

From: [Haapala, Jay](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Cc: [Mcleer, Cathy](#); [Redmond, Meghan](#)
Subject: AARP comments, City of St. Paul residential zoning
Date: Tuesday, April 11, 2023 4:29:17 PM
Attachments: [April 2023 AARP St. Paul Housing.pdf](#)

April 11, 2023

St. Paul Planning Commission
25 West 4th Street, Suite 1400
St. Paul, MN 55102

Dear Planning Commissioners:

On behalf of 620,000 AARP members in the state and approximately 27,000 residing in the City of St. Paul, AARP recognizes the City's attention to its housing issues and potential zoning policy to provide more affordable and appropriate housing options for residents today and in the future.

Nationally, statewide and in St. Paul our population is rapidly aging and suitable housing is in short supply. In reaction to these trends, many communities are encouraging development of "missing middle" housing – from the federal government's 2022 announcement of plans to build over 100,000 units of affordable housing nationwide, to the State of Minnesota's new investments, to cities like St. Paul that are updating their zoning ordinances accordingly.

According to AARP/Statista analysis, more than 1,100 older adults (aged 55+) are expected to be evicted in 2023, and 250 older adults (55+) are expected to experience homelessness in Ramsey County, with the majority of older adults being affected in St. Paul. Nearly half of St. Paul renters are cost-burdened and zoning prevents the development of more affordable and appropriate housing in 72% of the City's residential land area. We also call your attention to facts cited in the City of St. Paul Department of Planning & Economic Development Memorandum to the St. Paul Planning Commission entitled "1-4 Unit Housing Study Phase 2" and dated February 24, 2023. According to the American Community Survey:

- Nearly two-thirds, 64.9% of St. Paul households include just 1 or 2 residents (2021).
- Attached single-unit and 2 to 4-unit housing accounts for only 11.5% of the City's housing stock (2017).

AARP is the nation's largest nonprofit, nonpartisan organization dedicated to empowering people aged 50 or over to choose how they live as they age. AARP supports the wider availability of "middle housing" as an affordable, accessible housing option for people of all ages. In early 2023 for reference, AARP published a guide and model ordinance entitled, "[Discovering and Developing Middle Housing](#)," and "[Re-Legalizing Middle Housing: A Model Act and Guide to Statewide Legislation](#)" (which can also be applied to local government). We published similar resources for the development of [Accessory Dwelling Units](#) (ADUs), which is relevant to updating housing policy in St. Paul as well.

Based on this lens, we offer the following comments and recommendations to the Planning Commission and City Council:

Summary of Proposed Changes

The City Council initiated this effort by a resolution passed in 2018. The proposed changes reflect the City's 2040 Comprehensive Plan policies, including policy H-48. "Expand permitted housing types in Urban Neighborhoods to include duplexes, triplexes, town homes, small-scale multi-family... to allow for neighborhood-scale density increase, broadened housing choices and intergenerational living." As of today, regulations applicable to 72% of the land in residential zones allow only detached, single-family homes. The most significant proposed changes will apply to most of the land in those zones.

Overall Response

The plan is consistent with AARP's policies and principles and its model provisions for middle housing and ADUs. We expect that the plan will greatly increase opportunities for older residents to age in place, in more affordable and appropriate homes. Having said that, the plan does not address procedures applicable to new proposed housing types, which can be a significant barrier to new development if impractical. We request the City to consider including the requirement for incorporating universal design, accessibility, and visitability standards.

Neighborhood-scale Density, Middle Housing

AARP finds the proposed changes to H1, H2, H3, and RM zones favorable and consistent with our policy for increased density, and the development of affordable and appropriate housing in a broad sector of the City's residential land area. This includes allowed units per lot, lot size restrictions, maximum lot coverage, maximum floor area ratios, height limits, set-back regulations, cluster developments, and incentives for affordable units, all that favor development. We applaud the further increased density proposed in proximity to transit. It is reasonable for the changes to zone RL to be limited.

We urge the City to include affordable housing requirements for developments that are approved to increase density. While it is important to increase housing supply, it is also important to increase housing supply that is affordable. Increase housing supply of unaffordable housing will not accomplish the goal of providing housing to middle to low-income households.

ADUs

We appreciate that the City's proposal in relation to ADUs is consistent in all major respects with AARP's *ADU Model Local Ordinance*.

Procedural Barriers

AARP urges the City of St. Paul to clarify and streamline procedures to approve new housing development within the proposed ordinance. Unclear and/or impractical processes limit development even where policies allow. We request the City to further ease permit process and reduce burdensome notice periods and hearings. We find it reasonable,

however, for the Planning Commission to review newly allowed cluster developments on parcels smaller than 9,600 square feet.

Universal Design, Visitability, and Accessibility

As mentioned above, AARP urges the City of St. Paul to incorporate universal design, accessibility, and visitability standards. The goal of universal design is to create a living space that anticipates a homeowner's changing needs, as well as the needs of family and guests, and is inclusive of all physical and cognitive abilities. We urge the City to provide incentive to developers by way of grants, tax credits, and funding to incorporate such designs for new construction.

Thank you for considering these recommendations to create more affordable and appropriate housing for residents today and in the future. Thank you also for continuing to engage with residents of all ages as you move toward adopting a new ordinance. Please write back or call if we can be of assistance – cmcleer@aarp.org or 651-726-5640.

Sincerely,

A handwritten signature in black ink that reads "Cathy McLeer". The signature is written in a cursive, flowing style.

Cathy McLeer
State Director, AARP Minnesota



1919 University Avenue W., Suite #500 | Saint Paul, MN 55104
1-866-554-5381 | Fax: 651-644-5539 | TTY: 1-877-434-7598
aarp.org/mn | aarpmn@aarp.org | twitter: @aarpmn
facebook.com/AARPMinnesota

April 11, 2023

St. Paul Planning Commission
25 West 4th Street, Suite 1400
St. Paul, MN 55102

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Thank you for considering these recommendations to create more affordable and appropriate housing for residents today and in the future. Thank you also for continuing to engage with residents of all ages as you move toward adopting a new ordinance. Please write back or call if we can be of assistance – cmcleer@aarp.org or 651-726-5640.

Sincerely,

A handwritten signature in black ink that reads "Cathy McLeer". The signature is written in a cursive style with a large initial "C" and "M".

Cathy McLeer
State Director, AARP Minnesota

From: [Adam Frei](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: 1-4 Unit Housing Study Proposal and Recommendations
Date: Wednesday, April 12, 2023 12:03:39 PM

Dear Planning Commissioners,

Thank you for the invitation to comment on the proposed zoning amendments based on the recent 1-4 Unit Housing Study. I enthusiastically support the goals of this proposal, and recommend the following changes:

1. Further simplify proposed zoning standards by eliminating the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more equitable approach. It would also make the code simpler for people seeking to build new homes.
2. Expand the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. Expand "density bonus" incentives to support more sustainable housing developments beyond affordable and 3 bedroom units. Please also consider offering density bonuses to include cooperative homeownership models, electric vehicle charging, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Adam Frei
936 Albemarle St.
Saint Paul, MN 55117

Emma Brown

From: Austin Wu <theaustinwu@gmail.com>
Sent: Monday, March 13, 2023 8:19 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Comment on 1-4 Unit Housing Study

Follow Up Flag: Follow up
Flag Status: Flagged

Hello there,

I am writing a comment in support of the proposals found in the 1-4 Unit Housing Study. It is really exciting that this proposal would legalize a great number of homes-per-lot throughout the City, and a wider variety of housing types to accommodate the various dimensions of diversity among Saint Paul households: the number of residents, physical abilities, the amount of indoor and outdoor space residents want and need, and more. Walking around Saint Paul I see a lot of empty or underused lots where more housing can be fit in, and instead of growth being lost to the suburbs more housing options can help keep more people in the City. The proposed “density bonus” for 80% AMI affordable homes and three-bedroom apartments is a great addition. I currently live in a shared house right now, but am intrigued about the possibility of living in an ADU on a quiet alleyway – if more ADUs existed in the City. We need more ways of incentivizing the construction of unsubsidized affordable homes in our city, and this is a good start.

However, I think the City can be more ambitious in legalizing and incentivizing a greater variety of higher-density housing options throughout the City. The proposed zoning district H1 should be eliminated, and the existing zoning districts R1, R2, R3, R4, RT1, and RT2 should be simply consolidated into the proposed zoning district H2. The name of the existing zoning district “RL” should be changed to “H1”. The City staff’s recommendation is arbitrary; there is no compelling reason for limiting the number of Homes Per Lot to three in areas currently zoned R1, R2, and R3, which tend to be more expensive and exclusive neighborhoods. Lots in the areas currently zoned R1-R3 are generally larger than lots zoned R4-RT2, and thus provide more opportunities for building infill housing. The technical standards of the proposed H1 zoning district (e.g. minimum Lot Area Per Unit) would effectively prevent infill development in many of the places that are most conducive to it. Consolidating the zoning districts of the current code into one new district (H2) instead of two different ones (H1 and H2) would make our Zoning Code simpler and easier for would-be small-scale developers to navigate. The number of places where the proposed H3 district can be applied should be expanded, from 1/8 of a mile from neighborhood nodes and rapid transit to up to 1/4 of a mile away. Additionally, the proposed H3 district should be applied along every arterial street in Saint Paul.

Finally, to assist people in getting infill lots filled in quickly, I am curious about the capacity for Saint Paul to have a catalog of pre-approved buildings which can be constructed by-right. In South Bend, Indiana, there is now a catalog from the municipal government which contains pre-approved plans ranging from a 1-bedroom carriage house to a two-story, 6-unit apartment building. I think the plans look quite nice, and would fit right in in Saint Paul too. It can be found here for reference:

- <https://southbendin.gov/bsb/preapprovedplans/>
- https://southbendin.gov/wp-content/uploads/2022/08/SBBT_Catalog_22-0112-lowres.pdf

Sincerely,

Austin Wu
1892 Feronia Avenue
Saint Paul, MN 55104

From: [Benjamin Werner](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Phase 2 Comments
Date: Tuesday, March 7, 2023 10:48:20 AM

Good morning,

Here are my comments on the 1-4 housing study.

1. I think the proposed new zoning areas generally look good. It makes sense to allow all these new housing types.
2. Some of the alley configurations are confusing. I understand the benefits. However, when imagining plowing the alleys I feel like some of the configurations will make that quite difficult. It's worth contemplating.
3. There was a lot to read through, but generally speaking it looks like the highest value properties and areas are not going to be rezoned. To me, that feels like a continuation of the exclusionary zoning this study is working to prohibit. Areas in Battle Creek, around Como and Phalen lakes, in Saint Anthony Park, and around Crocus Hill all won't change much. Density won't increase in the highest value areas, which will maintain their exclusionary characteristics in the first place. I could be mistaken but that's how I felt after an initial read through.

Exciting work overall! I'm looking forward to more duplexes and triplexes in St. Paul!

Ben Werner

From: [Benjamin Werner](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Re: Address requirement for public comments.
Date: Wednesday, April 12, 2023 9:19:01 AM
Attachments: [image001.png](#)

Great!

My address is 431 Classon Ave #1C, Brooklyn, NY 11238

On Wed, Apr 12, 2023 at 9:22 AM *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:

Hi Ben,

It does not prevent you from commenting. State law just requires that we have addresses for the record.

Thanks,

Emma

From: Benjamin Werner <benreszkawerner@gmail.com>
Sent: Tuesday, April 11, 2023 4:41 PM
To: *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us>
Subject: Re: Address requirement for public comments.

