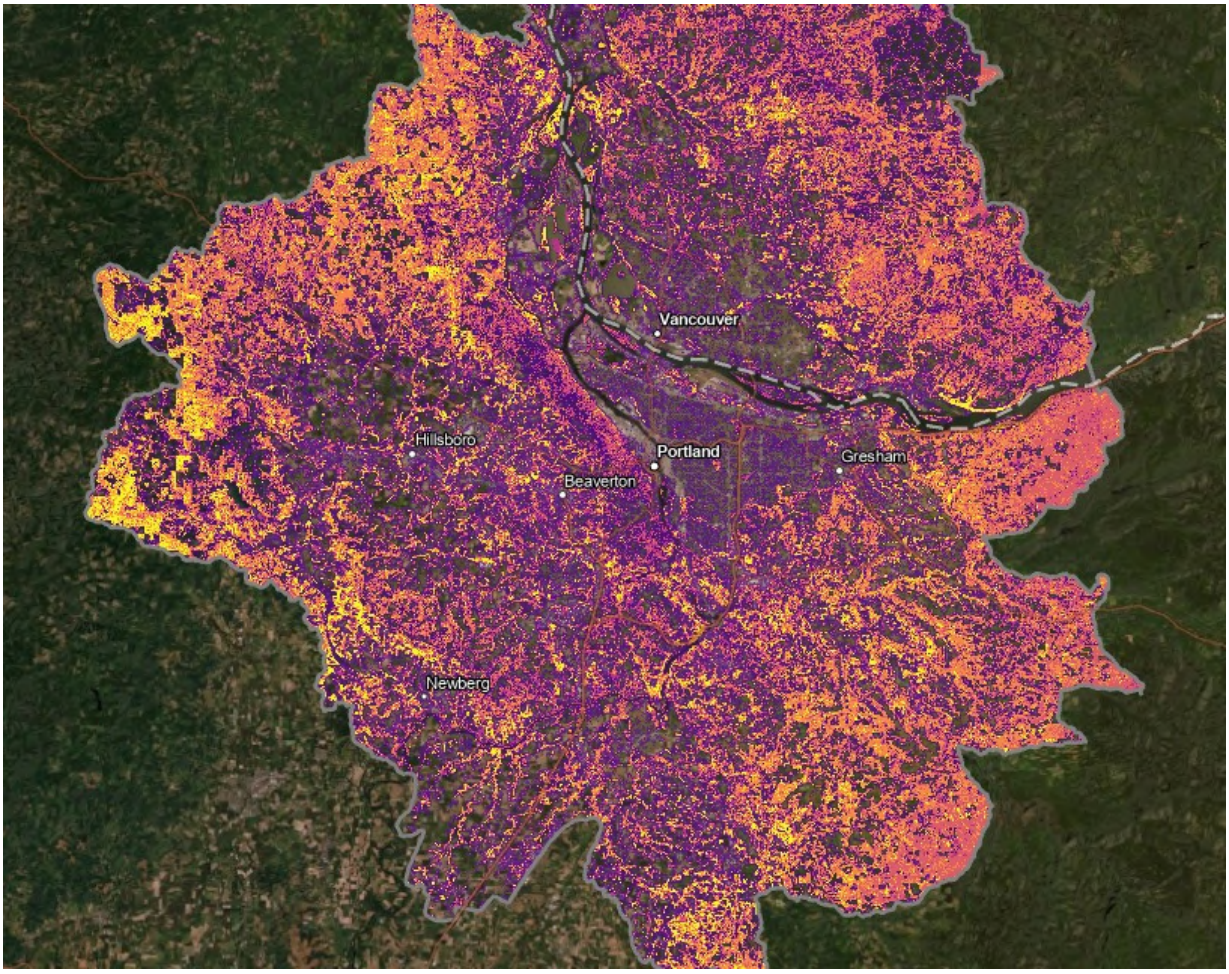
Intertwine Region - The Metro Wildlife Habitat Connectivity Assessment Toolkit project uses the Intertwine region for its pilot studies which encompasses an area of 2,800 square miles situated between the Coast Range and Cascade Mountains. This area also includes the greater Portland-Vancouver metropolitan regions, with over 150+ private/non-profit organizations, and counties in Oregon State (Clackamas, Marion, Multnomah, Washington, Yamhill) and Washington State (Clark, Columbia, Cowlitz, Skamania).

Matrix - A non-habitat land cover type, matrix is used in the Metro Wildlife Habitat Connectivity Toolkit to describe land cover characteristics observed in the field or collected through remotely sensed data. For example, in habitat and permeability field assessments (see Appendix E), the Dominant Matrix Type refers to the non-habitat land cover feature (agriculture or development) with the highest percent coverage on a spatial grid.

Permeability or Resistance Value(s) or Layer(s) - Permeability values are a quantitative scale of values that represent ease of movement for wildlife, ease of access, or least resistance to movement. The resistance value or resistance layer utilized in connectivity modeling is derived from the permeability value (the inverse value) and can be thought of as the "friction" between wildlife movement and the physical landscape or habitat the wildlife is traversing. In Connectivity modeling the permeability is referred to as resistance values/layers or "current" which may be further defined and interpreted on a project or species specific basis. In the pilot study for the Metro Wildlife Habitat Connectivity Toolkit, a GIS data layer of the region was created by combining landscape features that had been categorized based on land cover grid data and habitat features needed by selected surrogate species. The resulting habitat permeability model is converted into values based on permeability and resistant or barrier-like effects as the surrogate species moves through the landscape

Source Area(s) - Identifying Source Areas is typically the first step in applying the Metro Wildlife Habitat Connectivity Toolkit. These are location(s) that practitioners or managers are interested in trying to connect. Identified by regions of special conservation interest, jurisdictional areas based on agency or ownership, research sites, and wildlife core habitat locations, among other ecological, landscape, and social factors. These identified areas may sometimes be known as the source or ground "nodes" in the connectivity modeling process but equate to the same meaning. These nodes are the center locations of where source areas are identified. The source areas can also be connected using circuit-theory and follow the path of least resistance in terms of wildlife movement (see Circuitscape Connectivity analysis).

Habitat Connectivity Modeling for the Intertwine Region



Prepared for:

Lori Hennings, Natural Resources Scientist, Metro Regional Government

Prepared by:

Leslie Bliss-Ketchum, Director, Samara Group
Claire Brumbaugh-Smith, Spatial Analyst Contractor
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Draft provided for comment:

July 3, 2023

Updated:

January 31, 2024

Introduction

The Importance of Habitat Connectivity

Habitat connectivity is an essential requirement for wildlife, plants, and ecological functions. This is particularly true in urban habitats, such as the Portland metropolitan region, where the land cover between habitat patches can be particularly hostile to some species and disruptive to ecological functions. Urban areas are expanding globally, and Portland, while benefiting from constraints on sprawl from Urban Growth Boundary regulations, is nonetheless continuing to expand and develop.

Given the importance of habitat connectivity and expansion of urban land cover, there is a critical need for land managers, developers, conservationists, and planners to be able to access tools that support the preservation and enhancement of habitat connectivity in the Metro region. Spatial models can support users by illustrating locations where connectivity is likely in existing open space, and where gaps in connectivity exist. Spatial models could be a first step for practitioners in determining where to direct activities that can support connectivity such as restoration and acquisition, community efforts and engagement activities, and landowner partnerships.

This project was developed in order to complete region-wide spatial models of habitat connectivity based on work previously completed that produced the Metro Habitat Connectivity Toolkit. This Toolkit utilizes a surrogate species approach to apply empirically derived information to assessing habitat connectivity for three major habitat types in the region: Oak woodlands and savannah, conifer forest and forested riparian, and wetlands and open water.

The History of Metro Habitat Connectivity Efforts

Habitat connectivity is not a new focus in the Portland metro region, and specific efforts to understand regional connectivity pathways began as early as 2008. At this time Lori Hennings of Metro held several workshops with regional land managers to identify important habitat areas across the region, marking these locations on the map and connecting them using existing forested riparian areas.

Connectivity planning and mapping efforts were reinvigorated in 2012 with collaboration between Portland State University and Metro in the development of the Metro Habitat Connectivity Toolkit development. The Habitat Connectivity Toolkit includes a six-step process to identify the value of a given habitat connectivity zone. Step one in the process is to identify areas to connect. For some community partners, this is an easy step. For example, Metro may be interested in assessing connectivity between two natural areas they manage. For partners that do not manage or own their own parcels (or perhaps are not landowners at all), it could be helpful to have a regional scale connectivity model to identify and guide strategic partnerships for habitat connectivity objectives.

Objectives of this work

Building upon surrogate species data and permeability models development in creation of the Wildlife Habitat Connectivity Toolkit to create Intertwine region scale habitat connectivity maps that represent 1. Oak habitats, 2. Open water/wetland habitats, 3. Forested habitats, and 4. A combined map to illustrate overall connectivity needs across these three habitats.

These maps can then be used to inform local and regional planning to mitigate barriers from roads and other development, and support connectivity value for land acquisitions and restoration projects. Developing these maps can also support collaboration across land owners and managers with limited resources and/or limited spatial distribution across the Intertwine region.

Methods and Results

Below we provide a description of how the habitat specific and combined regional habitat connectivity models were developed along with a series of screenshots at various scales from around the region to illustrate the results of the model. Data packages for each habitat type and the combined models have been provided to Metro along with metadata for each.

Habitat Permeability Models

Habitat connectivity models representative of three distinct habitat types (Oak, Open Water, and Forest), were built using surrogate species selected for each habitat type. See Metro Toolkit Appendix A for more information on surrogate species selection methods. These surrogate species were Western gray squirrel and Nuthatch for Oak woodlands/savanna; American Beaver and Northern Red-legged Frog for Open Water; Swainson's Thrush and Douglas Squirrel for Forest. Initially, Rubber Boa and Northern Alligator Lizard were considered for surrogate species, but were later removed from this analysis due to data constraints. The specific Oak and Forest Habitat sections below include additional details.

Habitat permeability models (HPMs) were created for each surrogate species using biological literature review and best available data. HPMs are built using GIS parameters that represent the permeability of individual habitat characteristics. Up to twenty parameters were considered for each species, including parameters such as percent shrub cover, percent structures, or distance to open water. Each parameter was assigned a value between 0 (no permeability) and 3 (high permeability). Data from the Institute for Natural Resources (INR), National Hydrography Dataset (NHD), and National Wetlands Inventory (NWI) was used to build HPMs, in addition to other regionally available data sources, such as The Intertwine Alliance Regional Conservation Strategy (RCS) and Regional Land Information System (RLIS). For each species, all parameters were summed to produce a final HPM,

which was then used to create the source and resistance raster needed for each species' Omniscape inputs.

Circuitscape/Omniscape

Minimum patch sizes were incorporated based on home range for Oak (Western gray squirrel patch size= 0.17 km2 and Nuthatch patch size= 0.1 km2), Open Water (American beaver patch size= 0.065 km2 and Northern red-legged frog patch size= 0.01 km2), and Forest (Swainson's thrush patch size= 0.019 km2 and Douglas Squirrel patch size= 0.015 km2) surrogate species. Minimum patch size source areas were used to model functional connectivity between areas of dense, highly permeable land cover or habitat features for the species. Initial tests were run using an older, alternative connectivity program, Circuitscape, which was fraught with hardware and time constraints as there were too many minimum patch areas in the Intertwine Extent to run properly. These initial methods were tested using the one-to-all or pairwise approach across the Intertwine region before switching to an improved connectivity program, Omniscape (McRae et al. 2016, Landau et al. 2021, Conservation Corridor Toolbox). Similarly to Circuitscape, Omniscape uses circuit theory to model how current moves across a landscape. But rather than patches, Omniscape uses a wall-to-wall approach, treating the entire landscape as a resistant surface. Some areas, such as roads, will be highly resistant and impede current flows, while other areas, such as intact habitat, will have a low resistance and facilitate flow.

All six surrogate species models were run independently in Omniscape producing three products each: the normalized current output, cumulative current output, and flow potential output. The editable configuration file (.ini) defining connectivity parameters were set to have a moving window size equal to the surrogate species patch size (converted to pixel radius), utilized parallel batching and block sizing to assist faster computer processing on a desktop computer. Sources (pixels where current would be injected into the model, similar to starting points for the connectivity pathways) were based on areas within low resistance. The bottom 25% of resistant values were converted to source values equal to 1/resistance value; the top 75% received a source value of 0, meaning no source originated from these areas.

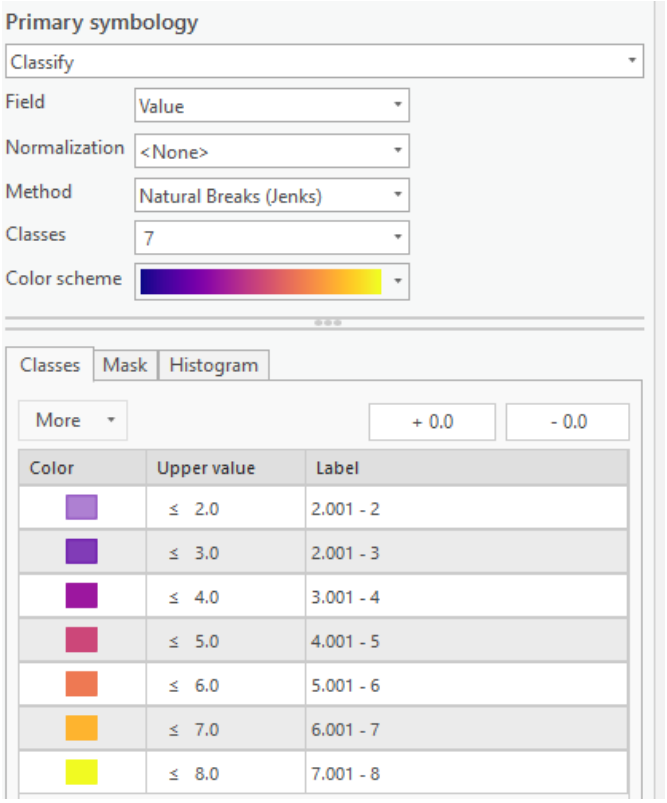
Symbology and Interpretation

The individual 5-meter resolution surrogate species models were combined and symbolized to produce a for each habitat type (Oak, Open Water, and Forest) using the individual cumulative current outputs of each surrogate species model (Table 1). Each of the surrogate species omniscape outputs were categorized using 4 class quantile categories and indexed as 4 unique values. We applied the raster calculator tool to sum and produce a single connectivity output for each habitat type.

Table 1. Symbology and classification of connectivity pathways defined specially for each habitat type Omniscape Connectivity model output for the Intertwine region. The indexed, summed, cumulative current connectivity models range from 0-8 values with 0 representing null or no connectivity, 1 representing very low connectivity and increasing values to 8 representing high connectivity and more channelized pathways.

Habitat Type Sum Cumulative Current Connectivity Index and Connectivity Type Interpretation:

0-1= transparent, considered background value, low cumulative current without distinguishable pattern to connectivity
2= low cumulative current and/or highly diffuse flow
3= low cumulative current and/or moderately diffuse
4= low cumulative current and/or low diffuse
5= moderate cumulative current and/or low constricted
6= moderate cumulate current and/or moderate constricted
7= high cumulative current and/or moderate constricted
8= high cumulative current and/or highly channelized



←Figure 1. Omniscape Output symbology was customized using purple to yellow color gradient and transparency to represent the combined oak cumulative connectivity output. Values 2-3 are semitransparent, and purple to yellow represent increasing cumulative current values. Null or no connectivity or with very low-current and diffuse areas are not symbolized and appear fully transparent.

A note on interpretation of this symbology: When interpreting the connectivity index, it is important to remember that high connectivity values don't necessarily represent highly permeable habitat. Instead, it could represent subpar habitat where current is constricted/channelized due to nearby barriers. Similarly, mid connectivity values may indicate highly permeable habitat where current can move through freely and diffusely. Therefore, when interpreting the outputs of these habitat connectivity models, it is important to keep the landscape context in mind when drawing conclusions about connectivity value.

Habitat Specific Methods and Screenshots

Oak Habitat Surrogate Species Connectivity Model

Initially, the alligator lizard was considered a surrogate species for the Oak habitat type. However, when building the habitat permeability models, several concerns arose. Specifically, there is a lack of literature on the biological needs and habitat use of Alligator Lizards. The literature that does exist, emphasizes habitat needs at a small spatial scale, such as rock piles. This type of small-scale data is not easily derived from remotely sensed data, or other sources. Additionally, the frequency of occurrence of this species is somewhat rare within the Intertwine region, making them less suitable as a surrogate species. See Metro Toolkit Appendix A for more information on the selection criteria for surrogate species.

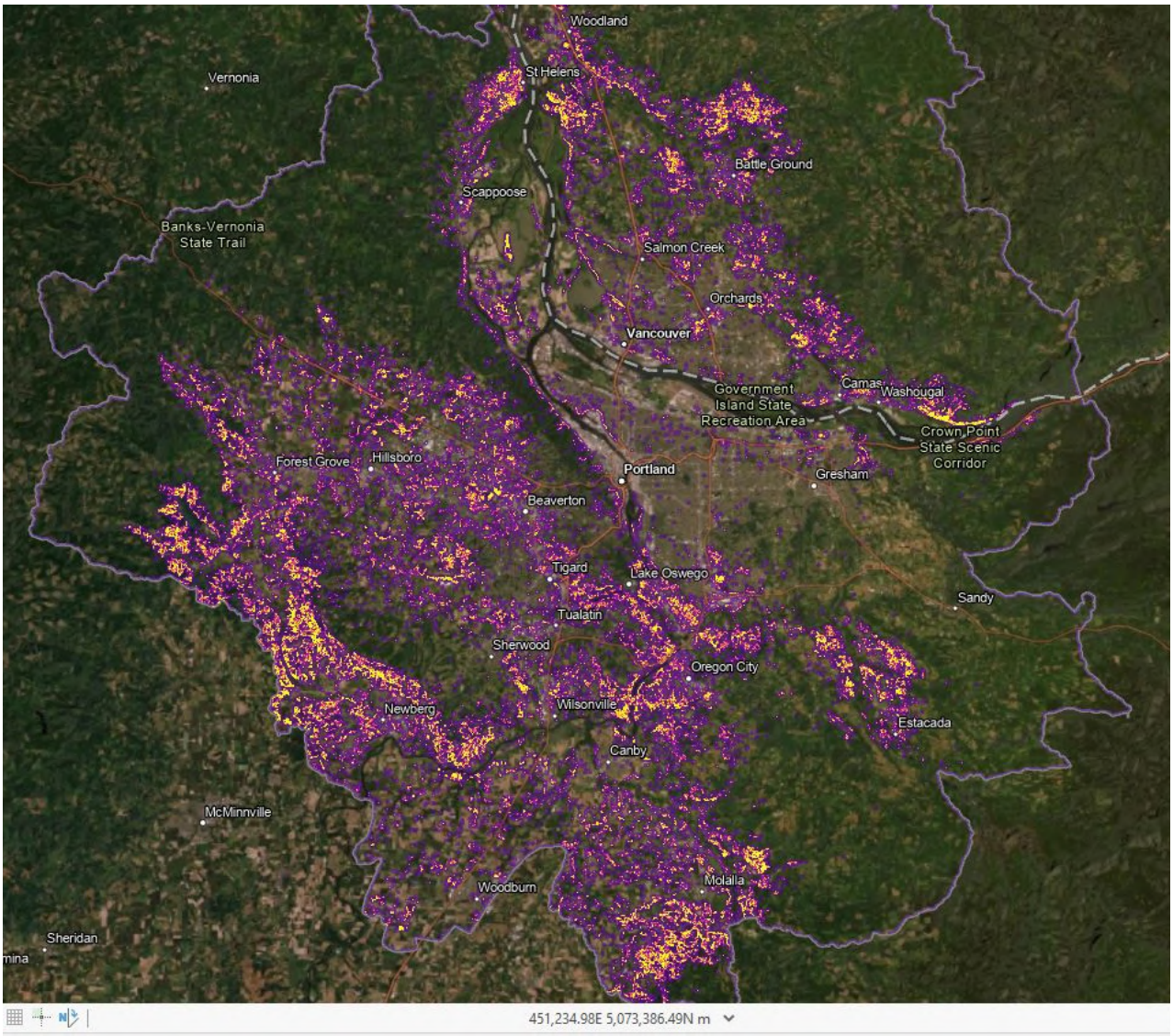
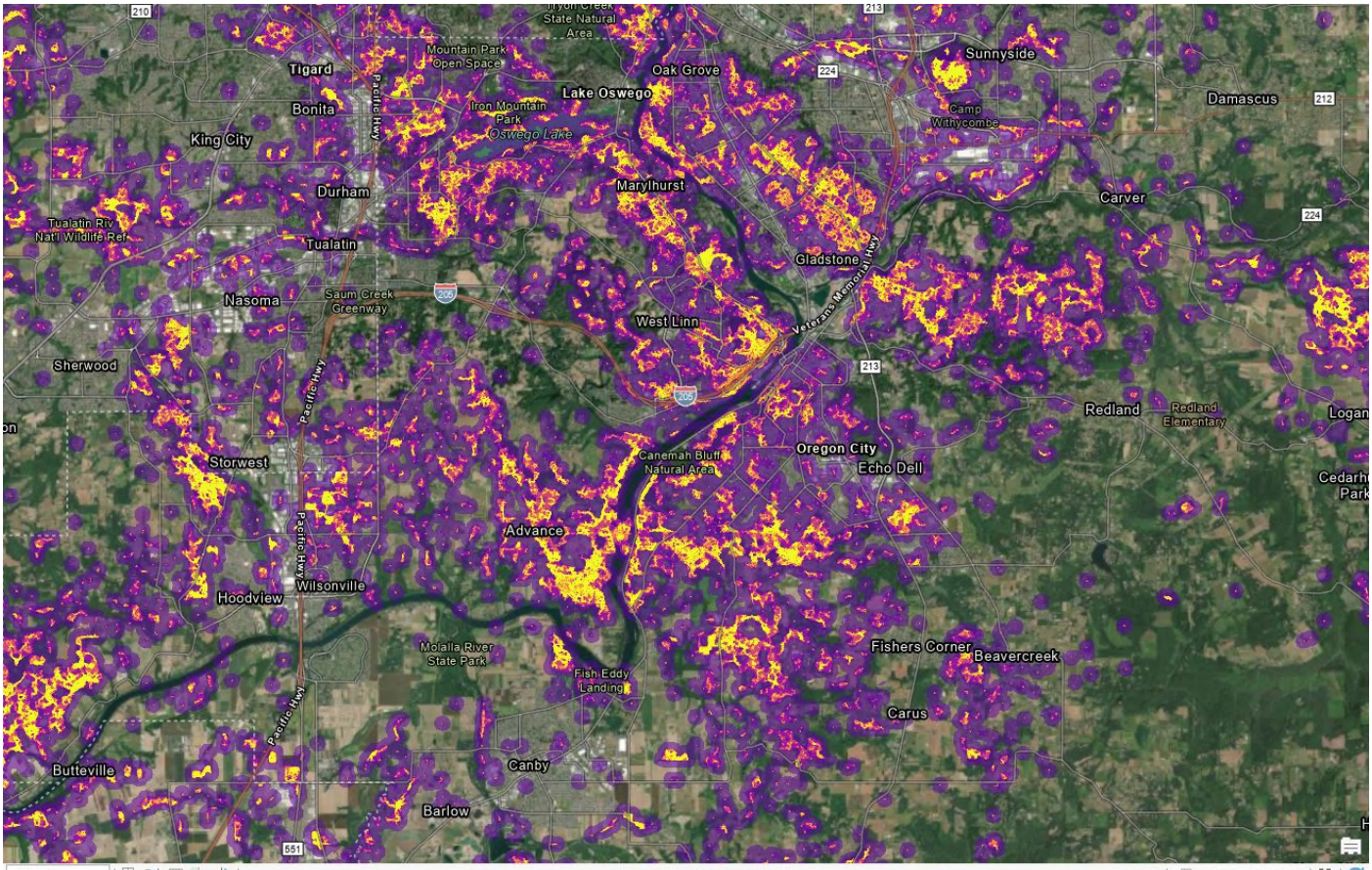


Figure 2: Intertwine region-wide results for the Oak habitat surrogate species model


Tigard
Bonita
King City
Durham
Tualatin
Nasoma
Sherwood
Storwest
Advance
Wilsonville
Hoodview
Butteville
Barlow
Canby
Lake Oswego
Oak Grove
Marylhurst
West Linn
Oregon City
Echo Dell
Gladstone
Carver
Sunnyside
Damascus
Redland
Fishers Corner
Beavercreek
Carus
Molalla River State Park
Fish Eddy Landing
Canemah Bluff Natural Area
Mountain Park Open Space
Iron Mountain Park
Oswego Lake
Camp Withycombe
Tualatin Riv Natl Wildlife Ref
Saum Creek Greenway
Pacific Hwy
Veterans Memorial Hwy
Redland Elementary
1:101,774
512,219.38E 5,031,393.48N m
Selected Features: 0