Emma,

I'm not a St. Paul resident anymore. Does that prevent me from commenting?

Ben

On Tue, Apr 11, 2023 at 4:39 PM *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:

Emma Brown

From: Braden Holmes <bradenholmes33@gmail.com>
Sent: Monday, March 20, 2023 11:08 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: 1 to 4 Housing Study
Attachments: image001.png

Follow Up Flag: Follow up
Flag Status: Flagged

Emma,

Hello, my address is 200 Exchange St S, St Paul, MN 55102. Again, I look forward to seeing the results of the study!

Thank you,
Braden Holmes

On Mon, Mar 20, 2023, 10:57 *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:

Hi Braden,

Thanks for your comments! If you'd like your comments to be part of the public record and shared with the Planning Commission as an official comment, **please respond to this email with your address.**

Thank you,

Emma Brown

Senior City Planner

Pronouns: she/her

Department of Planning and Economic Development

1400 City Hall Annex, 25 West Fourth Street

Saint Paul, MN 55102

P: 651-266-6657

emma.brown@ci.stpaul.mn.us



From: Braden Holmes <bradenholmes33@gmail.com>
Sent: Wednesday, March 15, 2023 11:45 AM
To: *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us>
Subject: 1 to 4 Housing Study

Dear Planning Commission of St. Paul,

It is very encouraging to hear about this study which seeks to explore more housing options for the residents of St Paul. I have previously lived in places where the rental stock was overpriced and sprawled out, so the idea that we may be able to expand the density of St. Paul (and lower the price of rent, which is rather high) makes me quite happy.

I look forward to the results of this study as well as other movements towards a greener, denser, less expensive and more walkable city.

Sincerely,

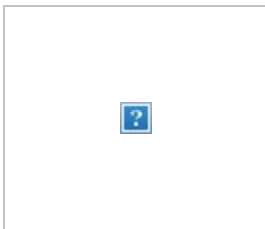
Braden Holmes

From: [Isaac Russell](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: RE: Center for Economic Inclusion Comments 1-4 Unit Study
Date: Tuesday, April 11, 2023 1:41:30 PM
Attachments: [CEI 1-4 Unit Comments.pdf](#)

To Whom it May Concern,

Please see the attached comments on the 1-4 Unit Study for the Planning Commission. Please let me know if you have any questions.

Thank you.



Isaac Russell, MPP
Director of Public Policy

irussell@centerforeconomicinclusion.org
www.centerforeconomicinclusion.org
O: 651.203.8447 C: 651.428.2752





Osborn370
370 Wabasha Street North,
Ste 900, St. Paul, MN 55102

info@centerforeconomicinclusion.org
www.centerforeconomicinclusion.org
(612) 351-8200

Dear Planning Commissioners,

My name is Isaac Russell, and I am the Director of Public Policy at the Center for Economic Inclusion. Thank you for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study.

We at the Center are committed to closing racial wealth gaps and building regional economies that truly work for everyone. To create a truly inclusive economy, state and local government must confront how current ways of doing business exacerbate racial inequities and economic growth and prosperity. When we look at access to affordable housing for first time homebuyers, we see startling gaps between communities of color and their White counterparts. For instance, 72 percent of middle-income White households are homeowners compared to 41, 53, and 50 percent of Black, Indigenous, and Latine middle-income households respectively. We also know that 3-65 percent of Black, Indigenous, Latine, and Asian households pay more than 30 percent of their income toward rent. According to Tufts university, this means less income for family essentials and contributes to food insecurity, triaging paying bills, and possibly forgoing needed medical care. This has multi-generational impacts on families and on communities. Investments in affordable housing are critical to the well-being of families and communities. We can't attract and retain talent and businesses without it, and to effectively achieve this in St. Paul requires changes in zoning.

We need more housing opportunities. Therefore, the Center for Economic Inclusion supports both the housing proposal in general and the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. We fail to understand why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in the 2040 Comprehensive Plan. The Center previously offered guidance to the City on.
3. We support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings. We encourage the Commission to also consider offering density bonuses to incentivize cooperative

homeownership models, and/or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

We have an amazing opportunity to legalize different types of housing options that can help move us towards a more racially equitable and economically prosperous St. Paul, the home of the Center for Economic Inclusion. Thank you for considering our comments.

Sincerely,

Isaac Russell
Director of Public Policy
Center for Economic Inclusion
370 Wabasha St. N, Suite 900
St. Paul, MN 55102

From: [Jennifer Nelson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: support from the Como Community Council (D10)
Date: Sunday, April 9, 2023 12:36:23 PM
Attachments: [2023.04 D10 1-4 Housing Study Letter of Support.pdf](#)

Hello,

I'm submitting support for the proposed 1-4 unit zoning changes on behalf of the Como Community Council. Please see the attached letter.

Best,

Jenne Nelson
District 10 Como Community Council
Board Chair
612-418-1537



District 10 Como Community Council

1224 Lexington Parkway North

Saint Paul, MN 55103

651.644.3889

organizer@district10comopark.org

www.district10comopark.org

April 13, 2023

To the Saint Paul Planning Commission and City Council

District 10 Como Community Council is writing to express our strong support for the proposed amendments to the Saint Paul Zoning Code, stemming from Phase Two of the 1-4 Unit Housing Study conducted by the City's Department of Planning over the past two years. We urge you to pass the proposed amendments.

We believe the proposed zoning changes will allow opportunities for increased housing density in the City, which will result in a number of benefits.

- An increased supply of housing will help meet a demonstrated need in the City and across the metro area.
- The zoning amendments will create the potential for smaller, more affordable housing units of which there is a critical shortage in the City.
- The zoning amendments will create the potential for more rental units, again a demonstrated need in the City.
- Both the increased affordability and greater number of rental units will allow for housing access to a wider population to our Como neighborhood with its many amenities.
- The increased density could support a greater number of neighborhood-serving businesses which are currently in short supply in Como.

Regarding questions posed by the Planning Commission to the community, we have the following specific responses and input.

- The proposed amendments increase housing options, which is significant for Como (which is currently dominated by single-family housing and the site of many racial covenants).
- We support combining H1 and H2 into a single district that uses the proposed H2 standards.
- We'd like to see density bonuses for multi-family housing as well (i.e., apartments) to encourage more affordable rental units across the City.
- We support the increased flexibility for lot splits, in that this can result in more available and affordable home ownership.

In conclusion, we are strongly supportive of the City of Saint Paul's proposed zoning amendments and applaud the thoughtful, rigorous, and forward-thinking work done by the planning staff to advance these changes. We appreciate the opportunity to comment on the proposal.

Sincerely,

District 10 Como Community Council

Jenne Nelson, Chair

Dan Edgerton, Vice Chair

From: [Emma Brown](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: FW: Single Family Residential Neighborhood
Date: Monday, April 17, 2023 10:12:54 AM

From: Karoline Finlay <karoline.finlay@ci.stpaul.mn.us>
Sent: Monday, April 17, 2023 10:12 AM
To: Emma Brown <Emma.Brown@ci.stpaul.mn.us>
Subject: FW: Single Family Residential Neighborhood

Emma:

Here's another comment that came directly to me.

Karoline.

From: Steve and Crystal Rogers <spcdrogers@outlook.com>
Sent: Monday, April 17, 2023 10:11 AM
To: Karoline Finlay <karoline.finlay@ci.stpaul.mn.us>
Cc: Jane Prince <Jane.Prince@ci.stpaul.mn.us>
Subject: RE: Single Family Residential Neighborhood

Think Before You Click: This email originated **outside** our organization.

No problem. I was not aware of this requirement

Crystal Rogers
2115 Skyway Drive
St. Paul MN 55119

On Apr 17, 2023 10:08 AM, Karoline Finlay <karoline.finlay@ci.stpaul.mn.us> wrote:

Crystal:

Thank you for submitting your comments. However, in order for your comments to be included in the public record you will need to submit your full name and address.

Thank you,

Karoline.

Karoline Finlay

Planning Secretary

Planning and Economic Development

25 4th St. W., 1400 City Hall Annex

Saint Paul, MN 55102

651-266-6641

karoline.finlay@ci.stpaul.mn.us

www.stpaul.gov



From: Steve and Crystal Rogers <spcdrogers@outlook.com>

Sent: Monday, April 17, 2023 10:07 AM

To: Jane Prince <Jane.Prince@ci.stpaul.mn.us>; Karoline Finlay <karoline.finlay@ci.stpaul.mn.us>

Subject: Single Family Residential Neighborhood

Think Before You Click: This email originated outside our organization.

Good morning, Jane and Karoline,

My name is Crystal Rogers and I live on Skyway Drive in St. Paul. I want to encourage you

to vote against zoning changes that would allow duplex and quad homes into any neighborhood without further conversation on impacts to environment, parking, rental vs ownership and the impacts these have in the existing neighborhood.

I do not believe that enough conversation/research has been done to support this.

Thank you for listening,

Crystal

From: [Daniel Tikk](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Support for proposed amendments for Phase Two
Date: Sunday, April 9, 2023 7:16:01 PM

Dear Planning Commission:

I am writing to voice my support for the proposed amendments in Phase Two of the 1-4 Unit Housing Study. The city's approach with these amendments is appropriate to encourage and allow for infill housing development at a pace and scale that should be easy to manage for the city's residents. These amendments are a practical and essential step to provide additional desperately needed housing for the city's current and future residents.

I would recommend a few changes to the proposed amendments to better meet the goals of the study:

First, I suggest combining the two residential districts, H1 and H2, into a single district that uses the H2 standards. The distinction between the two as proposed is unnecessary, and the zoning code would benefit from the more streamlined approach.

Second, I suggest expanding the use of H3 zoning. It would be appropriate to expand its use to lots within 1/4 mile of BRT routes and neighborhood nodes, as this aligns with previous practice and better utilizes these transportation and community resources.

Third, I suggest expanding the density bonus to encourage additional affordable homes, such as by offering a higher bonus for homes affordable at 60% of AMI or lower. I would also support additional density bonuses for projects that align with other city goals around climate change and reducing emissions, such as homes that include solar panels, smart electric panels, EV chargers, induction cooktops, electric dryers, electric water heaters, and an additional bonus for projects which are entirely free of a natural gas hookup.

Thank you for the opportunity to provide comments. The proposed zoning amendments are a thoughtful, measured approach that will improve the housing landscape in Saint Paul.

Sincerely,
Daniel Tikk
791 Ashland Avenue, St. Paul, MN 55104

Emma Brown

From: David Ackos <davidackos@gmail.com>
Sent: Thursday, April 13, 2023 5:34 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Comments for Public Hearing on 1-4 Study

Follow Up Flag: Follow up
Flag Status: Flagged

Hi,

My name is David Ackos and I'm a resident and homeowner on St. Paul's West Side (739 Smith).

Saint Paul's 1-4 Study is an exciting step towards abundant housing and local control.

Like many other St. Paulites, I am very excited to see the research and moves to legalize many more forms of smaller and more affordable housing. We need to allow incremental development. Higher density in piecemeal approaches is how cities have urbanized in the past. Legalizing cottage courts, small homes, duplexes and triplexes, and ADUs are huge steps towards welcoming all kinds of neighbors into our neighborhoods. Higher density and incremental development will be great for small businesses, urbanism, transit, walkability, bike infrastructure, and our long term climate plans. It also is a small step towards undoing some of the systemic racism that plagues our land use systems.