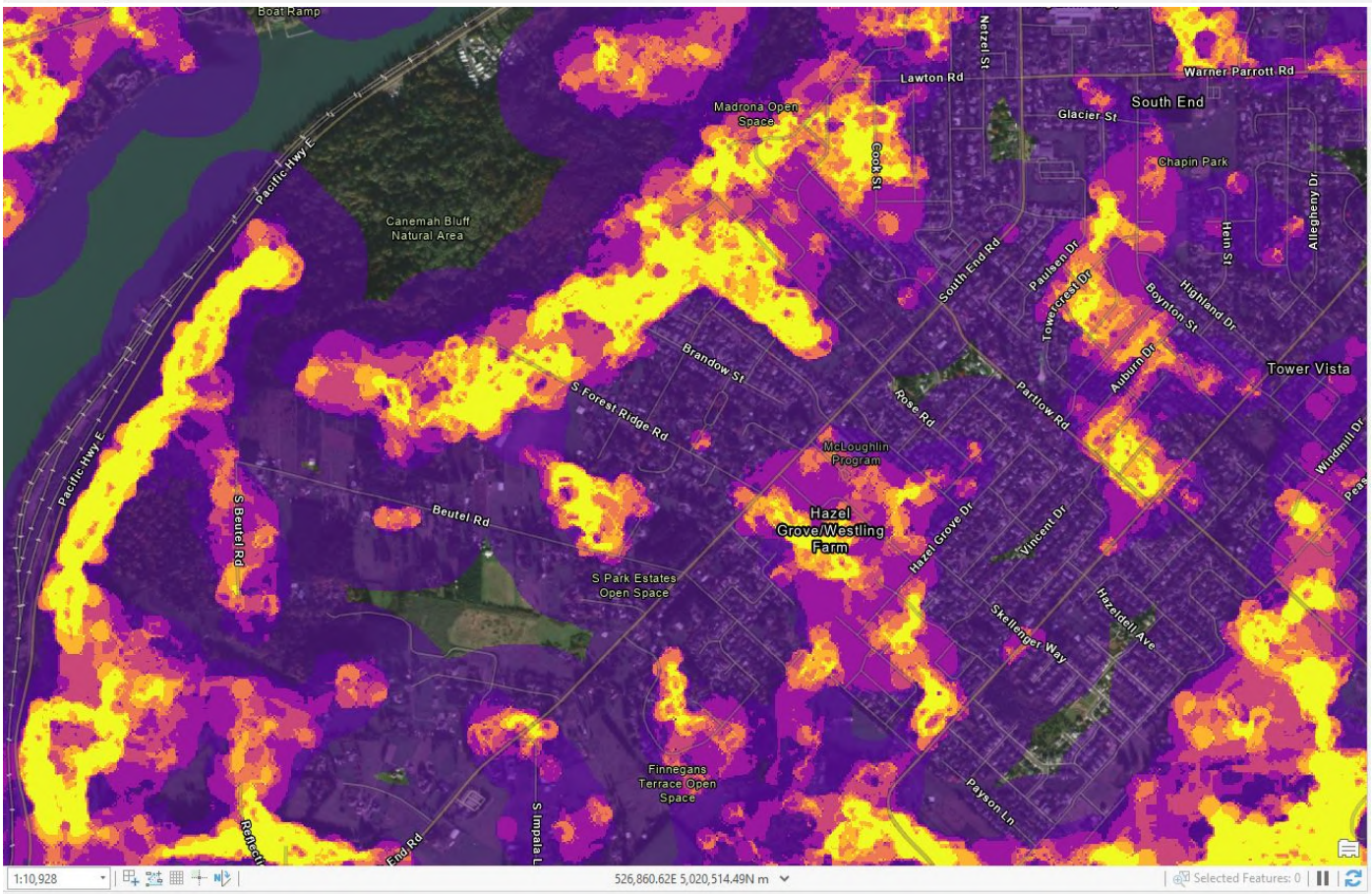
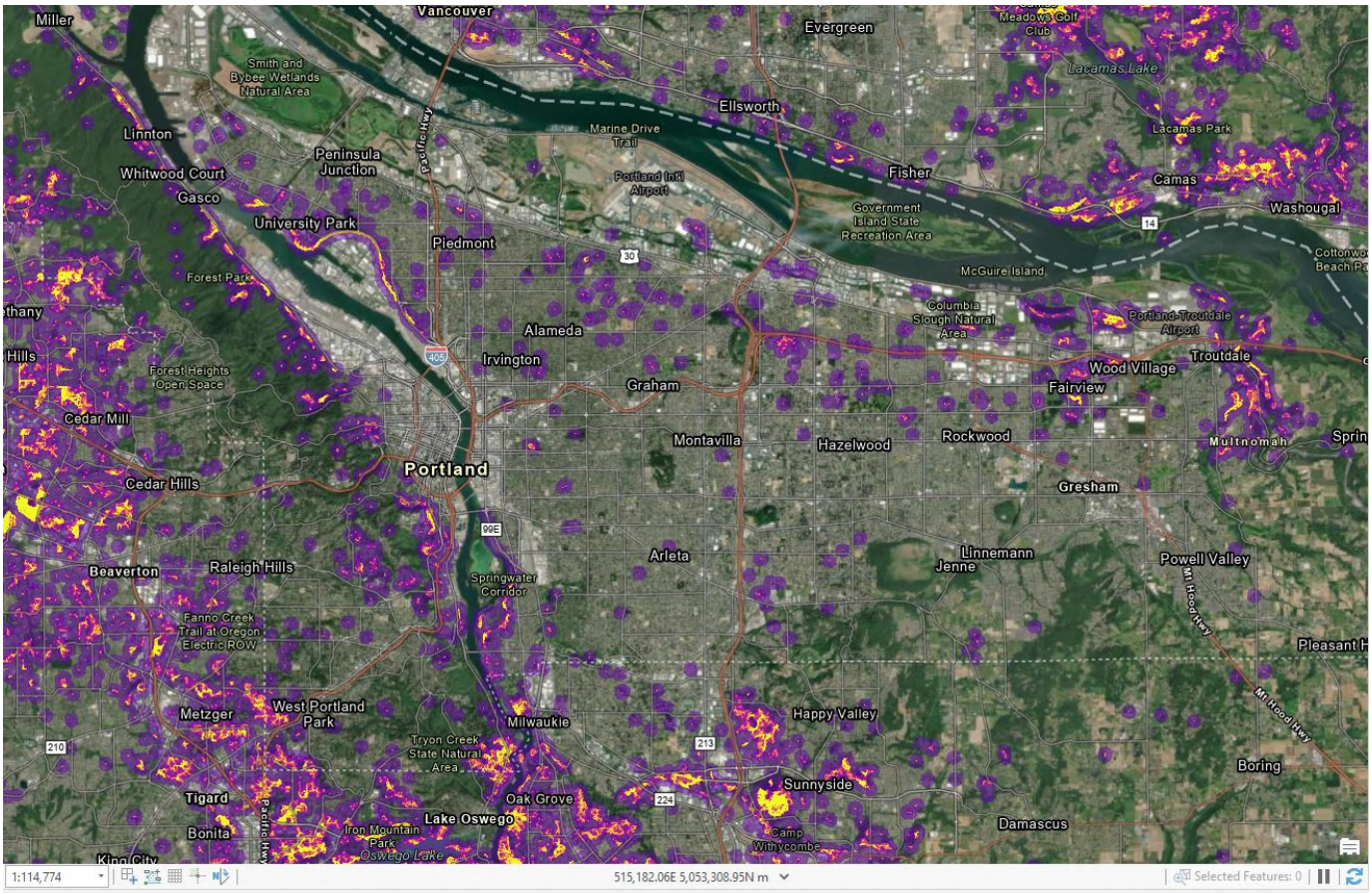

Boat Ramp
Pacific Hwy E
Canemah Bluff Natural Area
Madrona Open Space
Lawton Rd
Netzel St
Warner Parrott Rd
South End
Glacier St
Gooch St
Chapin Park
Allegheny Dr
Hein St
South End Rd
Paulsen Dr
Towercrest Dr
Boynton St
Highland Dr
Tower Vista
Auburn Dr
Brandow St
S Forest Ridge Rd
Rose Rd
Parrlow Rd
Windmill Dr
McLoughlin Program
Hazel Grove/Westling Farm
Hazel Grove Dr
Vincent Dr
S Beutel Rd
Beutel Rd
S Park Estates Open Space
Skellenger Way
Hazeldell Ave
Finnegans Terrace Open Space
Payson Ln
1:10,928
526,860.62E 5,020,514.49N m
Selected Features: 0

Figure 3: Oak habitat results Canemah Bluff (a) Results zoomed Canemah Bluff (b)



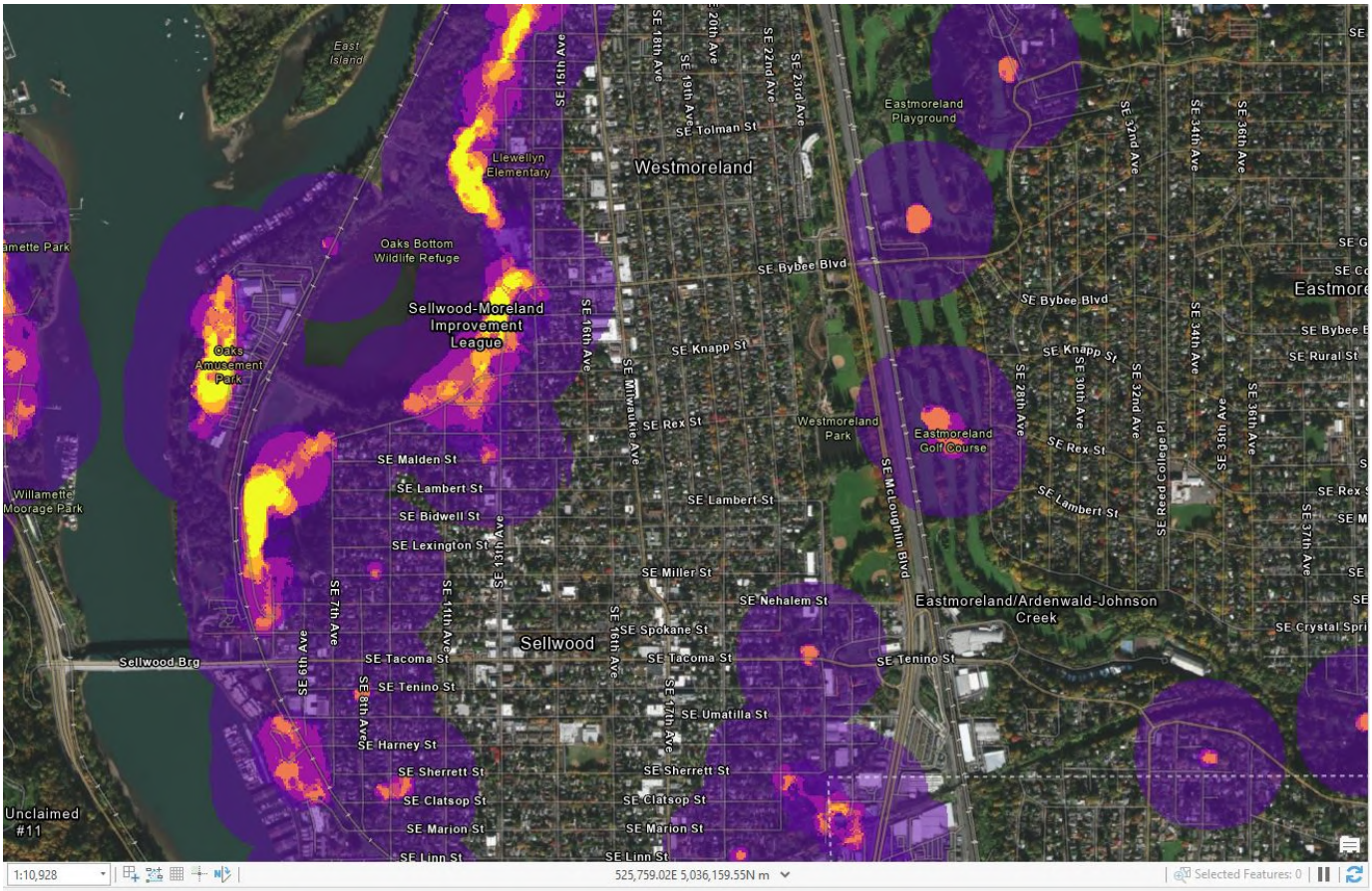


Figure 4: Oak habitat results Central Portland (a) Results zoomed Central Portland Oaks Bottom (b)

Figure 5: Oak habitat results zoomed Scholls area

Forest Habitat Surrogate Species Connectivity Model

Swainson's Thrush Omniscape run repeatedly failed, encountering an error related to the moving window. Multiple workarounds were tried, including remaking the input datasets, using a different computer, and adjusting the settings in the INI file. The best solution found was to increase the blocking size from 1 pixel to 3 pixels. This allowed the moving window to run properly, and according to Omniscape documentation "only negligible differences in the cumulative current map output." (https://docs.circuitscape.org/Omniscape.jl/dev/usage/). This change in blocking size was noted in the INI file.

As mentioned above, some surrogate species were removed from the analysis during the HPM creation process. Specifically, Rubber Boa was removed due to data limitations, including lack of literature on habitat needs, and the habitat needs that are known are too small scale (such as rock piles) to capture in this type of spatial analysis. Additionally Northern Red Legged Frog was removed from the Forest habitat type (though retained in the Open Water habitat type) because it has such specialized habitat within the forest categories. This skews the Forest model to have relatively lower connectivity values than the Oak and Open Water models, and tends to mask out areas where both Swainson's Thrush and Douglas Squirrel have high connectivity.