But on their own the recommendations from this study aren't enough. We need reinstitution of rent stabilization, robust support for development of social and cooperative housing ownership, and community supports for local residents to develop and own these smaller units (especially in common).

I am overwhelmingly supportive of approving the zoning changes as put forward, except for the density bonuses. 15 years affordability at 80% AMI is just too little, and contributes to the same problematic ways we support affordable housing. 80% AMI is actually a solid middle-income by the perspectives of most St. Paulites, since the Area Median Income is deeply skewed by the tax havens outside of the cities that benefit from our labor. We need permanent affordability and local control – and projects across St. Paul and Minneapolis are exploring how to go about this. The city needs to provide technical assistance and funding for group builds and permanently affordable land ownership in models like the Permanent Real Estate Cooperative. Then we can realize the true potential of this rezoning, and grow our city by our priorities and values, not the whims of the market.

For this reason, I urge city council and the planning commission to approve these changes. However, I ask that you allow the density bonuses explicitly for 1. Permanently affordable projects, and/or 2. Permanently locally controlled projects, so that they are not used to continue extracting land and value from our neighborhoods.

--

David Lauer Ackos

They/them

davidackos@gmail.com | +1 651-328-3396

From: [Emma Runchey Smalley](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Support for Variety of Neighborhood-Scale Housing in Saint Paul
Date: Wednesday, April 12, 2023 9:12:22 PM

Dear Planning Commissioners,

Thank you for the invitation to comment on the proposed zoning amendments stemming from Phase 2 of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general and also recommend the following changes:

1. *Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.*

2. *Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).*

3. *I support the proposed “density bonus” that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).*

Thank you so much for your consideration.

Sincerely,
Emma Runchey Smalley
1600 Grand Avenue, Saint Paul, MN 55105

Emma Brown

From: Jordan Backstrom <Jordan@fhfund.org>
Sent: Thursday, April 13, 2023 9:12 AM
To: *Cl-StPaul_1to4HousingStudy
Subject: 1-4 Unit Housing Study Comments
Attachments: FHFund Letter STP 1-4UnitHousing.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Saint Paul Planning Commission:

The Family Housing Fund (FHFund) is pleased to comment on the draft ordinance proposed as part of the zoning updates with the 1-4 Unit Housing Study Phase 2. We support the City's goals in these proposals to increase housing supply choice in Saint Paul. A greater range of housing choices leads to economically diverse and accessible communities and neighborhoods.

The Family Housing Fund and collaborative partners lead the Building Equity in Small Multifamily Initiative, which is a set of strategies to ensure low-to-moderate income community residents have the opportunity to purchase 2-4 unit buildings, become owner-occupant landlords, and build wealth through home equity and rental income. We believe this is a promising strategy to reduce racial wealth disparities, prevent displacement, and support local ownership and control of land. FHFund has also worked for several years to increase development of ADUs as a type of small-scale housing that can play an important role in addressing our region's need for more affordable housing options.

We have identified several specific opportunities to strengthen the built form draft guidelines to help achieve the 1-4 Unit Housing Study vision. These suggestions are consistent with the goals of the 1-4 Unit Housing Study plan to increase housing choice, equitably distribute housing options, and encourage reuse of existing homes and infill development.

FHFund recommends combining the proposed H1 and H2 districts into one district using the proposed H2 standards. Additionally, FHFund would recommend that proposed RL parcels are also included in this same district with the same standards as proposed H2 districts. This adjustment would further simplify the zoning code, and having more options available by right encourages homeowners as well as emerging and small-scale developers to take on more rehab and infill projects.

Additionally, FHFund recommends adding incentives for affordability and additional housing units in all zones. It is encouraging to see the density bonuses identified by planning staff, including the focus on 3+ bedroom units and affordable units. In conjunction with the recommendation above, FHFund recommends density bonuses in all RL, H1, and H2 parcels match the H2 proposed bonuses (6 unit maximum, 50% lot coverage maximum). These bonuses may make it more feasible to develop 3-bedroom affordable units in 2-4 unit buildings, which is a needed housing type and price point in the region.

Finally, FHFund recommends reconsidering the requirements for dedicated sidewalks and pathways to new ADUs. This can provide a financial and potentially logistical challenge that can be a key barrier in developing ADUs. Additionally, FHFund recommends these built form regulations should be further aligned with the City's other programs and departments to remove additional barriers. For example, when building ADUs, the City of Saint Paul requires dedicated water and sewer connections which other neighboring cities in the region do not. FHFund has heard from partners that this presents a key financial barrier to developing ADUs that is unique to the City.

These suggestions to modify the built form regulations changes proposed as part of the 1-4 Unit Housing Study can help to address key barriers to development in Saint Paul. Further, aligning these built form regulations with the City's other programs and departments can further encourage and empower small-scale, emerging developers and homeowners to pursue more Missing Middle development and create new affordable rental and ownership units.

Please feel free to contact me with any questions. Thank you for your consideration.

Sincerely,

Jordan Backstrom *Program Officer*

FAMILY HOUSING FUND

310 4th Avenue South | Suite 9000 | Minneapolis, MN 55415

T 612.274-7696 **F** 612.375.9648

E jordan@fhfund.org

He/Him/His

April 4, 2023

Via email to 1to4HousingStudy@ci.stpaul.mn.us

Dear Saint Paul Planning Commission:

The Family Housing Fund (FHFund) is pleased to comment on the draft ordinance proposed as part of the zoning updates with the 1-4 Unit Housing Study Phase 2. We support the City's goals in these proposals to increase housing supply choice in Saint Paul. A greater range of housing choices leads to economically diverse and accessible communities and neighborhoods.

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regulations with the City's other programs and departments can further encourage and empower small-scale, emerging developers and homeowners to pursue more Missing Middle development and create new affordable rental and ownership units.

Please feel free to contact me with any questions. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Jordan Backstrom". The signature is fluid and cursive, with a long horizontal stroke at the end.

Jordan Backstrom *Program Officer*

FAMILY HOUSING FUND

T 612.274-7696

E jordan@fhfund.org

Emma Brown

From: Gabriella <sggabs@gmail.com>
Sent: Thursday, March 30, 2023 9:53 PM
To: *Cl-StPaul_1to4HousingStudy
Subject: Community input on questions

Follow Up Flag: Follow up
Flag Status: Flagged

Hey there, thanks for your work with the housing study over the last few years. It's an important step towards improving opportunities for more housing. You asked for feedback on a few questions with my name and address.

My name is Gaby Lasala. I live with my wife at 936 Charles Ave St Paul, MN 55104.

1. Does this draft ordinance propose a zoning approach that supports more new housing options for all St Paul residents in a fair or neutral way? Why or why not?

I think it is a great start but I hope you would consider my answers to the following questions as a way to go a bit further in expanding the reach of R2-R3 zoning. Thank you.

2. Do you support creating two lower-density residential districts - the proposed h1 district and proposed h2 district or should the h1 and h2 be combined into one district that uses the proposed H2 standards?

I don't support separating H1 and H2 as separate districts. The main reason I see is it's limiting what can be done along the Mississippi River primarily zoned as H1. These could have beautiful row homes with great green space that still would cover a good percentage of the lot. Having just an H2 doesn't mean all those zones are going to build 4 units on 1,500sqft minimum lots, it just will allow it in areas that will benefit from more housing. There is no need to limit this and need to amend it later when someone wants to make this happen on a property.

3. Should more areas be rezoned to the proposed H3 zoning district? If so, which locations and why?

Yes. I know the city has been focused on public transit routes within 1/8 mile of a station but I think it is limiting areas that are equally important to allow H3 zoning. An average person can walk 1 full mile in about 20 minutes. That means we're limiting H3 zoning to a 4 minute walk from a transit station/bus stop. I'd ask the commission to consider expanding the radius from 1/8 of a mile to anywhere between 1/4-1/2 mile. I know this is part of the 2040 comprehensive plan policy from watching the recording from last week but I am not sure that it's necessarily limiting you from expanding to 1/4 of a mile which is a 5-6 min walk. This would allow properties within 5-10 minute walk from transit to be able to have the flexibility to grow with ease and not having to do future amendments.

In addition, I'd ask for the commission to consider the intersection of the bike plan in expanding H3 zoning to areas with possible future-planned safer bike routes like Pierce Butler. Why? I believe it's important to consider increasing density around what the City of St Paul's bike plan will be able to do for our city. It will expand access for people in areas that have historically not been served with safe bicycle infrastructure to have the option to that form of transportation without fear of being hit by a driver. People want to live by this kind of infrastructure. My wife and I specifically bought a home on Charles Ave because it was a bike boulevard. We were 1 out of 5 people offering on this house and our main motivation was to live off of established bike infrastructure in the city's bike plan. The more you expand the network, the greater the demand will be to live off one of these routes.

4. Are there other policy goals that the city should consider incentivizing in the form of density bonuses?

Yes. There are 2 that should be considered. First, I think the city should incentivize builders going vertical vs horizontally allowing them height exemptions to add units that preserve green space for wildlife and for storm drainage. We have to consider climate change as an important part of our resilience as a city and preserving space for trees and building shade for

our increasingly warmer summers will be important for improving neighborhoods ability to thrive, especially with the consideration that our trees on our blvds are being cut down due to disease.

Second, incentivizing going electric especially with the federal plan that helps people electrify their homes instead of pursuing carbon-intensive forms of energy like gas. I don't know if this is a thing or not but it could be as simple as including free electrical inspections for stoves, heat pumps, etc.

Thank you again for your time.
Gabriella Lasala

From: [Galen Benshoof](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: zoning amendment comments
Date: Wednesday, April 12, 2023 7:59:30 AM

Dear Planning Commissioners,

Thank you for the opportunity to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I strongly support the proposal overall. I'd like to see the following changes to it:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Galen Benshoof
1068 Laurel Ave
St. Paul, MN 55104

From: [Gaius Nelson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Cc: [Luis Pereira](#)
Subject: Additional1-4 Housing Study Comments
Date: Monday, April 17, 2023 3:53:37 PM
Attachments: [Testimony 1-4 unit Planning Commission 041423.pdf](#)

Please find additional testimony.

Thank you.

--

Gaius G. Nelson
206 Wheeler Street South
Saint Paul, MN 55105
651-690-0199

Gaius G. Nelson
206 Wheeler Street South
Saint Paul, MN 55105

SUBJECT: 1-4 Unit Housing Study Phase 2
TO: Saint Paul Planning Commission
Testimony regarding April 14, 2023 Public Hearing

Members of the Planning Commission,

Thank you for allowing us to speak with you about the proposed zoning amendments based upon the 1 – 4 unit housing study.

I understand the goal of the study and subsequent amendments to the zoning code is to allow and encourage the increased production of much needed housing, and hopefully more affordable housing units. Unfortunately, I do not believe these goals will be accomplished through the far-reaching changes proposed, and that there will be unintended consequences that are detrimental to the desired goals and to the character and urban fabric of the city.

Many conflate increasing housing stock with an increase in the availability of affordable housing stock. Unfortunately, this is not necessarily the case. Supply side economics has proven time and again not to produce the trickle-down effects promised.

I believe the proposed amendments will lead to less affordable housing. If the changes work as envisioned, existing, smaller more affordable houses will be demolished to make way for larger multi-unit structures. These new units will consist of market rate rental housing with rents as high as the market will bear. Or even more detrimental to the intended goals, developers will build new expensive single-family homes completely out of character with its surroundings by taking advantage of the new dimensional standards. This occurred several years ago in the Highland and Macalaster Groveland neighborhoods, resulting in out of scale structures that initiated the current District 14 & 15 amendments to the zoning code. These amendments

created a consensus of the dimensional standards for “neighborhood-scale housing”.

Developers typically utilize the limits of the required standards and it is unlikely that they will change their mode of operation based upon the new zoning. In many areas, large single-family homes remain the highest and best use from a market perspective.

Proposed actions and solutions:

- 1) In order to respect the work that was done in the District 14 & 15 amendments, and to encourage production of additional housing units – Allow use of the newly proposed dimensional standards for setback, height and density only for projects that add housing units. Relaxed dimensional standards should be an incentive – not as-of-right.
- 2) Institute a policy that requires “no loss of affordable housing” by requiring developers to replace any naturally occurring affordable housing units with an equivalent number of equally affordable units when developing multi-unit projects.

My thesis adviser from my studies in planning and architecture at MIT was Dr. Sandra Howell, a gerontologist and environmental psychologist. She had been contracted by HUD and later published a book about the design of housing environments for seniors. One concept that I carry with me from her work is the concept that I call the *Hierarchy of Spaces*.

We create our understanding of the world in many ways. The hierarchy of spaces describes how one moves through space in a hierarchy from Public to Private. The progression includes Public to Semi-public to Semi-private to Private. This occurs both in architecture and urban planning. Public and Private are easy to understand. One does not enter a house from the public street into a bedroom to access to the rest of the house. The Semi-public and Semi-private realms are a little more difficult and often confused – even by trained professionals.

When this happens there is a dissonance between what we physically see and experience, and our cognitive map of how the world should be. This idea also overlaps with the concepts for Defensible Space and the Use of the Commons, where spaces that are used by many individuals or are poorly defined as to their ownership are often neglected and depleted of their utility and

become spaces that feel less safe. Unclear definitions of control and ownership of the in between spaces easily leads to friction and lack of the quiet enjoyment of one's home.

These issues directly relate to the proposed allowance of construction of multiple dwelling units within existing backyards, as well as those accessed from alleyways. This is not a normative and understandable urban development pattern. In addition to the cognitive dissonance created, that are a multitude of practical difficulties that have not been addressed in the proposed zoning modifications including:

- 1) Addressing and finding these hidden units. How do guests and delivery workers or emergency responders find units that are hidden behind other homes without a clear public access. Where are mailboxes located?
- 2) Where is snow stored?
- 3) Is there adequate permeable surface area to handle large storm water drainage.
- 4) Will sunlight be blocked by taller, closer and much longer structures

The proposed densities far exceed the photographic examples indicated within the study or what most individual would consider to be neighborhood-scaled housing. No average person reading this study would understand that their neighbor would be allowed to replace the single-family home next door with a 5 unit structure, and would be shocked that many areas would allow 8 units on what was once a single-family lot.

The test cases provided little demonstration of what the impacts of the proposed changes will be to adjoining neighbors and the urban fabric and streetscape. To provide truly adequate notification to the public of the extent of the proposed changes, the planning commission should look to the District 14 & 15 zoning study to understand these issues better. I would suggest that additional graphic and models be produced that:

- 1) Demonstrate the full as-of-right massing adjacent to a typical existing home;
- 2) Indicate where car will be parked at a minimum ratio of 1 per unit;
- 3) Show where trash and recycling bins will be located;

- 4) Indicate snow storage areas that will be realistically required;
- 5) Indicate realistic sidewalk and driveway coverage of impermeable surfaces and provide calculations for storm water management;
- 6) Indicate the change in character on a typical city block that will result from several maximally developed lots using the proposed dimensional standards.

Additional considerations regarding the proposed zoning amendments include:

- 1) Discrete H1, H2 and H3 zoning districts are appropriate, given the fact that the size of lots in current zoning districts already imposes a differential in overall density between districts. Expansion of higher density zones beyond those indicated in the comprehensive plan as being near nodes and transit corridors is not acceptable;
- 2) Only one density bonus for additional units should be allowed;
- 3) A density bonus should require compliance with additional design guidelines that assure that structures are truly neighborhood-scale and do not impinge upon neighbors.
- 4) Encroachments within front and sideyard setbacks by decks and unenclosed porches should not be allowed. Future variances are often requested to enclose such elements;
- 5) Front yard setback should be increase in the H1 & H2 zone to maintain continuity of the existing character of neighborhoods;
- 6) Noise producing mechanical units should be prohibited within side yards adjacent neighboring houses.

The original charge by the City Council to allow duplex and tri-plex housing on city lots has been far exceeded by the proposed changes. Scaling back the allowed densities to duplex and triplex housing, in addition to planned alternatives such as cluster housing and neighbor-scales 4 and 6 units building is a better approach than that proposed.

Please reevaluate the densities that this proposal envision to better follow the original charge and to assure an orderly and incremental growth within the city.

Emma Brown

From: Hannah Jenkins <hjenkins@macalester.edu>
Sent: Thursday, April 13, 2023 11:13 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Support of Proposal

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Hannah Jenkins
1600 Grand Ave, St. Paul, MN, 55105

From: [Kathy](#)
To: [Luis Pereira](#)
Cc: [Emma Brown](#); [Josh Williams](#); kevinlouisvargas@gmail.com; [Adam Yust](#); tom@tomdistad.com; clar0319@umn.edu
Subject: HDC Resolution on 1-4 Housing Study
Date: Monday, April 17, 2023 10:27:14 AM
Attachments: [HDC Resolution 1-4 Housing Study 04142023.pdf](#)

Think Before You Click: This email originated **outside** our organization.

Luis,

Please see the attached Highland District Council resolution of support for the 1-4 Unit Housing in-fill study. I understand that public testimony was to close on Thursday, April 13 at noon. I am not sure if the Planning Commission extended the deadline on Friday morning, but the HDC wanted to submit this to the Planning Commission anyway.

I will say that after waiting for a really long time for the release of Phase II, the amount of time given to review and comment was extremely quick, considering how much information was incorporated into the study. It seems like PED used to take 6 months or more on some of these larger studies, to make sure that the community was actually engaged. I will say the on-line info sessions were a great step in the right direction.

Thank you for your consideration,

Kathy

Kathy Carruth
Executive Director
Highland District Council
651.695.4005
Kathy@highlanddistrictcouncil.org
www.highlanddistrictcouncil.org
Like Us On Facebook! [Highland District Council](#)



HDC Resolution to Support Changes to the Zoning Code

WHEREAS in April of 2023 the Highland District Council (HDC) task force on the 1-4 Housing Study discussed the proposed zoning code changes to city zoning code; and

WHEREAS the updated zoning code will offer a variety of new housing options for the residents of Saint Paul, especially within the Highland Park neighborhood where the addition of duplexes, triplexes, etc. would be a welcome addition; and

WHEREAS changes to the setback and building heights and density bonus, allow for more flexibility in construction of various housing options and incentivize gentle density; and

WHEREAS the proposed changes promote a more democratized environment for the addition of housing: currently the majority of development in the cities is either very expensive single family homes or very large multi-family apartment complexes, and neither of these property types are accessible to a lower or middle income family trying to build wealth; and

WHEREAS no longer requiring projects 4 units and under to go to site plan review will also simplify the permitting process for new projects because any projects 3 units and above currently have to go to site plan review, which can take 6 or more months and can cost more than \$10,000; and

WHEREAS allowing permits to go through the regular plan review, which is the current case for duplexes and single families, will make the process more accessible to more communities; and

WHEREAS there is a large demand for more diverse housing options in the city and a need for more housing that allows seniors to live on one level without having to move to a retirement home or massive apartment complex; and

WHEREAS many people want to own their homes and allowing more housing development options can address that need as well as give more power back to homeowners to determine the highest and best use for their property and their families; therefore

Be it Resolved, that the Highland District Council supports the proposed zoning code amendments suggested by the City of Saint Paul as part of the 1-4 Infill Housing Study.

From: [Nick Erickson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Phase II Comments
Date: Tuesday, April 11, 2023 10:04:22 AM
Attachments: [image001.png](#)
[HousingFirstMN-Phase2-StPaul.pdf](#)

Please see the attached file from Housing First Minnesota regarding the Phase II proposal.

I would also like to speak at the Planning Commission on behalf on our organization.

Thank you.

Nick Erickson

Senior Director of Housing Policy

Housing First Minnesota

📞 651.697.7586 📠 612.210.8332

2960 Centre Pointe Drive, Roseville, MN 55113

HousingFirstMN.org





April 11, 2023

St. Paul Planning Commission
15 Kellogg Bld. West
St. Paul, MN 55102

Re: Phase II, 1-4 Unit –Modest Densification Proposal

Via Electronic Delivery

To the St. Paul Planning Commission,

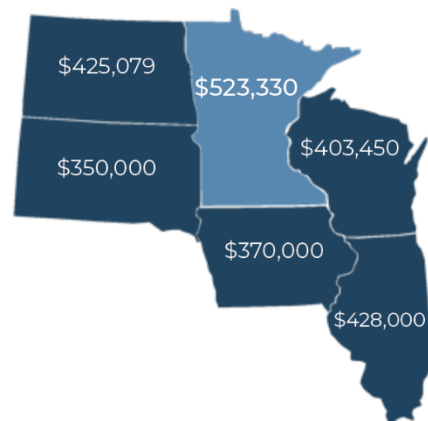
On behalf of our organization and its membership, Housing First Minnesota submits the following letter of support for the modest densification initiative within the Phase II proposal (the Proposal). Housing First Minnesota is a statewide organization representing a diverse array of construction and development firms from across the housing industry. Our members helped to build St. Paul and many other communities across the region and continue to work every day to seek ways to advance our mission of homeownership opportunities for all.

The Proposal seeks to advance housing affordability and access through modest densification. This type of zoning reform is at the forefront of the housing policy discussion in city halls and in state capitols across the nation. The implementation of this proposal will enable St. Paul to grow and prosper in the decades to come.