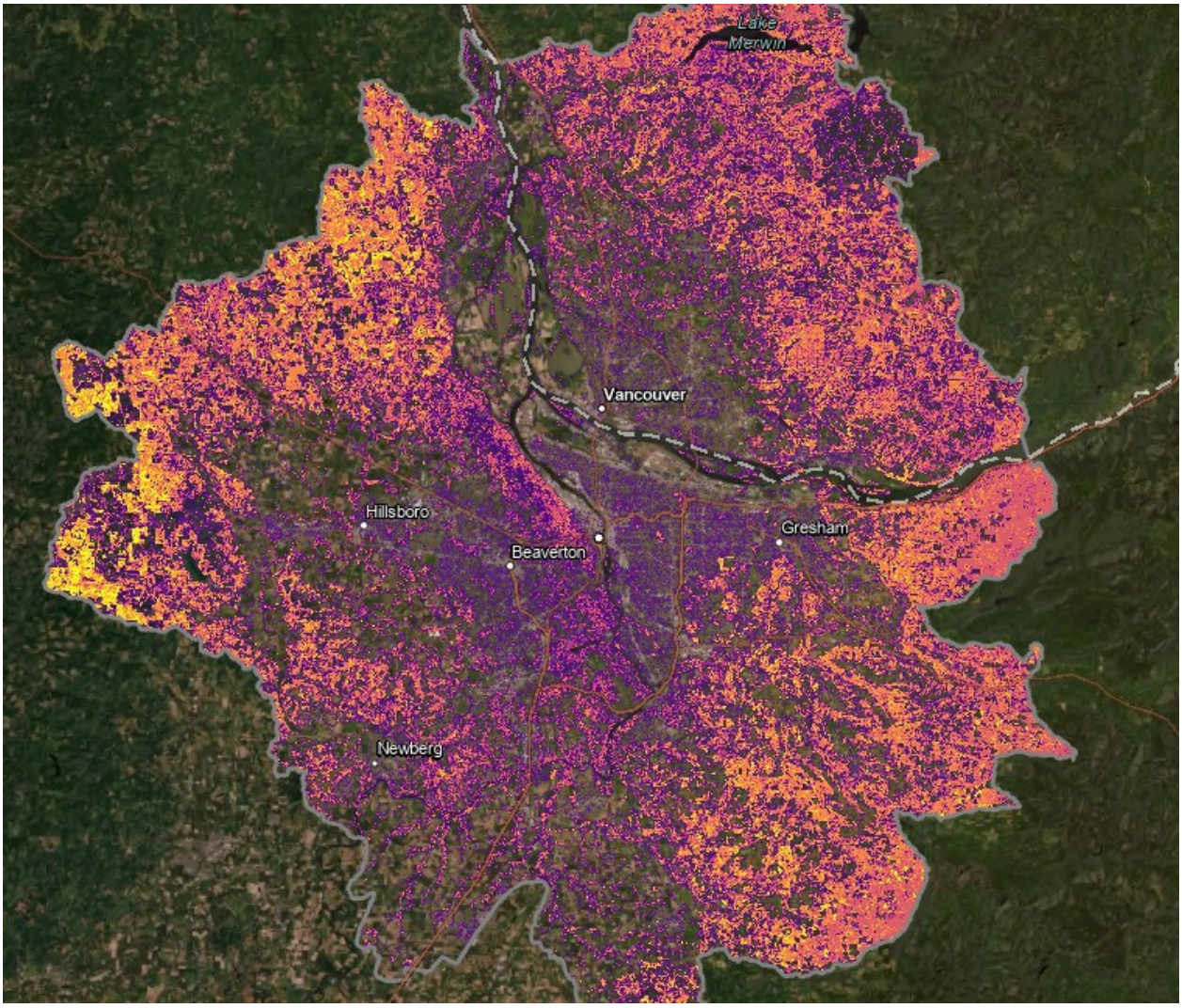


Figure 6: Intertwine region-wide results for the Forested habitat surrogate species model

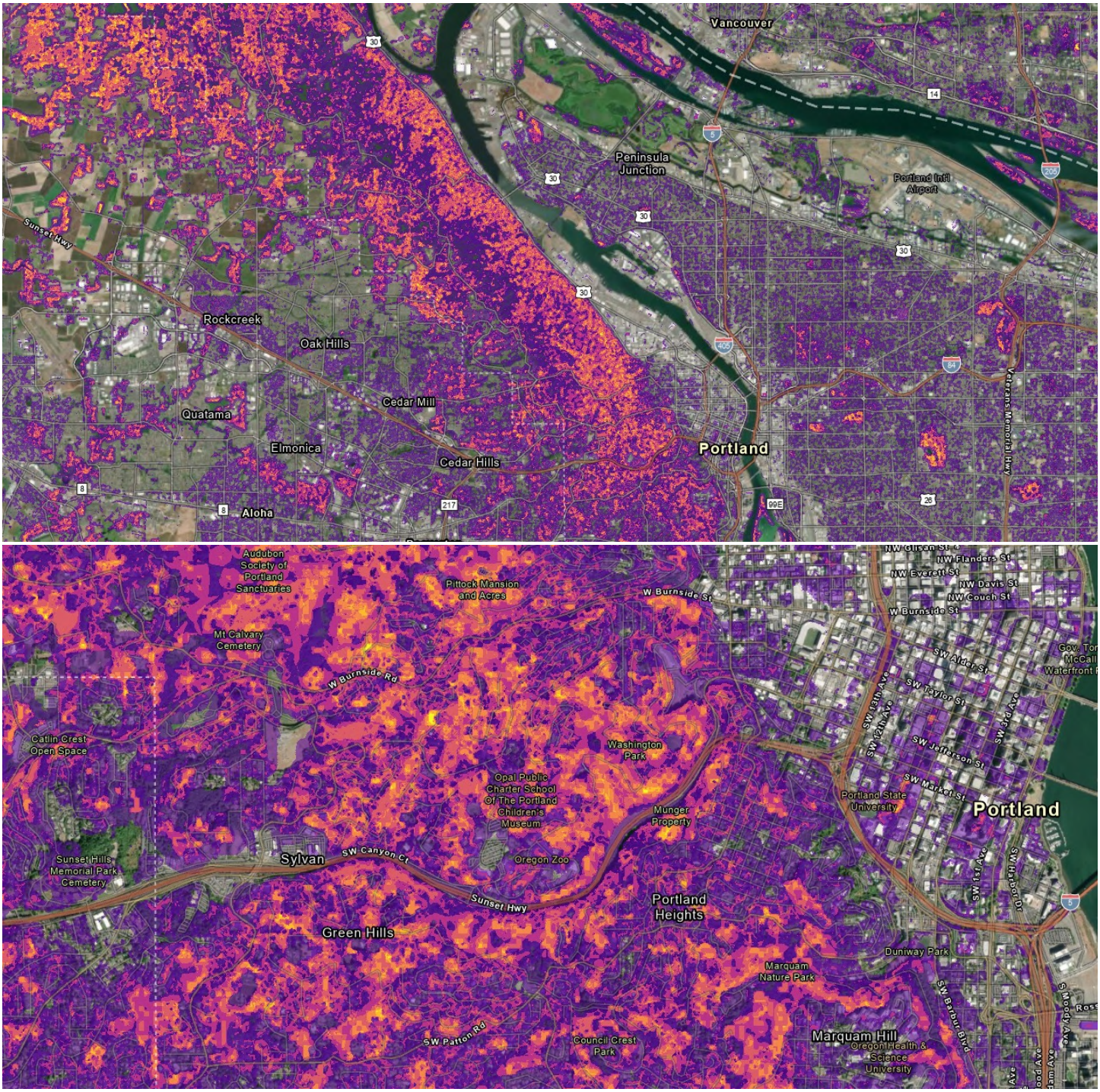


Figure 7: Forested habitat results for the Forest park area (a) zoomed to Marquam nature park area (b)

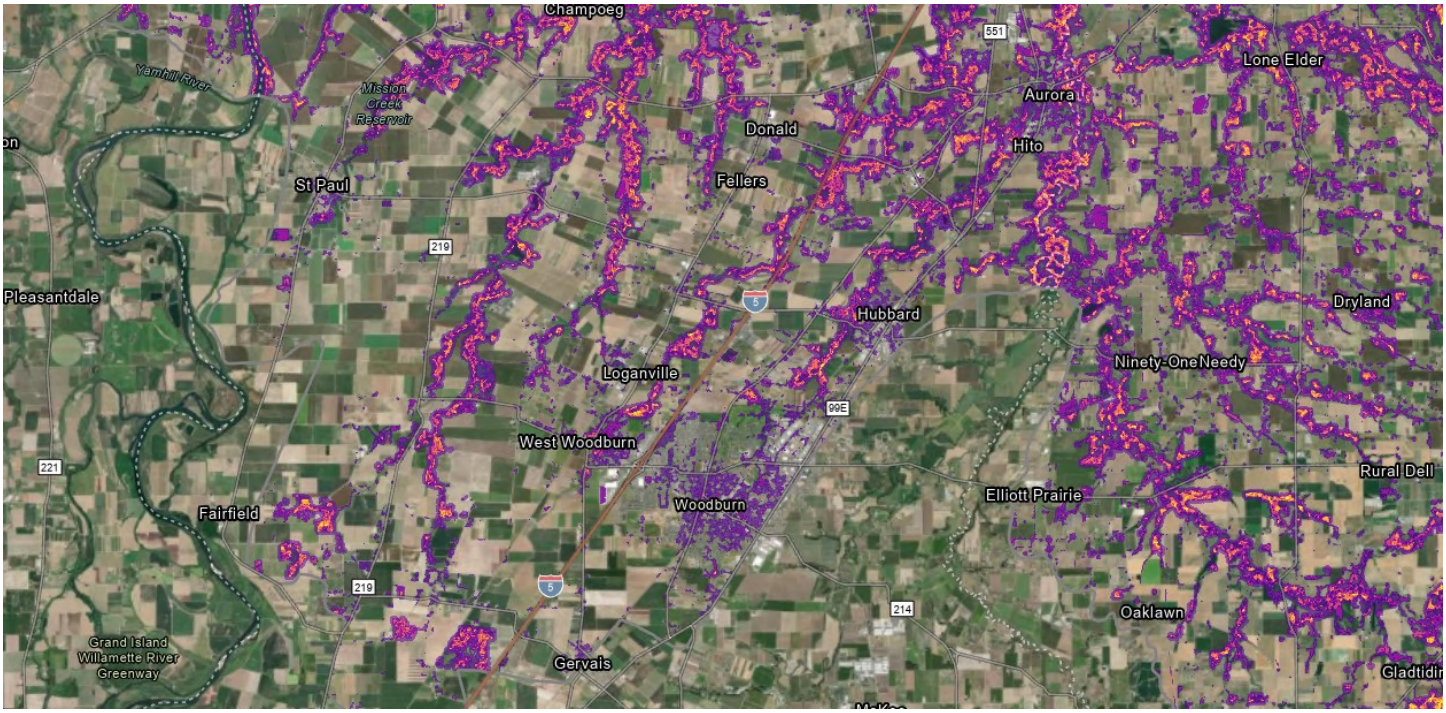


Figure 8: Forested habitat results for the Woodburn area showing constrained flow

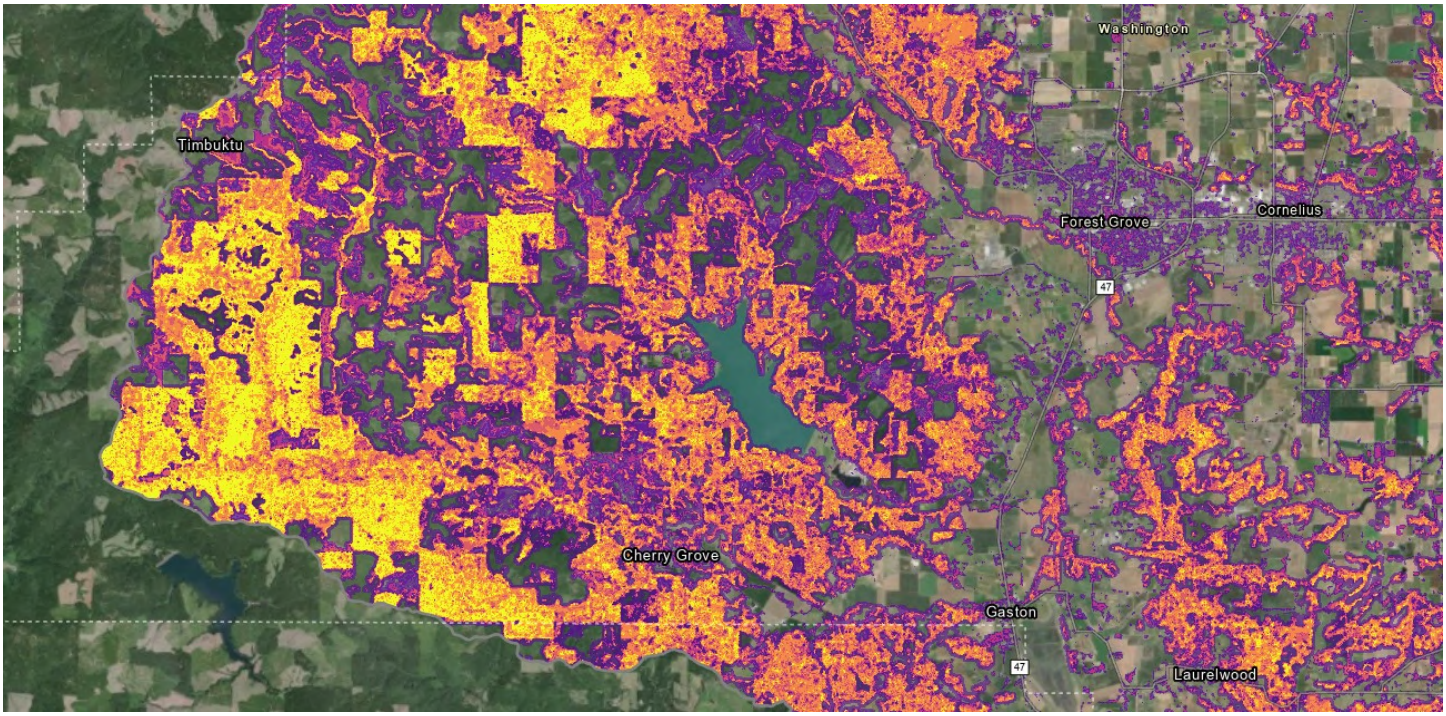


Figure 9: Forested habitat results for the Southeast area of the Intertwine region showing high connectivity value forested areas

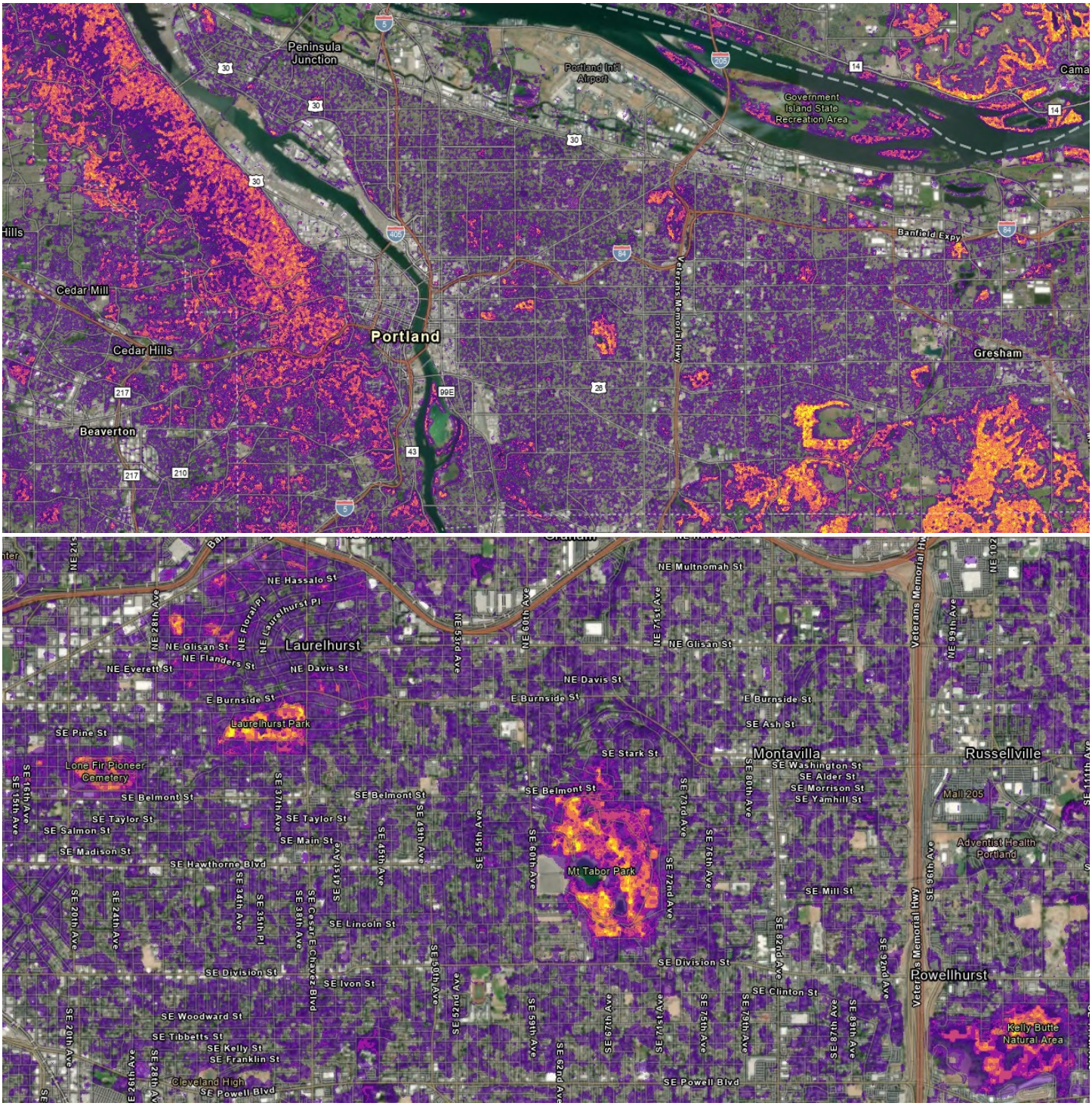


Figure 10: Forested habitat results for the Portland (a) and zoom of Mt Tabor (b)

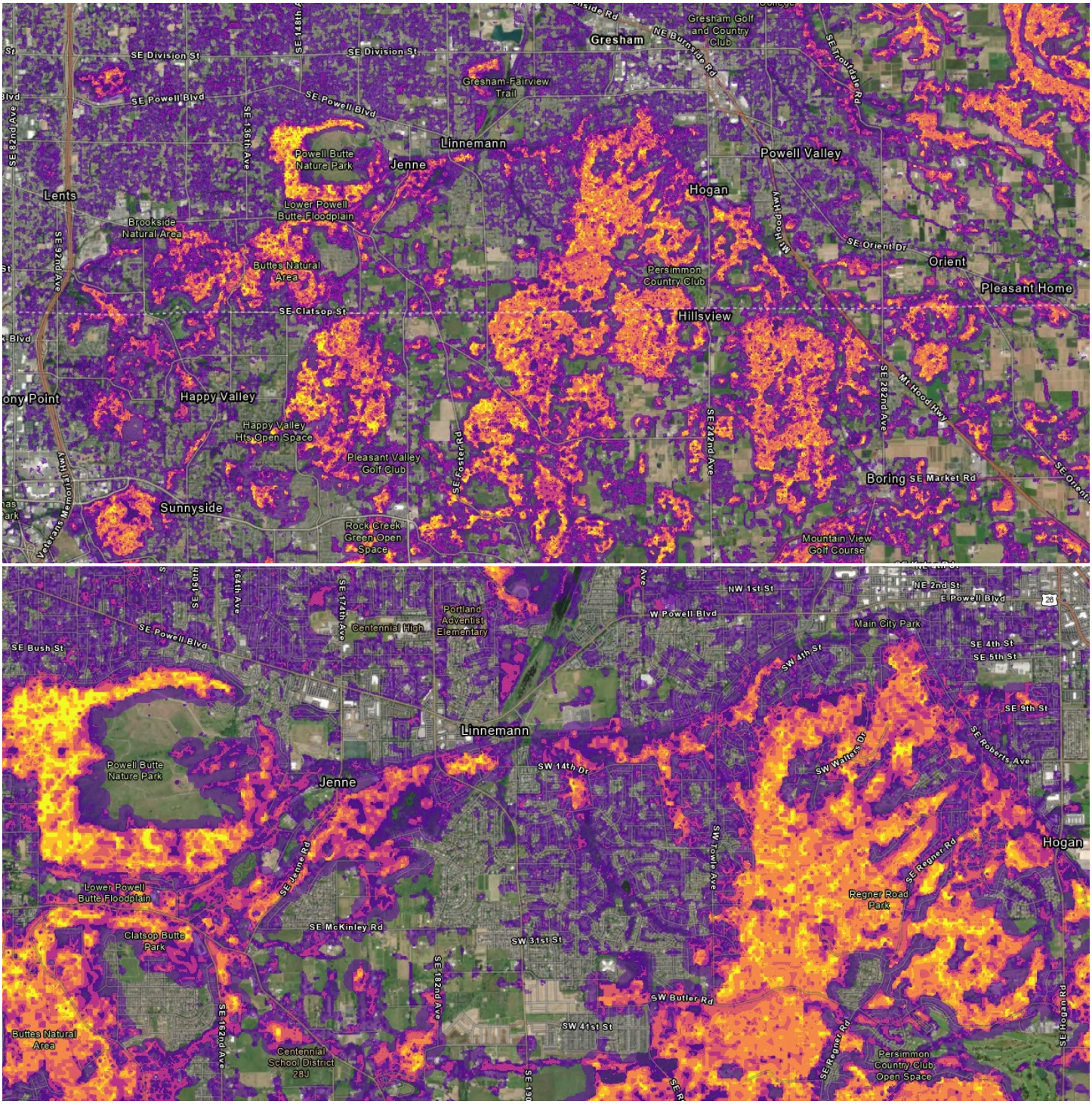


Figure 11: Forested habitat results for the Gresham Buttes area (a) and zoomed area (b)

Open Water/Wetlands Habitat Surrogate Species Connectivity Model

There were no extenuating circumstances for development of the Open water/Wetland models. Methods noted at the beginning of this section were followed, and a sample of the model results are shown in screenshots below.

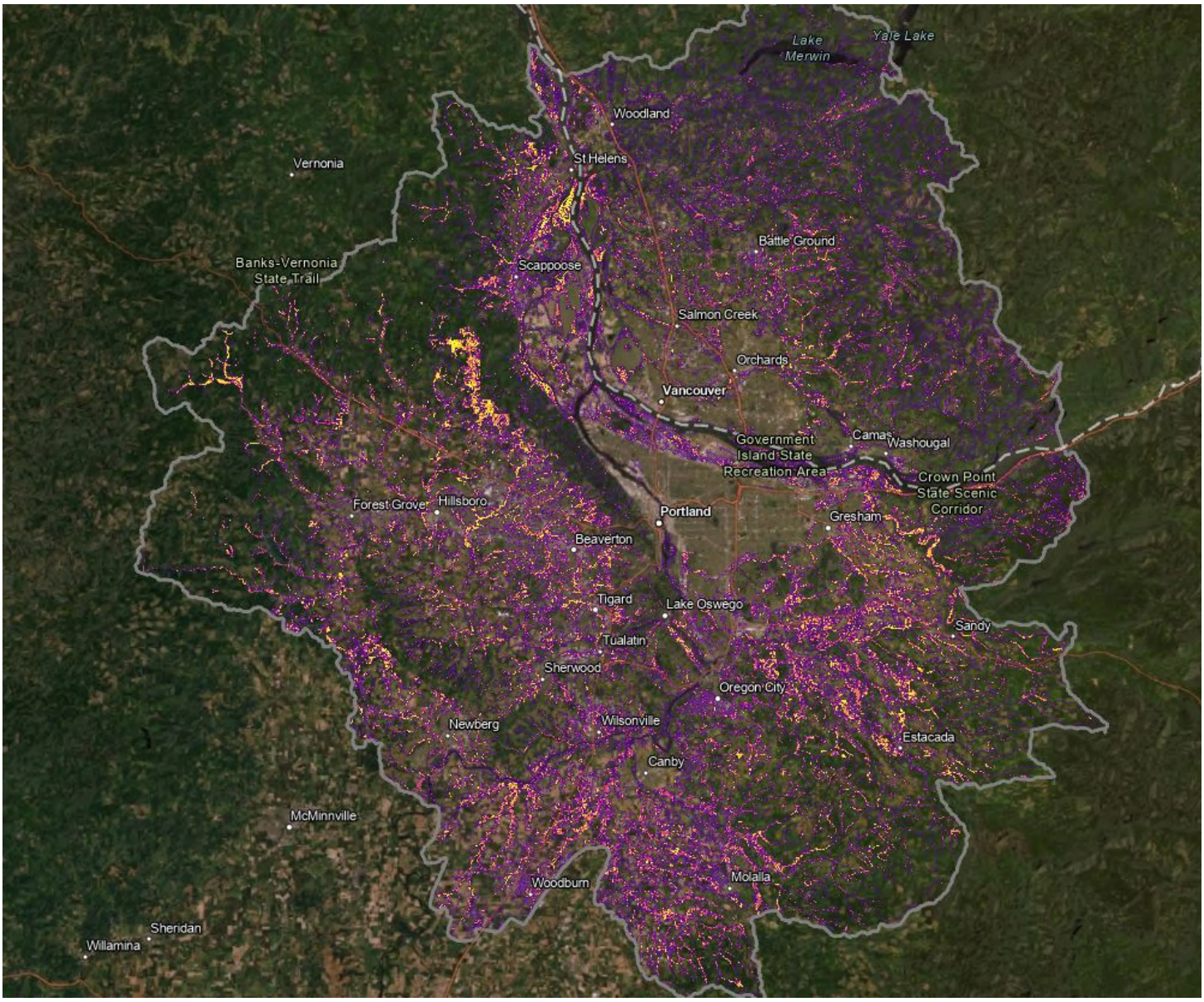


Figure 12: Intertwine region-wide results for the Open Water/Wetlands habitat surrogate species model

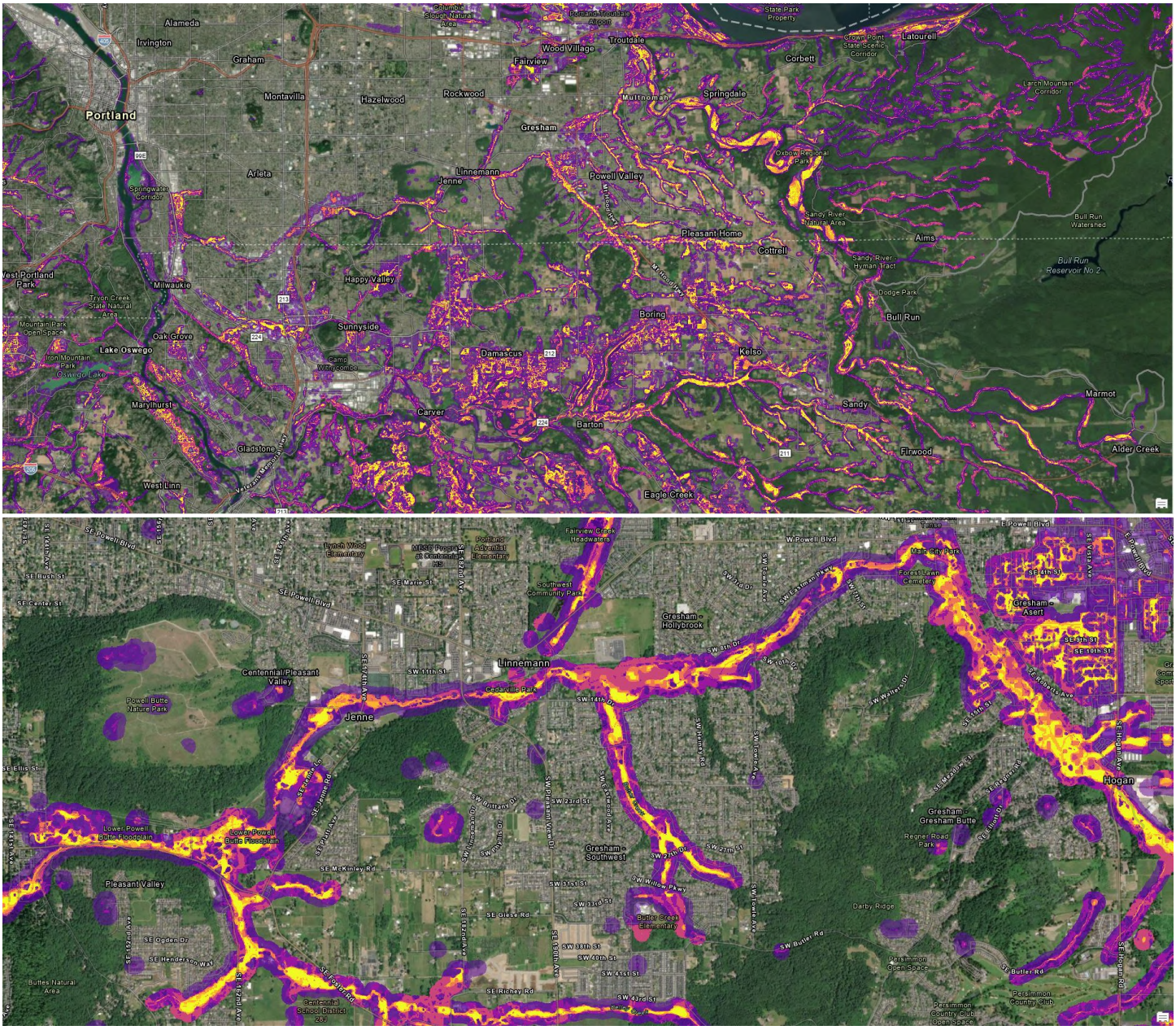


Figure 13: Open water/wetland results for Gresham and east Portland areas (a) upper Johnson Creek zoomed (b)