Our Housing Challenges

Minnesota’s housing record, particularly in the Twin Cities, illustrates how Minnesotans are being left behind by outdated housing policies that do not consider affordability or access:

- Minnesota has the highest new home costs in the region¹. (Right)
- Minnesota’s housing deficit is growing, and estimates place this deficit at triple Minnesota’s annual housing production².
- The Twin Cities has the widest homeownership equity gap in the nation³.
- The share of new housing priced less than \$300,000 per home is the lowest of any major Midwestern metropolitan area⁴. (Below)



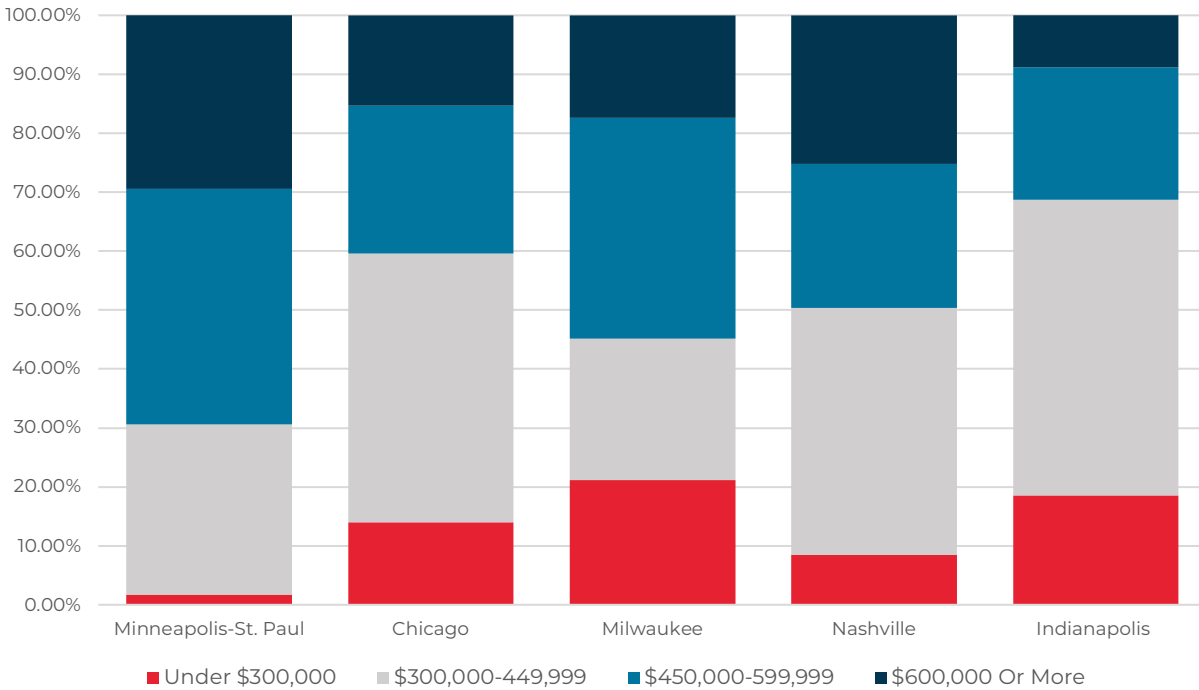
¹ Zonda, Midwest Median New, Single Family Detached Home Prices, March 2023.

² Up For Growth; US Census Bureau Building Permit Survey

³ US Census Bureau, American Community Survey, 2021

⁴ Zonda, Share of Homes Less Than \$300,000, March 2023.





Source: Zonda Market Reports of New Homes Sales. Jan. 2022-Feb. 2023

At less than 1.7%, this merger share of new starter homes at affordable prices resembles costal markets, not our Midwest peer markets.

Increasing Affordability and Access

At its core, the proposal legalizes missing middle housing, something needed and long overdue in the Twin Cities area. The Proposal will have a positive impact on the city’s housing market in several areas:

- **Inventory:** By adopting the Proposal, the City is opening up new opportunities for increased inventory in the city. This includes through new, large scale redevelopment opportunities, as well as through individual existing properties being modified or built.
- **Affordability:** By allowing more housing units on the same parcel of land, the land costs of a project will be shared across all units, decreasing the cost of construction for all units, whether it is a single lot conversion into more units, or a larger scale redevelopment opportunity.
- **Access:** Research by the Mercatus Center has shown that missing middle housing increases housing access to a more diverse array of residents than when only single-family zoning is allowed:

“As the United States confronts its history of systematic public and private housing discrimination, zoning is one of the prime targets for reform. Our evidence shows that zoning exclusively for detached houses effectively excludes large numbers of non-White households— as well as many white ones—who rent. It is especially important to ensure that multifamily and middle housing zoning are allowed in newly urbanizing



areas where zoning has its greatest effect. At the same time, even drastic zoning deregulation would partially address just one of many remaining racial disparities. Gaps in family wealth, marriage, educational opportunities, income, and homeownership are large and upstream of residential possibilities and choices.”⁵

Suggested Improvements

While the Proposal contains powerful tools to increase housing affordability and access, zoning modernization and modest densification alone cannot solve a city’s housing challenges. Other items that should be considered, either in Phase II or in future proposals, include:

- **Elimination of Floor Area Requirements (FAR):** FAR requirements are often used to mandate larger homes and Housing First Minnesota supports lifting any such requirement.
- **Lot Area By Unit:** Establish a minimum lot size standard for up-to-three units or allow the H2 density wherever Phase II will be implemented.
- **Exaction Reform In the Development Process:** Housing affordability can easily be increased by lowering the amount of dedications and fee-in-lieu-of requirements.
- **Ensuring Building Permit Fees Are Proportional:** According to the city’s records, it has collected more than \$10 million in excess building permit fees from 2018-2021.
- **Modifying Project Review Requirements To Ensure By-Right Projects Are Easily Approved:** A common theme in comprehensive land use reform currently is enabling more “by-right” projects so the approval process cannot be used to block needed, new housing that is compliant with all local and state regulations.

Finally, the Proposal can only achieve these goals in the city limits of St. Paul. Unlike political boundaries, the region’s housing market does not begin nor end at any municipal boundary. Enacting this missing middle housing proposal across the region, both in and outside of St Paul, will provide the needed balance to the region’s housing market.

Conclusion

Modest densification not only increases housing supply, it also increases affordability and access. Notably, these are the same issues housing First Minnesota has worked to elevate over the years.

We applaud St. Paul’s Planning Commission, staff and elected leadership for addressing its proactive approach to addressing its housing challenges with actionable solutions.

Sincerely,



James Vagle
Chief Executive Officer



Nick Erickson
Senior Director of Housing Policy

⁵ Salim Furth and MaryJo Webster, “Single-Family Zoning and Race: Evidence from the Twin Cities,” Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA, October 2022.

Emma Brown

From: James Slegers <james.slegers@gmail.com>
Sent: Wednesday, April 5, 2023 8:51 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Public Comment on 1-4 Housing Study Proposal

Follow Up Flag: Follow up
Flag Status: Flagged

Planning Commissioners,

Thank you for the opportunity to comment on the proposed zoning changes currently described in the Phase Two portion of the 1-4 Housing Study. I have a couple of proposed changes, responding to the question prompts.

Prompt 2: I support eliminating the district listed as H1 and consolidating it with the district described in H2. This simplifies the code and opens up opportunities for more types of housing more places, and is not significantly more expansive than what is already proposed in H1.

Prompt 3: Functionally, the H3 district is intended to encourage moderate density near transit and walkable amenities. I would suggest increasing the catchment for this district type to a 1/4 mile distance from the listed amenities, which is functionally around a 5 minute walk and would open up this option to all properties along a transit corridor (BRT and light rail stops are, as an example, around 1/2 mile apart). Without this, I suspect that this bonus would only see narrow applicability and more likely be pre-empted by higher density developments most directly adjacent to high frequency transit stops

Prompt 5: Multi-unit medium density housing is intended to produce more, more affordable, and more sustainable housing - housing that is more likely to be built or lived in by local people and which may not qualify for the kinds of capital or developers that produce high density commercial rentals. I would propose that the density bonuses suggested be offered for housing with ownership models related to co-operative ownership, residential land trusts, or other models that emphasize local ownership, long term affordability, and decommodification of housing, which keep capital in Saint Paul.

Thank you for your consideration,

James Slegers (he/him) / james.slegers@gmail.com / (651) - 366 - 2410
1153 Edmund Ave. W.

Emma Brown

From: Jamie Stolpestad <jamie@yardhomesmn.com>
Sent: Wednesday, April 5, 2023 3:48 PM
To: *Cl-StPaul_1to4HousingStudy
Subject: 1 to 4 Unit Housing Study feedback

Follow Up Flag: Follow up
Flag Status: Flagged

Dear All,

I am writing to strongly support the proposed changes of Part 2 of the 1 to 4 Unit Housing Study. In addition, I am writing to provide feedback on the additional questions asked by the Planning Commission to inform its policy decisions regarding this study and more broadly. Thank you for those questions - I think those are very important and appropriate. I really appreciate the intentionality and enlightened perspective implied in asking those questions.

Question 1: Does proposal promote more new housing options in fair or neutral way?

- The proposed changes are a good start but the zoning code would remain biased in ways that provide unequal opportunities based on the location and neighborhood of the land parcel. The multitude of distinct zoning districts largely overlaps with where BIPOC residents were forced to live or excluded from living based on prior redlining, housing policy and/or transportation policy. The incrementalism prevalent in additional zoning amendments is not sufficient to overcome these biases. Yes, reducing the number of zoning districts is helpful. But until there are even fewer zoning districts and they are applied irrespective of historic racial and socioeconomic geographic patterns, I don't view the zoning code to be "fair" or "neutral" in what development and wealth building opportunities are available. A more equitable city would require a far broader rethinking of land use regulations.

Question 2: Proposed H1 / H2 or combined.

- Similar to my comments in response to Question 1, the consolidation of zoning districts is a positive step. But your recommendations do not go far enough to ensure fairness and equitable opportunity. There is little practical difference between the proposed H1 / H2 / H3 zones and combining these into just 2 zones. If the goal is to achieve a fair and color-blind set of opportunities for the development of land, then consolidating to H1/H2 and H3 would be a better choice. But it begs the questions why are there so many other residential zones, why are there so many restrictions to housing development — what are the public benefits of all of those? It is important to shift the mentality around zoning from being a tool to exclude people and opportunity and instead consider ways to include people and create opportunity. Inclusionary zoning would have far fewer districts, far fewer restrictions, and be far simpler for an average resident to navigate.

Question 3: Should more areas be H3?

- Yes. The compelling logic in prior zoning changes has been to promote livable and vibrant communities and ones where walking can be a primary mode of transportation. Most experts believe a 1/4 mile radius from a major transit node is a comfortable distance to walk, and where higher density of land use should be allowed and encouraged. This logic suggests that the higher density under H3 be allowed for lots within 1/4 mile and not 1/8 mile of major transportation corridors. Having said this, the Covid Pandemic has upended many historical conventions and travel patterns. More people are working, living and playing in residential areas and not traveling from a living area to a work area to a play area. These new patterns of living suggest that zoning districts should not be transit corridor-centric at all. The conclusions from long-term study and recent learnings from the Pandemic are that more density and flexibility is helpful across the entire city for more housing, and a wider range of uses and mixes of uses.

Question 4: Balance of more housing vs. displacement pressures.

- Maybe. This is a very difficult question to answer, and certainly in isolation to many other aspects of public policy. The proposed changes generally are sensitive to minimize “first order displacement” (i.e. existing residents being forced out of existing homes and business locations) by offering a wider range of incremental development options like additions, ADUs, mixed-uses, etc. But any incremental development, especially in the current inflationary environment, has the potential to create “second-order displacement” (i.e. economic pressures and indirect pricing pressures). As a finance professor, I think it is more important to relieve the current pressures on supply by unlocking more opportunities for housing development. It is extremely difficult, and perhaps impossible, for zoning to serve as a tool to address the risk of second-order displacement. Fiscal policies and programs like community land trusts, cooperative ownership structures and incentivized / subsidized financing tools are needed to address second-order displacement pressures. The rent control regime is a hugely significant additional factor that studies have shown in other markets has the impact of reducing new investments into housing subject to price controls. So, it is likely that whatever positive potential is created by removing barriers in the zoning code will be muted by broader pricing controls created by other government policies.

Let me conclude that the proposed changes under Part 2 of the 1 to 4 Unit Housing Study are an important and appropriate next step for the City of St. Paul. And after this step there are many more that the Planning Commission and other arms of the City government can take to promote a more vibrant, sustainable and equitable community.

Thank you for enacting these changes as soon as possible.

Jamie

Jamie Stolpestad
Partner, YardHomes MN
475 Old Highway 8 NW, New Brighton, MN 55112

From: jastolpestadii@gmail.com
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Feedback to 1-4 Unit Study
Date: Sunday, April 16, 2023 6:45:23 PM

Dear Sir or Madam,

As a proud St. Paul native, I am writing to express my strong support for the proposed modernizing amendments to the St. Paul Zoning Ordinance.

St. Paul is in the midst of a severe housing crisis, has a near peak population, has a dramatically different demographic profile of households than during much of its history, and faces dramatic challenges from climate change. All of these require significant updates to an old zoning ordinance. Such an update is required by state law to align zoning with the most recently approved Comprehensive Plan. And an update is long overdue to address barriers to housing construction and inequities in what development potential is offered to different land parcels across different neighborhoods. The opportunity a resident has to add housing to their property currently differs dramatically based on where the resident lives, largely a legacy of historic discrimination against BIPOC households.

The changes proposed are sensible, appropriate and important in that they allow for the creation of a range of housing in addition to the single-family homes that are now so prevalent. Many residents have housing needs that are not provided by the current housing stock. And adding backyard cottages, converting existing structures to serve multiple households, or building anew on vacant lots are severely limited by a wide range of barriers in the current code. For example, a resident in a single family home or duplex on one side of a double lot is effectively prohibited from building on the adjacent vacant lot, even though there are other single family homes or duplexes on 40' lots up and down the same street. Another example of what is not permitted is the creation of a basement apartment in an over-large historic home and adding a backyard cottage home for an aging relative. The proposed zoning amendments would make these logical and appropriate housing options newly legal.

Some people are likely to argue against these changes and inaccurately assert that the proposal would “eliminate single family zoning” or some other silly soundbite. They will likely complain about the risk of more traffic, over-crowding, various environmental hazards and the most ambiguous complaint of all – that the changes will alter the “character” of existing neighborhoods. The antiquated zoning code has contributed toward dramatic housing cost inflation, dramatic shortages of housing, dramatic inequities by race, and the rise of homeless and tent cities in parks. The residents and businesses of St. Paul should prioritize housing people and providing greater housing choices over the nebulous benefits of preserving neighborhood character. The character of existing neighborhoods is at greater risk through inaction.

Thank you for enacting the proposed zoning changes as soon as possible. And going forward, please find further ways to reduce inequities, expand opportunities to a wider range of housing types everywhere, and reduce the complexity of the zoning code.

Jamie

Jamie Stolpestad

225 2nd Street SE

Minneapolis, MN 55414

Emma Brown

From: Jessa Anderson-Reitz <jessarandersonr@gmail.com>
Sent: Wednesday, April 5, 2023 1:23 PM
To: *CI-StPaul_1to4HousingStudy
Subject: 1 to 4 Housing Study Comment

Follow Up Flag: Follow up
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Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of oil and gas).

Thank you for your consideration.

Jessa Anderson-Reitz
1423 Eleanor Avenue
Saint Paul, MN 55116

From: [Karen Allen](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Feed back on proposed amendments
Date: Tuesday, April 11, 2023 9:23:28 AM

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration and thank you to the planning staff for their dedication to this study.

Karen Allen
1315 Minnehaha Ave W, Saint Paul MN 55104

--

Karen Allen
[LinkedIn](#)
651-315-2262

From: [Karen Allen](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Additional comments in response to public hearing
Date: Monday, April 17, 2023 10:24:36 AM

Dear Planning Commissioners,

Thank you for the opportunity to submit a public comment regarding the proposed zoning code amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. The proposal has a lot of community support, including ours, and the strengths of the proposal will only be enhanced by community feedback. Our board members and attendees appreciated the thoughtful discussion topics brought forth by community members, organizations, and commissioners during the public hearing.

We wanted to highlight a few discussion points that we found especially pertinent with hopes that the planning staff, commission, and perhaps other city departments could further consider these.

- What anti-displacement policies can be implemented? With the goal of keeping existing residents in their homes, keeping small affordable homes intact, preventing teardowns, and to ensure equal access to wealth building for our BIPOC residents. Looking forward to the insights of the city's upcoming study.
- How can the city mitigate the ecological impacts of our built environment? Especially stormwater runoff and tree coverage loss (dearth of tree coverage often disproportionately impacts low-income neighborhoods), or loss embodied carbon via demolition. What is the role of zoning in this vs other departments?
- How can the city foster development opportunities for local, small, women or minority owned developers, via reducing red tape, increasing technical support, creating pre-approved plans or other means. Local ownership and investment is a cornerstone of community strength and wealth-building. How does this intersect with community ownership models like land trusts and co-operatives? This could be a discussion with the Housing Redevelopment Authority and others.

With these and the many other priorities before the planning commission, it's important to consider what should fall into 'zoning code' vs other avenues that shape development. The commission should be wary of using zoning code as a primary tool to address issues that are greatly outside its purview, and avoid creating too many hoops or complicated processes that would hinder development.

Again, thank you to the planning staff and the commissioners for the opportunity to comment on the zoning amendments. We are strongly supportive of the staff's proposal and look forward to the next steps in this process.

Thank you,

Karen Allen

Former renter, current resident & small-time landlord, Sustain Saint Paul Board Member
1315 Minnehaha Ave W, Saint Paul, MN 55104

--

Karen Allen

[LinkedIn](#)

651-315-2262

Emma Brown

From: kesid@aol.com
Sent: Friday, April 7, 2023 10:07 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: Comments about more 1-4 density areas - added comment
Attachments: wildlife-corridors-and-permeability-report-April-2010.pdf

Follow Up Flag: Follow up
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I added 12. below to my comments to not put higher density on streets without sidewalks unless it can be made safer than it already is which is pretty dangerous, including a plan for safe walking routes to schools and bus stops everywhere in the higher density plan.

Thanks - name and address below.

-----Original Message-----

From: kesid@aol.com
To: 1to4HousingStudy@ci.stpaul.mn.us <1to4HousingStudy@ci.stpaul.mn.us>
Sent: Fri, Apr 7, 2023 9:42 am
Subject: Comments about more 1-4 density areas

A summary of what a higher density city should look like is below, detailshere -

1. I have lived on duplex zoned streets in neighborhoods with a mix of 2 story apartments, single family and in-between since I moved here from Iowa when I was 27 43 years ago and have enjoyed the mix of housing options, moving from apartment to duplex to single family as our income and needs for space and interest in having a yard and garden space went up.
2. I strongly believe that all towns and cities should have this mix of housing options within a few blocks of each other.
3. I strongly believe that we need to live within and not instead of nature. Plants and animals need wildlife corridors for a healthy gene mix and ability to survive, they need a dark and light cycle (as do humans) to know when to eat and sleep so they are healthy, many animals like frogs need it quiet (as do humans), many don't safely cross wide streets (nor do humans) and the wider the corridor the more animals and plants can survive. See the urban wildlife corridor study done by Portland Oregon before implementing their Light Rail building, although they didn't include dark night skies, attached and at this web site: <https://www.oregonmetro.gov/sites/default/files/2019/08/22/wildlife-corridors-and-permeability-report-April-2010.pdf>
4. As a Saint Paul Parks volunteer who picks up lots of trash at our local Frost Lake Park (the city doesn't do it or maintain it other than trees across trails and mowing) and along the Bruce Vento Bike Trail (the city doesn't pick up trash or maintain it other than trees across trails and mowing and snow plowing) I strongly believe unhoused tent camping is very bad for participants and our parks and park users and we need more local, state and federal dollars for housing they will accept so they can get a hand up for any medical then legal, language and job needs since people come from around the world, not just Saint Paul. Affordable housing will help but more trash pickup and restoration and endangered species protection (the endangered Rusty-Patched Bumble Bee's existence for now depends on us) and family nature programming resources are needed along with that!
4. Doing this big zoning change is a good time to also do urban wildlife corridor planning. For equity each neighborhood should have a planned/zoned urban wildlife corridor so kids grow up with access to nature and know what birds and bumble bees, coyotes and rabbits are. Each area should have parks and bike trails each with a name and a plan for restoration to pre-settlement conditions which means native plants maintained by using or mimicing fire, elk and bison (mowing high, cutting out non-natives, burning where possible). The Portland corridor study includes the idea of permeable land use as a part of a corridor, although not as good as a land restored and maintained to pre-settlement. The new zoning should allow for areas of each yard to be put into pollinator and rain gardens and vegetable plots and be designed to keep all the water on each yard and not going down street drains. This should be extended to requirements

for industrial and commercial areas - the last zoning change for them removed green spaces from the map resulting in the future east west strips of all-industrial/commercial that prevents wildlife migration north and south needed for health and global warming.

5. Doing this big zoning change is a good time to also pass an ordinance to be a Dark Sky City or we will have even more light pollution causing higher breast cancer rates in women who live in it and other human health problems related to sleep and the same in insects, and bird migration (we are on a Migratory Flyway). We are a Pollinator Friendly City and they need it to be dark at night, and there are telescopes at high schools (an observatory at Harding) where kids could learn about the night sky. All of Hawaii does this and some other cities.

6. Doing this big zoning change is a good time to pass an ordinance like North Saint Paul has to prohibit and help remove buckthorn and to remove it as part of an upgrade of the natural areas that our residents need to be able to go to to be healthy and know how to live within and not instead of nature. Soybean aphids overwinter on buckthorn and fly south to millions of acres of farm fields and farmers have to spray pesticides which kills all insects which is why the rusty-patched bumble bee is mostly just left in our pesticide-free city with its native plants in shorelines and wet areas and degraded natural areas above utilities and restored prairies and a few yards.

7. Doing this big zoning change is a good time to give all of our public parks names and, like Seattle does, a plan to upgrade and maintain them to pre-settlement conditions. We could look at all of the neglected public natural areas on the east side of Saint Paul above the Lake Phalen buried creek Beltline Interceptor and above the 450 miles of buried "poop pipes" such as the wooded acres west of Harding and along the pipeline parallel with Birmingham and elsewhere. Nearby residents walk in these degraded "parks" when they don't feel unsafe due to unhoused tent camping. Native people teach their neighborhood young people about important plants and I see rusty-patched bumblebees and many others and birds in these local parks.

8. The Purple Line BRT route is getting a second look as it should since the Vento Trail is loved by everyone I meet along it and is a great wildlife corridor going through a bottomland forest and in a mixed-density neighborhood but not high density and businesses or commercial. A change to White Bear Avenue is being looked at so it should be removed from your map for now until a final decision is made. One size doesn't fit all - adding fast Snelling-like buses through the east metro, and BRT on the new lanes on 35E but to jobs both north and south (you can't get to south jobs on a bus now...I worked there for 37 years and had to drive though they can get to our jobs), which is almost half of Saint Paul, instead of bulldozing the Vento Trail, makes more sense.

9. A distributed bus service and distributed and mixed density housing that is zoned based on where not just new fast buses can go but on where cars can park. Higher density shouldn't be added where there are already lots of cars always parked in the street. Our duplex only street is barely passable in the winter since the houses are small, the garages fill up, there are multiple cars per family, and most have at least one car in the street - makes more sense than adding density even where there is no more room for cars.

10. More cars on the same streets mean the streets will wear out even faster and this should be factored in. We have two huge potholes and 30 medium potholes on our street and this happened a few years ago too. Also nearby streets south of Frost Lake Park don't even have curbs and that project has been delayed for another ~10 years after a previous delay.

11. There should be a limit on density and disaster plans should include supports for families and kids during disaster. Studies say at a high density there is more crime - the richer people that end up running things will run low on cash and take it away from apartment areas even though apartments pay way more in property taxes per foot of street than lower density does last I looked, and this leads to stress and higher crime. We are sure to have another disaster or pandemic someday. At the depth of the COVID crisis I was held up with a gun by two ten year olds guess where - at the highest density apartment area near us east off of Maryland.