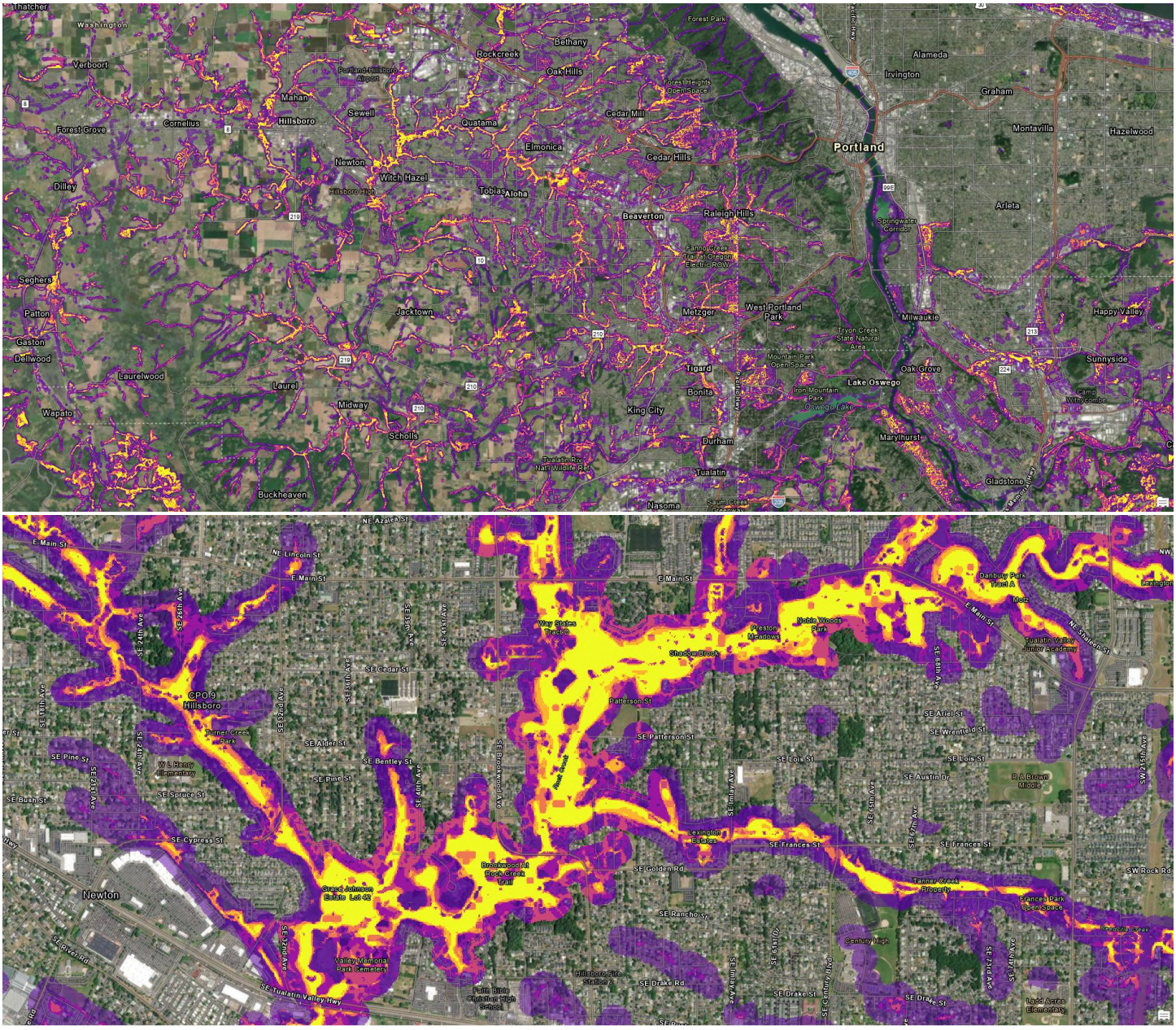


Figure 14: Open water/wetland results for Tualatin hills (a) and zoomed Rock Creek area (b)

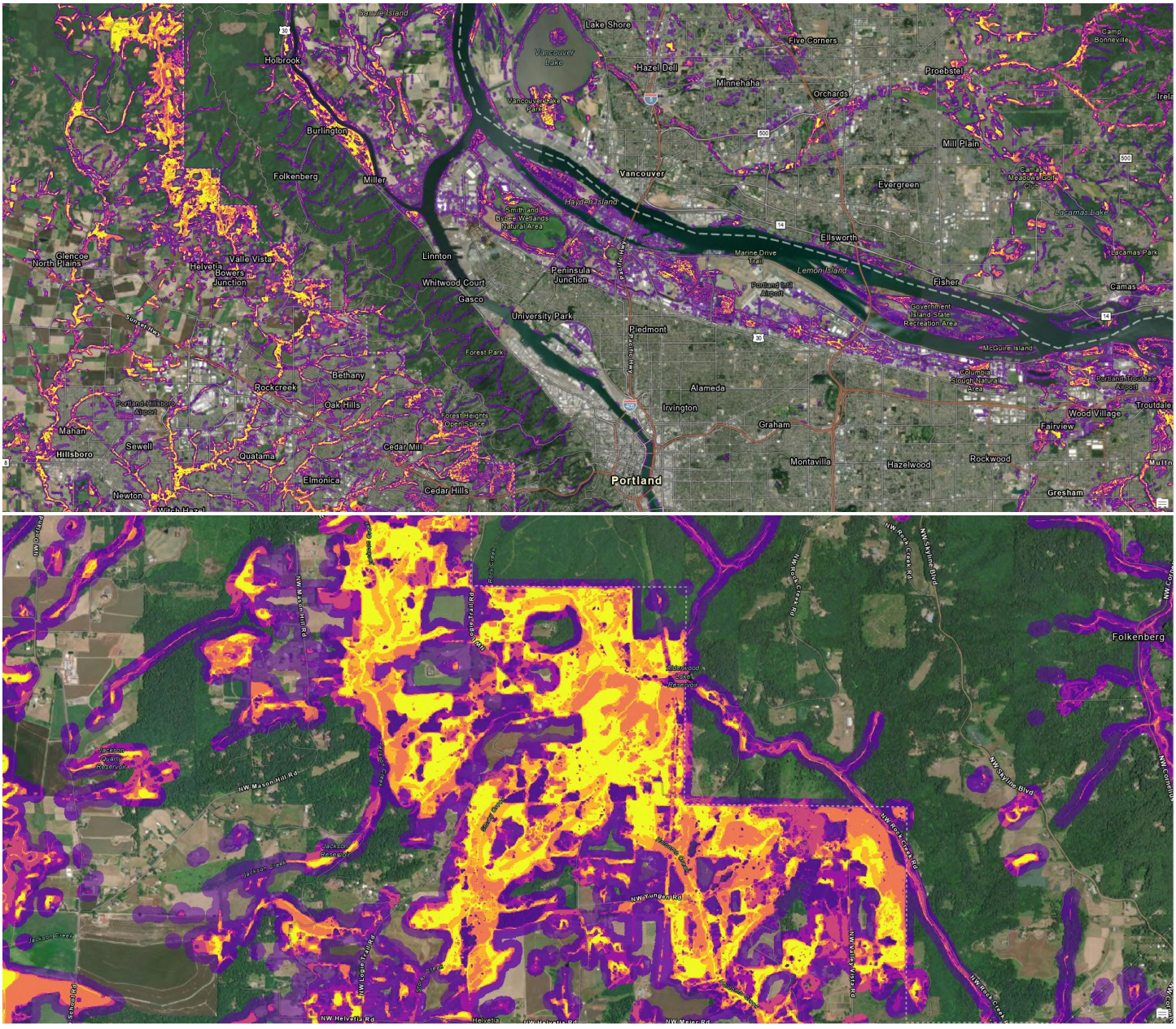


Figure 15: Open water/wetland results for Northwest portion of the Intertwine region (a) and zoom in to most obvious area with data artifact

All Habitats Combined Connectivity Model

All Habitats Maximum

To make the All Habitats Combined Connectivity Model, the cell statistics tool was used with all three habitat types Oak, Open Water, and Forest ("statistic = maximum”), to produce a single connectivity output representing the maximum connectivity values across all habitats. Similarly to the habitat type connectivity models, this maximum result was symbolized to visually represent connectivity pathways. Different pathway shapes and cumulative current results were indexed as values 2-8. The lowest values “<2” represent diffuse minimally connected areas or null connectivity (no connectivity) across the three habitat types, with increasing values up to 8 representing more channelized and/or highly connected areas across the three habitat types (Table 2). This method, of using the Maximum value across all habitat types, highlights any location with high connectivity for at least one habitat model. The result retains all high connectivity values on the landscape, even if it is only highly connective for a single habitat type.

Table 2. Combined Group Sum Cumulative Current Connectivity Index and Connectivity Type Interpretation
Symbology and classification of connectivity pathways defined specially for All Habitats Maximum Connectivity model output for the Intertwine region. The indexed, summed, cumulative current connectivity models range from 0-8 values with 0 representing null or no connectivity, 1 representing very low connectivity and increasing values to 8 representing high connectivity and more channelized pathways.

Value	*Interpretation of Value*
0-1	*Transparent, considered background value, low cumulative current without distinguishable pattern to connectivity*
2	*Low cumulative current and/or highly diffuse flow*
3	*Low cumulative current and/or moderately diffuse*
4	*Low cumulative current and/or low diffuse*
5	*Moderate cumulative current and/or low constricted*
6	*Moderate cumulate current and/or moderate constricted*
7	*High cumulative current and/or moderate constricted*
8	*High cumulative current and/or highly channelized*

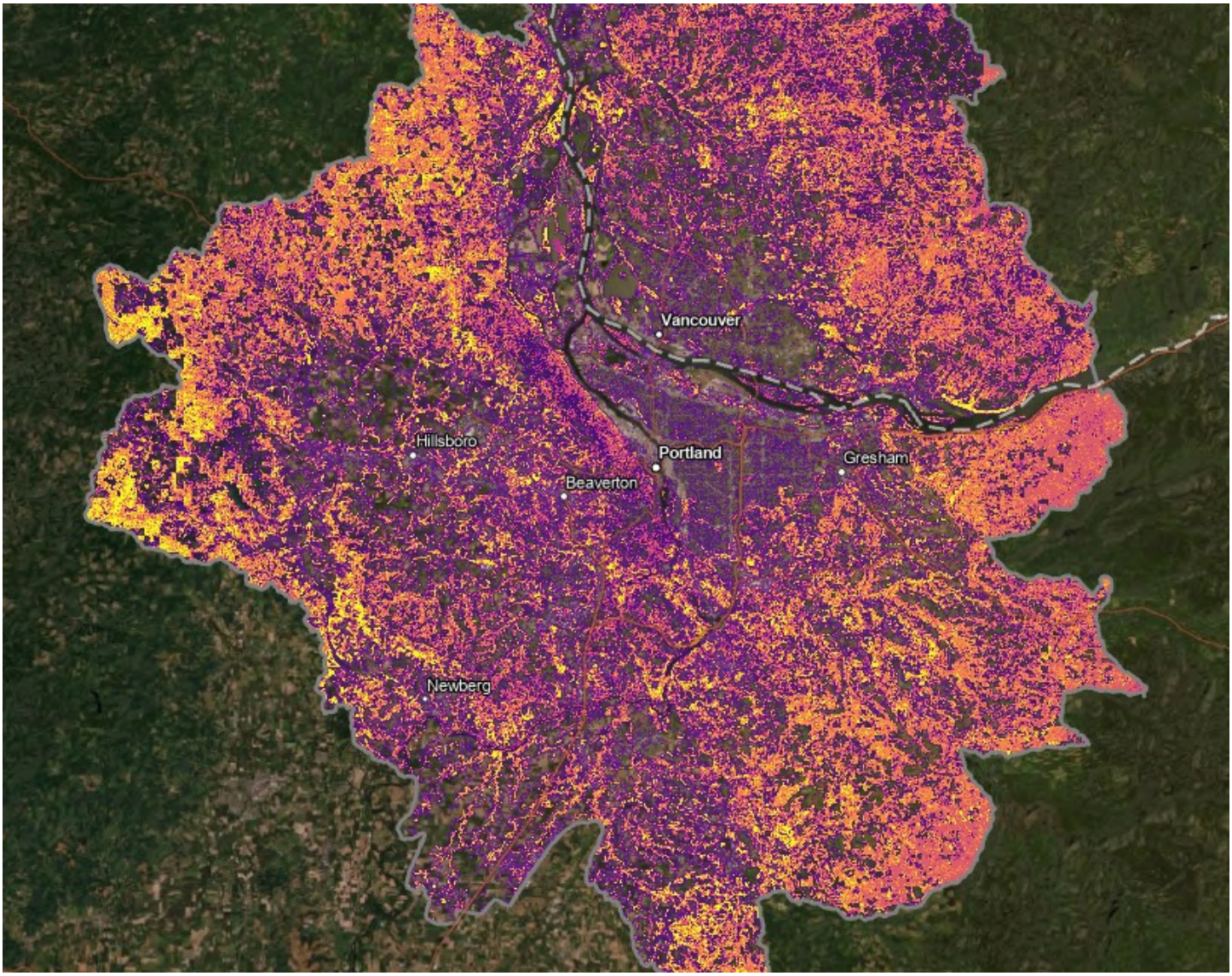


Figure 16: Intertwine region-wide results for the Maximum value all habitats surrogate species model

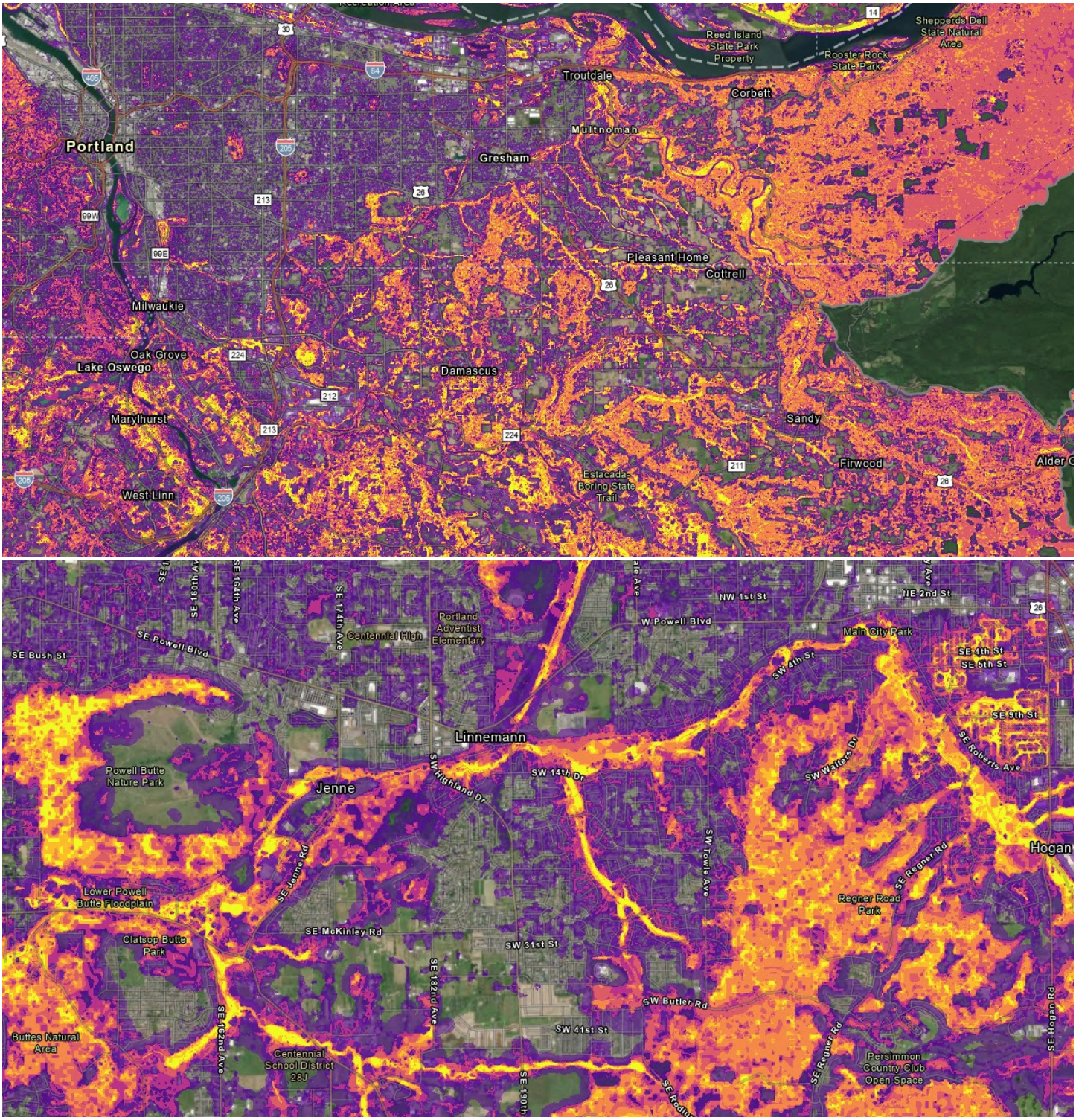


Figure 17: Maximum all habitats combined results for the East side of the Intertwine region (a) and zoomed area of Gresham Buttes (b)

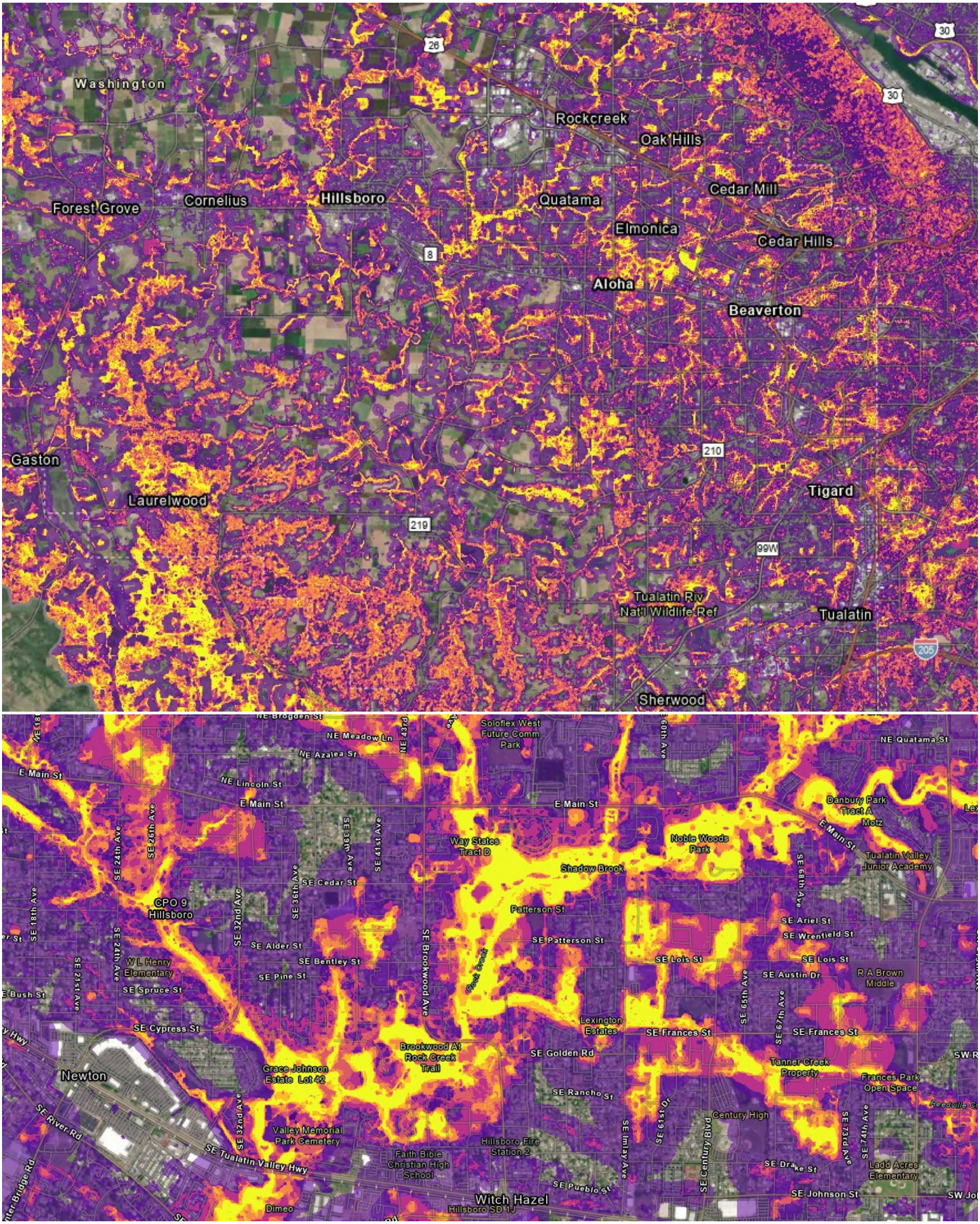

Washington
Rockcreek
Oak Hills
Cedar Mill
Forest Grove
Cornelius
Hillsboro
Quatama
Elmonica
Cedar Hills
Aloha
Beaverton
Gaston
Laurelwood
Tigard
Tualatin Riv
Nat'l Wildlife Ref
Tualatin
Sherwood
26
30
8
210
219
99W
205
Soloflex West
Future Comm
Park
NE Meadow Ln
NE Azalea St
NE Lincoln St
E Main St
NE Quatama St
Danbury Park
Tract A
Motz
Way States
Tract D
Noble Woods
Park
Tualatin Valley
Junior Academy
Shadow Brook
SE Cedar St
CPO 9
Hillsboro
Patterson St
SE Ariel St
SE Wrenfield St
SE Alder St
SE Patterson St
SE Bentley St
SE Lois St
W L Henry
Elementary
SE Pine St
SE Austin Dr
R A Brown
Middle
SE Spruce St
SE Cypress St
Lexington
Estates
SE Frances St
Brookwood At
Rock Creek
Trail
SE Golden Rd
Tanner Creek
Property
Frances Park
Open Space
Newton
Grace Johnson
Estate Lot 42
SE Rancho St
Valley Memorial
Park Cemetery
Century High
Faith Bible
Christian High
School
Hillsboro Fire
Station 2
SE Drake St
Ladd Acres
Elementary
SE Pueblo St
SE Johnson St
Witch Hazel
Hillsboro SD 1J
Dimeo
SE River Rd
SE Tualatin Valley Hwy
SE 18th Ave
SE 24th Ave
SE 28th Ave
SE 32nd Ave
SE 36th Ave
SE 41st Ave
SE 21st Ave
SE Brookwood Ave
SE 65th Ave
SE 67th Ave
SE 68th Ave
SE 74th Ave
SE Imlay Ave
SE Century Blvd

Figure 18: Maximum all habitats combined results for the Western area of the Intertwine region (a) and zoom to the Noble woods park connectivity area (b)

All Habitats Summed

Also included is an All Habitats Summed dataset that used the raster calculator to sum the connectivity outputs for all habitat types. The values of this summed dataset range from 1 to 24. This was categorized into 4 equal intervals (1-6, 7-12, 13-18, and 19-24). The lowest category (1-6) was visualized as transparent and can be considered not conducive to connectivity. The 7-12 category can be interpreted as low current and low diffuse flow, the 12-18 category as moderate current and moderately constricted flow, and the 18-24 category as high current and highly channelized flow (See Table 3). The method of using the Summed value for all habitat types, highlights locations where multiple habitat types have high connectivity values. However, the Summed model only highlights areas where high connectivity values exist for multiple habitats (in contrast to the Maximum model described above), and therefore visually biases high connectivity toward areas with less common habitat types (i.e. Oak)

Table 3. All Habitats Summed Cumulative Current Connectivity Index and Connectivity Type Interpretation
Symbology and classification of connectivity pathways defined specially for All Habitats Summed Connectivity model output for the Intertwine region. The indexed, summed, cumulative current connectivity models range from 1-24 values with 1 representing very low connectivity and increasing values to 24 representing high connectivity and more channelized pathways.