12. The higher density plan should include a plan for all blocks for Safe Streets to the neighborhood school and bus pick up, and that higher density shouldn't be put on streets that don't have sidewalks if more traffic and cars parked in the street especially in winter and with people swerving for potholes makes walking down it less safe. Kids on our duplex street for safety are already being driven to the bus and picked up or wear bright vests to walk the block to Maryland to get on the bus. Approaching 70 my husband and I who walk to the Vento Trail or Frost Lake Park quite often have to be especially careful of people in a hurry to get to work.

Thanks for listening to my ideas about your high density plan including -

1. us living within and not instead of nature by including local urban wildlife corridors,

2. names for all public green spaces and pre-settlement upgrade and maintenance plans even for above buried utilities,
3. with wildlife friendly green space in both residential and commercial yards to keep water there,
4. a dark sky ordinance, a buckthorn removal ordinance, I
5. local family programs for health on trails and nature knowledge here in the city,
6. a plan for street maintenance and more cars parked on the street before increasing zoning,
7. and distributing a mix of single family, duplex, fourplex and somewhat higher but not too high density housing that individuals can move to as their age and income goes up and then they get older while staying close to family
8. Federal, State, County help for more "hand up" housing to prevent unhoused tent camping
9. The Purple Line route is getting a new look since people don't want the Bruce Vento Bike Trail removed and they do want better transit but that goes to businesses and where our east side distributed high density housing already is and where new is being built here right now. White Bear is now being looked at but distributed fast buses added along Phalen Boulevard, Maryland especially, Payne, Arcade and English - like the Snelling bus with fancy stations etc - and BRT on 35E north and south - would be great.
10. Don't increase density on streets without sidewalks since kids won't walk to school buses and people to buses for transit down a street with cars parked on both sides and people driving in a hurry to get to work.

The suburbs should do this too, we can't solve the problem ourselves, and some are.

Kathy Sidles
1380 Winchell St.
Saint Paul, MN 55106
651-771-7528

www.oregon**metro.gov**



Wildlife corridors and permeability

A literature review

April 2010



Metro | *People places. Open spaces.*

About Metro

Clean air and clean water do not stop at city limits or county lines. Neither does the need for jobs, a thriving economy and good transportation choices for people and businesses in our region. Voters have asked Metro to help with the challenges that cross those lines and affect the 25 cities and three counties in the Portland metropolitan area.

A regional approach simply makes sense when it comes to protecting open space, caring for parks, planning for the best use of land, managing garbage disposal and increasing recycling. Metro oversees world-class facilities such as the Oregon Zoo, which contributes to conservation and education, and the Oregon Convention Center, which benefits the region's economy.

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District 3 – Carl Hosticka

District 4 – Kathryn Harrington

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CONTENTS

EXECUTIVE SUMMARY	1
FUNDAMENTAL CONCEPTS IN WILDLIFE CONNECTIVITY	2
Introduction and study area	2
Habitat fragmentation	4
Metapopulation theory: A theoretical framework for understanding minimum population size	5
Theory of Island Biogeography: A theoretical framework for understanding community composition.....	6
Edge effects and habitat patch size and shape.....	7
Habitat patch size in the Portland-Vancouver region.....	9
Matrix: What lies between habitat patches	10
Urbanization and disturbance issues.....	12
Roads and road effects	13
Noise	14
Artificial light.....	15
Trails	16
Invasive species	18
Climate change	19
OVERVIEW OF THE REGION'S HABITAT AND WILDLIFE	20
Historic and current habitat	20
Fish.....	22
Amphibians	23
Reptiles	24
Birds.....	25
Mammals.....	27
Summary: What does wildlife need?.....	29
MORE ABOUT CORRIDORS	30
Different types of corridors and connectivity.....	30
Corridor width, length and shape.....	31

Corridor risks	33
Spatial scale	34
CONNECTING HABITAT: HOW IT'S DONE	35
Getting started.....	37
Assembling the working group	37
Establishing goals, criteria and selecting methodologies	37
Initial inventory.....	39
Identifying potential core habitat areas	39
Identifying focal species	39
Stakeholder outreach – locals know more	42
Final inventory	43
Selecting preferred alternatives (core habitats, focal species)	43
Identifying corridors	43
Barriers and gaps	45
Selecting preferred corridors and creating final maps	46
Implementing the strategy	47
Conducting broader outreach	47
Conservation tools for wildlife connectivity	48
Research, monitoring and adaptive management	49
Related efforts	51
SUMMARY – WHERE DO WE GO FROM HERE?	52
APPENDICES.....	53
Appendix 1. Literature relating to corridor widths.....	54
Appendix 2. Literature relating to species’ habitat area requirements	61
Appendix 3. Literature relating to species’ gap-crossing abilities	63
Appendix 4. Models and assessment techniques.....	64
Appendix 5. Vertebrate species known to use region habitats at least once every year.....	68
Appendix 6. Literature cited	80

EXECUTIVE SUMMARY

The purpose of this paper is to review the science of how and why wildlife species need to move across a landscape, including suggested methods to map and improve connectivity. The information will be used to create a regional wildlife connectivity map and strategy for the greater Portland-Vancouver metropolitan region, and will be incorporated into a regional conservation framework.

Connectivity can be difficult or impossible to regain after urbanization, yet it is critically important to the Portland-Vancouver region's wildlife. Habitat loss and fragmentation have partially or fully isolated many of the remaining habitat patches, and the matrix between patches may be too harsh for many species to navigate. Over time, isolated habitat patches tend to lose wildlife species, and without connectivity, these species cannot repopulate an area. Improving connectivity will help maintain the region's biodiversity by allowing species to move as needed to fulfill their life history requirements.

The amount and placement of a few key landscape features, especially trees, shrubs and hard surfaces, significantly influence the types of wildlife that can survive in urban areas. The size and shape of a habitat patch, as well as the relationship with surrounding habitats, play key roles in habitat quality and wildlife communities. Disturbance also plays a key role, and impacts may be species-specific. Roads, trails and development impose a variety of disturbances deriving from noise, sound, light, and human and pet impacts. However, the overall amount of habitat and the degree to which it is interconnected likely exert the most profound influence on urban wildlife.

This literature review consists of four sections plus appendices. The first section, *"Fundamental Concepts in Wildlife Connectivity,"* presents concepts and information about the ecology of connectivity, including the consequences of habitat fragmentation, ecological issues relating to urbanization and disturbance, invasive species and climate change. The second section, *"Overview of the Region's Habitat and Wildlife,"* describes historic and current habitat and discusses species groups and specific issues relating to each group. The third section, *"More about Corridors,"* reviews connectivity issues such as corridor shape, risks and spatial scale. The final section, *"Connecting habitats: How it's Done,"* provides a practical approach to creating a regional wildlife corridors map. The appendices include tables reviewing literature recommendations on corridor widths, patch size requirements and gap-crossing abilities for selected species, and a review of models and assessment techniques to identify wildlife connectivity. A regional vertebrate species list and literature cited are also provided in appendices.

Creating a wildlife connectivity strategy may range from relatively simple drawings on a map to complex modeling processes. At its best, it is a collaborative and iterative process. At its worst, the process becomes mired in arguments about specifics and takes too long, perhaps forever, to complete, even as population increases and more houses and roads are built. The movement strategy can identify opportunities to strategically invest in connectivity and initiate a process relying on long-range planning, restoration, acquisition, easements and other tools. Monitoring and adaptive management approaches, along with leadership, collaboration and public support, will be needed to ensure the strategy is effective. The long-term benefits for the region's biodiversity will be worth the effort.

INTRODUCTION AND STUDY AREA

The purpose of this paper is to review the science of how and why wildlife needs to move across our urban landscape. It is intended for the audience of people working on natural resources and in particular, wildlife connectivity in the Portland-Vancouver region. The goal is to provide the scientific foundation needed to map the region's most important habitat areas and develop a collaborative strategy to facilitate wildlife movement among these habitats. The results will be incorporated into a regional conservation framework.

The greater Portland-Vancouver region is at the northern end of the Willamette Valley ecoregion, the latter which encompasses 5,308 square miles (13,748 square kilometers) and includes the Willamette Valley and adjacent foothills [284]. Current vegetation in the region has changed substantially from historic patterns. Key factors include urban development, agricultural cultivation, livestock grazing, exotic species introduction, suppression of natural fires, logging, drainage of wetlands, and channelization of streams and rivers [6]. In the Willamette Valley, native prairie and oak savannah have been reduced to about one percent of historic land coverage; over 70 percent of the bottomland hardwood forests have been lost, as well as substantial wetland and surface stream loss [6;206;283;284].

The Portland-Vancouver metropolitan region ("region") provides homes for a diverse assemblage of native fish and wildlife including at least 26 fish, 16 amphibian, 13 reptile, 209 bird and 54 mammal species. These animals must be able to navigate the intricate network of roads, parking lots, backyards and barriers to survive and thrive. The region is expecting significant population growth in coming decades – about a million more people by 2025. Further, anticipated changes in temperature and weather patterns will impact habitat and wildlife in ways that are not yet known. Developing and implementing a strategic plan for wildlife movement now, that encompasses the region and connects to important habitats outside the region, can help preserve the region's biodiversity.

For geographic context, Figure 1 shows the region's urban areas (light green) and surrounding landscapes.

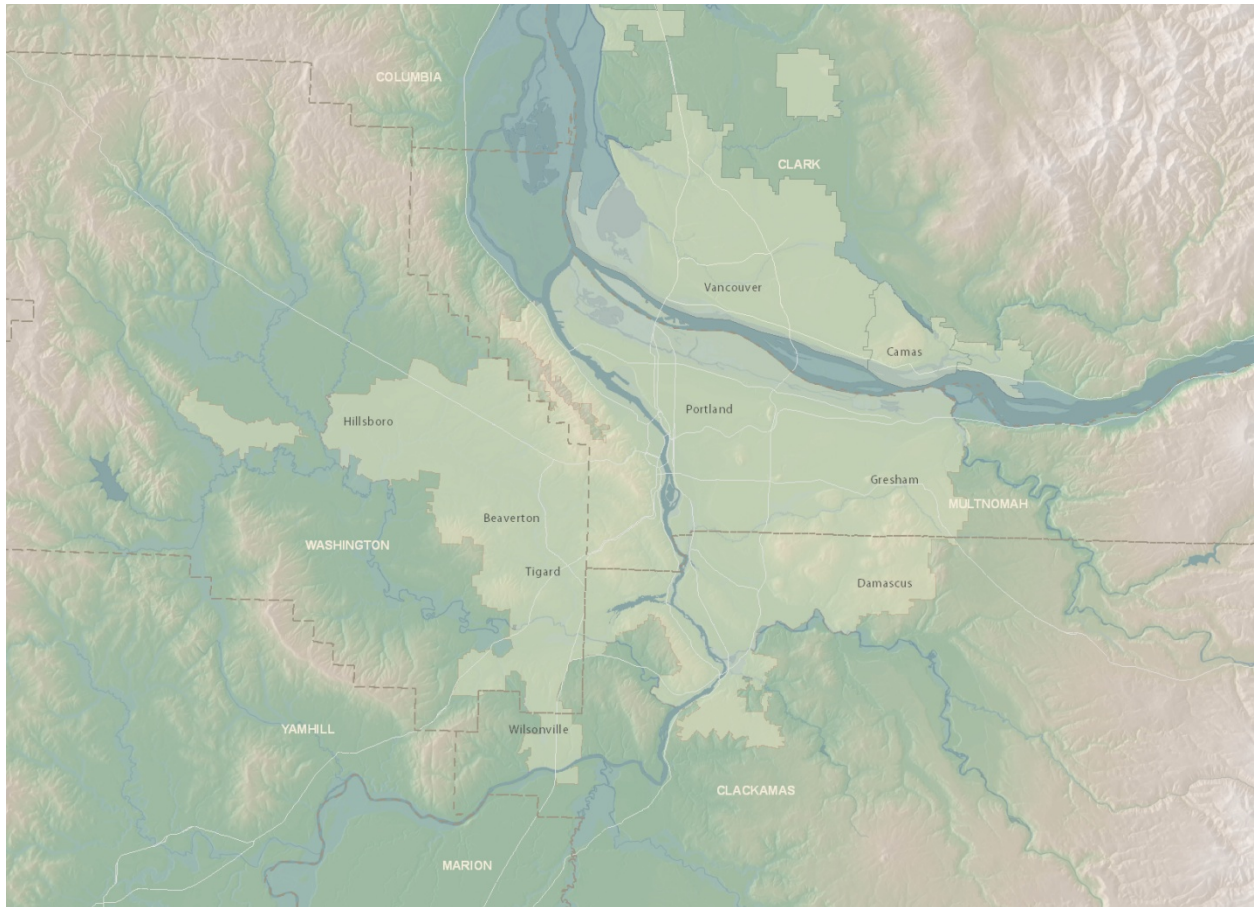


Figure 1. General study area location of the Portland, Oregon-Vancouver, Washington region. Areas in light green indicate urban areas.