Value	*Interpretation of Value*
1-6	*Transparent, considered background value, low cumulative current without distinguishable pattern to connectivity*
7-12	*Low cumulative current and/or low diffuse flow*
13-18	*Moderate cumulative current and/or moderately constricted*
19-24	*High cumulative current and/or highly channelized*

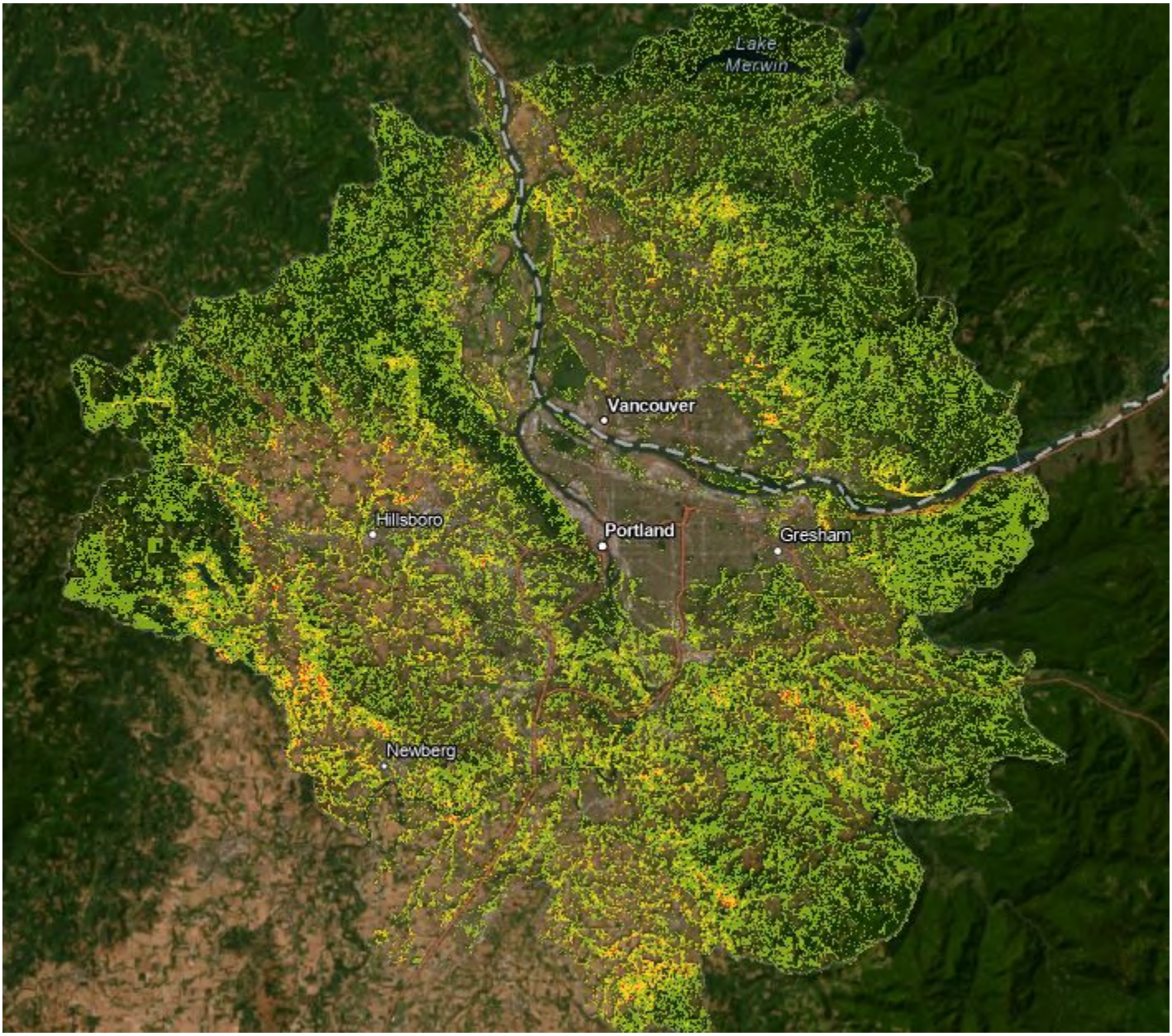


Figure 19: Intertwine region-wide results for the exploration of a Summed all habitats surrogate species model

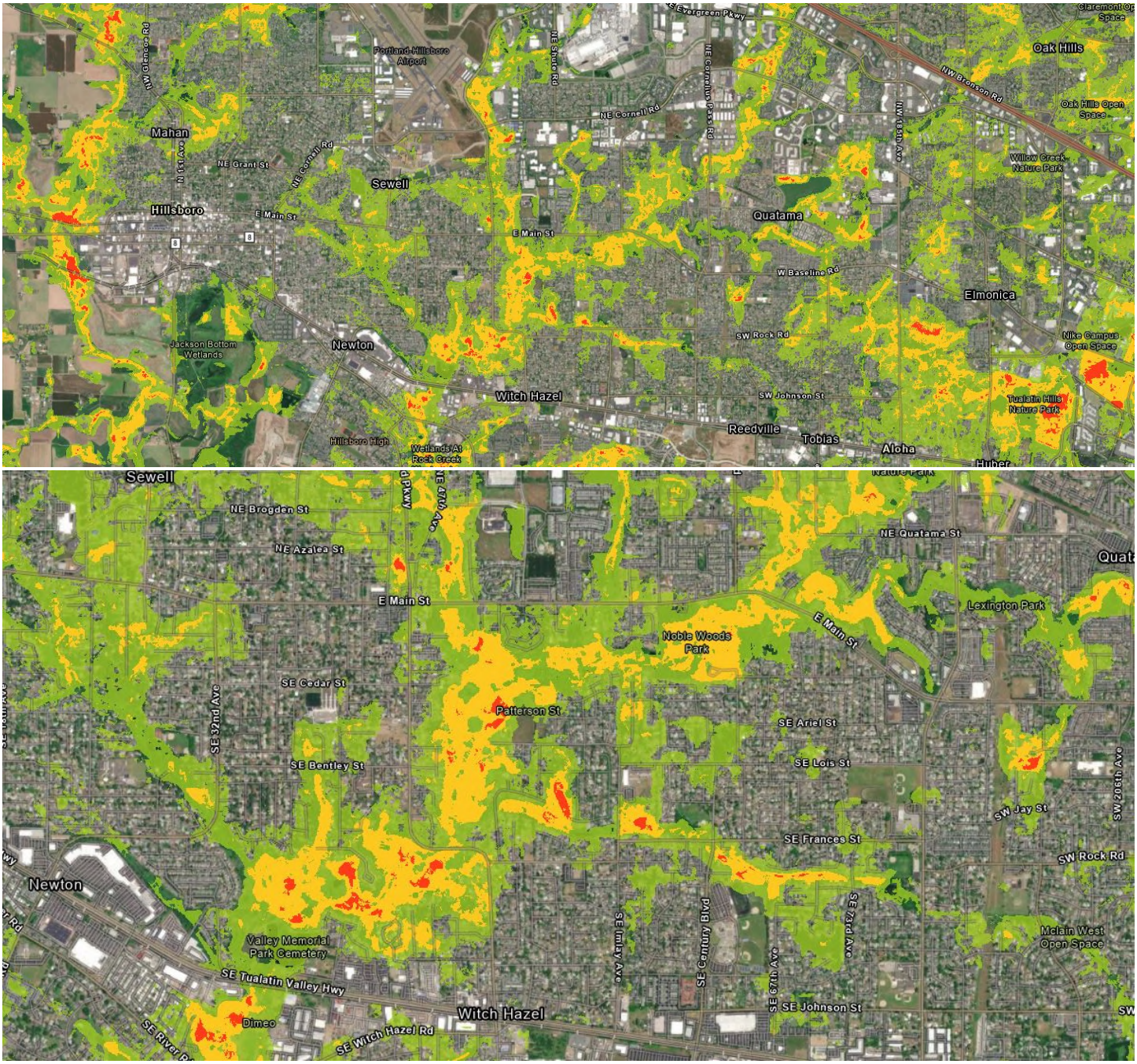


Figure 20: Summed exploration model results for the west side of the Intertwine region (a) and Noble woods park connectivity network zoomed (b)

Discussion

The habitat connectivity modeling results give valuable insight into locations across the metro region where high current flow values and conversely areas with low current flow values are for a given habitat type. High values indicate locations where connectivity is constrained and/or of high cumulative value. Many, but not all, locations with suitable habitat are also likely to be constrained in the urban environment given the limited availability of open space. Areas with large open space, such as Forest Park, and areas in the margins of the intertwine region for example, are less constrained and in places show lower values, but are known to include high value habitat. These visual discrepancies make interpretation somewhat challenging and caution should be taken in assuming that all high value areas are critical for connectivity and conversely that all low value areas are not. Additional modeling activities and analysis of the outputs can help to differentiate between these conditions and aid in simpler interpretations. At this time, with Metro's leadership, a group is convening to discuss the next steps in utilizing the existing model outputs and potentially generating new products to support connectivity work in the region.

At a regional scale the Oak model and Open water/Wetlands model have similar distribution of high value areas within the central southern portion of the region and some limited distribution in the central north portion (Figures 2 & 12), while the Forest habitat model appears to be roughly inverse with the highest values at the outer boundaries of the Intertwine region and along Forest Park (Figure 6). Areas of consistently high current flow include known natural areas such as Canemah Bluffs (Figure 3a, 3b), Burlington Bottoms (Figure 15a), Noble Woods Park (Figure 18a, 18b), Tualatin Nature Park (Figure 14a), and Oaks Bottom (Figure 4a, 4b) as examples. Generally, the largest areas of the lowest or no symbolized current value run through the districts of the city of Portland (with the exception of West Portland) (Figures 2, 4(a), 6, 7(a), 10(a), 12, 14(a), 15(a)). These are most pronounced for the Oak and Open water/wetland habitat types. The Forest habitats model is also low in these Portland districts; however, hotspots do appear, for example at Mt Tabor and Johnson Creek (Figures 10(b), 13(b)). The Forest habitat model shows greater distribution of current overall (both high and low) throughout the region, likely due to backyard habitat, street tree canopy cover, and tree cover in parks and natural areas. Many of these areas help to illustrate where action could be taken to support building connectivity between existing high value or constrained patches and/or where gaps exist and opportunities to add stepping stones could provide additional connectivity source areas for mobile species.

There is utility to being able to look specifically at one habitat type over the other, but the combined model gives an opportunity to consider how these varied habitats might provide connectivity across the region in concert. In an effort to best visualize and interpret the combination of habitat specific connectivity models we experimented with displaying the maximum value of each layer versus summing the values together. The method of using the Maximum value across all habitat types highlights any location with high current flow for at least one habitat model. The result retains all high current flow values on the landscape, even if it is only high for a single habitat type (Figure 16, 17a, 17b, 18a, 18b). The Maximum value model therefore, provides guidance across the region for locations where connectivity value is highly constrained/or has a high cumulative value for any habitat type, allowing for local and regional partners to best determine how they might contribute (or are already contributing) to connectivity value across the Intertwine region. This is in contrast to the Summed model, where only areas with high values for all habitat types would display a high constrained/or high cumulative value

connectivity value. Due to the nature of the modeled habitat types, the likelihood of all three spatially overlapping with high scores is unlikely, meaning areas in the region with high scores are very limited and patchily distributed (Figure 19, 20a, 20b). The Summed model is most interpretable at the very highest and very lowest values. For example, if the summed value output results in the highest possible value, we know that is because all three habitat layers have therefore contributed the highest value, however anything less than that and it is unclear which habitat type is contributing less and the possible combinations of values (and uncertainty in interpretation) only increase as the output value decreases. Because the habitat types differ in how frequently they occur on the landscape, with Forest being the most ubiquitous and Oak being the least, the Summed model biases high value areas toward Oak habitats and shows reduced value in all other parts of the landscape. The Summed model can, however, be a useful tool when considering regional priority connectivity areas that give the most constrained and/or cumulative connectivity value. If the goal is to determine a more selective set of areas with maximum values, that includes multiple habitat types, the Summed model can be a useful starting point. Ultimately, while there is a limited case use for the Summed model, we recommend using the Maximum combined model as the primary output for considering high value areas across priority habitat types in the region as this model provides a better representation of constrained and/or high cumulative connectivity values at a regional scale and is easier to interpret than the Summed model.

A notable issue with the model results includes the spatial distribution of values influenced by a data artifact due to the underlying spatial data (see example in Figure 15a, 15b) and is most influential in the Open water/Wetland model. This artifact is due primarily to hydric soils data used to help identify wetland areas. As more accurate fine scale data on soils, vegetation, and water resources become available, these models can be updated and these issues will be resolved. As with all models, the results are only as accurate as the underlying data and the assumptions used to build it. As mentioned above, we used a surrogate species approach, using known habitat and movement data from a set of surrogate species, used to represent their given habitat types. This information was reviewed by local species experts and refined based on their input. If a new surrogate species is proposed and/or new information becomes available about the movement preferences and habitat use of the existing surrogate species these models could be updated. Telemetry studies would be one way of improving our understanding of how these species navigate urban and urbanizing environments and would not only be valuable in improving these models, but would be a contribution to urban wildlife and habitat connectivity science. If/when resources are available to pursue telemetry studies of the surrogate species, we highly recommend these be conducted and the information is compared to these results, and updates are made to the underlying data as needed.

The true utility and ultimate usefulness of these maps results from the distribution of these data to local and regional partners to support conservation action and partnership in reaching conservation goals. We recommend using ArcOnline or other virtual platforms similar to the ODFW Conservation Strategy Compass tool (Internet at: Compass) allowing users to view, zoom, and manipulate layers as one option for data sharing, as well as providing the spatial data in a downloadable format for those users with spatial software access and expertise. Additionally, we recommend that the announcement of these data being available to partners coincides with a series of in person and/or recorded workshops that highlight the usefulness and limitations of the

models as well as suggestions for collaborative conservation efforts to promote regional connectivity. Ongoing efforts in the advancement of our understanding of regional connectivity constraints and opportunities for collaboration, including cross-benefit strategies with other regional priorities (such as equitable access to nature and reduction in urban heat island impacts to name a few), can support the maintenance and improvement of habitat connectivity in the Intertwine region into the future. We both appreciate the investment to date in habitat connectivity efforts, and would like to encourage continued investment as a benefit to not only the plants and animals that inhabit this region, but also the community of humans that coexist with them.