Maps can be powerful. A regional wildlife corridors strategy and map, supported by key stakeholders and widely recognized as a set of long-term natural resource goals, can help marshal public will and resources to improve biodiversity. It is not meant to be used in a regulatory sense; it will not be perfect the first time, and conditions change continually. Rather, it provides a way to strategically incorporate natural resource goals into restoration efforts, land use planning, transportation and development projects, and the back yards of the people who live here. It can help focus efforts and funding on actions most likely to benefit wildlife and habitat.

The following sections review the science of how and why wildlife species need to move across a landscape, including suggested methods to map and improve connectivity. Several appendices provide species-specific information, including Appendix 1 (corridor widths), Appendix 2 (minimum habitat patch size), and Appendix 3 (gap-crossing abilities). Appendix 4 reviews selected methods in modeling wildlife connectivity. Appendix 5 provides a regional vertebrate species list, followed by literature cited in Appendix 6.

HABITAT FRAGMENTATION

Habitat fragmentation is the process of breaking apart large areas of habitat into multiple smaller unconnected patches. It is generally used in the context of forested areas, but also applies to other habitat types, such as wetland, shrub or grassland habitats [79;121;343].

Wildlife corridors and landscape permeability are separate but related concepts. A permeable landscape is one where wildlife can move relatively freely from one area to another. Fragmentation reduces permeability and may result in areas connected only by one or two corridors, or in completely isolated habitats where animals are essentially trapped or in danger if they leave the habitat patch.

Fragmentation is widely recognized as an over-arching threat to wildlife and ecosystem health [152;368] and is closely linked to habitat loss and invasive species, two other major threats [369]. Identifying important wildlife movement corridors and providing viable connectivity between remaining habitat patches can help reduce many of the ecological impacts of habitat fragmentation [34;223;343;370].

Habitat fragmentation diminishes the landscape's capacity to sustain healthy native wildlife populations primarily through habitat loss, reduced habitat patch size, increased edge habitat, increased isolation of patches and modification of disturbance regimes. Fragmentation can benefit some native species, but is generally detrimental to more sensitive wildlife. Fragmentation reduces the amount of and access to habitats needed to meet species' requirements, thereby lowering the number of individuals of a given species that can be supported, reducing population sizes and increasing the likelihood of local extinctions.

Over time, habitat isolation can lead to cascading effects that may disrupt ecological processes. Ecological processes play an essential part in maintaining ecosystem integrity, and include the cycling of water and nutrients, the flow of energy, and maintaining biodiversity [123]. These processes occur at many different spatial scales and are present in every ecosystem, but are often severely compromised in urban ecosystems [3;61;88;249;272]. The capacities of urban greenspaces to support biodiversity, mitigate climate extremes, and facilitate storm water infiltration are well recognized contributors to sustaining ecological processes [61].

Two theories are especially useful in understanding how fragmentation affects wildlife populations: metapopulation theory and island biogeography. Metapopulation theory helps to explain the population dynamics of species in a fragmented yet connected habitat, whereas island biogeography provides a useful framework for considering habitat patch size, configuration, and connectivity for groups of species at the landscape scale. Both theories apply to urban habitats. Both can be used to consider best approaches to improving wildlife connectivity.

METAPOPULATION THEORY: A THEORETICAL FRAMEWORK FOR UNDERSTANDING MINIMUM POPULATION SIZE

Wildlife corridors serve as conduits for animal movement and provide habitat, but an important additional function is genetic exchange between populations [316]. A population is a group of individuals of the same species that live within a particular area and interact with one another. A metapopulation is a group of populations within a landscape connected by migrating or dispersing individuals [310]. Interactions between these populations can be beneficial by increasing genetic interchange and animal health, and reducing the risk of local population, and potentially metapopulation, extinction. It can also mitigate some of the effects of small habitat patch size.

In addition to extinction risk, isolated populations can become unbalanced and negatively affect other species. An isolated habitat patch may lose large predator species, leading to deer overpopulation; deer overpopulation leads to widespread vegetation loss, affecting other wildlife through habitat loss and simplification. The impacts from deer overpopulation are currently a noteworthy problem in some parts of the U.S. [170;196;199]. These imbalances can result in cascading ecological effects. For example, loss of large predators can also lead to overabundant smaller mammals such as raccoons, squirrels and mice, further impacting songbirds through direct predation and nest predation [20;66;263]. Because songbirds disperse seeds, aid in pollination and control insect populations, habitat is altered even more [383].

Physical isolation can lead to genetic isolation. Gene flow is a combination of breeding population number and the rate of migration among populations [207]. Gene flow may be particularly important to small populations or those isolated for long periods of time because individuals in such populations may become increasingly genetically similar. Habitat connectivity or isolation affects gene flow in different ways for different species. For mobile species such as some birds, metapopulations and gene flow occur at a larger spatial scale than for less mobile species such as salamanders or frogs [80;261]. Therefore, it is easier for frogs and salamanders to become isolated, and genetically inbred, than it is for birds, which can travel greater distances to interact.

For example, researchers at Western Washington University found a sharp decline in gene flow among Cascade frog populations separated by more than 6 miles (10 kilometers) [261]. In urban areas, effective isolation distances may be much shorter for many species because roads, buildings, and paved areas between habitat patches may be difficult or impossible to cross. Genetic isolation can increase inherited diseases and reduce a species' ability to adapt to its environment, sometimes leading to local or total extinction [214;343].

A minimum viable population size depends largely on how much suitable habitat area is available combined with how connected each population is to others. With no connectivity, a much greater population size would be needed for viability and extinction risk for a given species increases. Improving connectivity helps maintain and can increase biodiversity of inter-connected patches.

THEORY OF ISLAND BIOGEOGRAPHY: A THEORETICAL FRAMEWORK FOR UNDERSTANDING COMMUNITY COMPOSITION

The theory of island biogeography has been applied to urban environments to further understand how habitat fragments function and as a basis for developing habitat protection plans [102]. MacArthur and Wilson first proposed the theory to explain the number of species (species richness) on islands in the Pacific Ocean [2;222]. It explains species richness on various islands based on a four fundamental concepts:

1. Larger islands (in the region, habitat patches) host more species than small ones because they have more kinds of habitats. Larger islands are also easier to find by migrating animals. (species-area relationship)
2. Smaller habitat patches closer to large patches host more species due to greater ease of immigration from the species-rich "mainland." (distance effect)
3. Smaller habitat patches lose more species more quickly than large patches because their populations are likely small to begin with (area effect). Small populations are more vulnerable to extinction due to disturbance and chance.
4. The risk of extinctions in any patch closer to a large patch is lower than those further away due to increased chances of re-colonization. (rescue effect)

According to the theory of island biogeography, when populations become isolated from one another, disturbance or chance may lead to local extinctions. Once a species becomes locally extinct in an isolated habitat island, the likelihood of reintroduction of the species is very low.

While this theory was created [222] and first tested for island biota [335;336], it has since gained support for land-based habitat islands as well [81;88;310], although land systems are more complex [208]. One key difference is that isolated oceanic islands accumulate species slowly until richness stabilizes with constant background introduction and extinction rates, whereas terrestrial habitats that become isolated will over time tend to harbor a decreasing number of species (the effect of time since isolation) [42].

Scientists observed island biogeography effects in a fragmented chaparral habitat system in California, where in a span of 20-80 years since isolation all native rodents had disappeared in over half the habitat patches studied [42]. Researchers in the same area [344] found that patch size and time since isolation explained most of the variation in the number of bird species found within a given habitat patch.

In contrast, in connected habitats a population in one patch may become temporarily extinct, but as long as the patch is connected to another patch populated with that species, it could be re-colonized. This rescue effect is crucial in the maintenance of small populations with limited habitat areas [310]. The rescue effect provides a compelling argument to maintain, improve and even restore lost wildlife connectivity: without connectivity, the number of wildlife species in the region's greenspaces will dwindle over time.

The theory of island biogeography provides a straightforward way to think about the composition of wildlife communities. However, fragmented terrestrial systems are more complex than islands and the

theory does not account for edge effects, the matrix surrounding the habitat fragments, and human-caused changes and disturbances [208]. The next sections will discuss these issues.

EDGE EFFECTS AND HABITAT PATCH SIZE AND SHAPE

In addition to the important effects of habitat patch size (see Appendix 2) and proximity to other habitat patches key to the theory of island biogeography, the shape of a patch is also important to determining community diversity and composition [208]. Patch size and shape dictate the relative amount of edge and interior habitat. Edge habitat occurs where one habitat type, such as a forest, meets a meadow, road, or other natural or artificial habitat type [126;214]. Habitat fragmentation increases the amount and proportion of edge habitat, increasing the ecological effects associated with edges (edge effects). Edge effects derive from changes in conditions such as light, temperature, wind, humidity, and disturbances. Because of the increased habitat diversity and complexity of ecotones – the area of interface between two habitat types – edges often have greater species richness. Edge effects, however, also have negative impacts, especially when due to habitat fragmentation. Examples of negative edge effects include increased chance of establishment by invasive species, changes in vegetation structure and altered microclimate (for example, increased temperature and decreased humidity).

Although an increase in edge habitat may benefit some species, it can also reduce native biodiversity [13;187]. Invasive plant and animal species are much more prevalent in edge than in interior habitats. The number of species is sometimes higher in edge habitats, but the number of habitat specialists, which tend to be more sensitive or at-risk species, decreases [273;343]. Some species rely on large areas of relatively undisturbed interior habitat, and many sensitive species such as migratory songbirds avoid edges [164;169;216;216;359]. Nest parasitism – that is, egg-dumping by one species into another’s nest – by Brown-headed Cowbirds is also typically higher in species nesting in edge habitats, reducing the host species’ reproductive success [134;229;262].

Some urban predators such as foxes, skunks, coyotes, raccoons and jays hunt along edge habitats and trails where birds, bird and turtle nests, and small mammals are easier to find [51;107;375]. While benefitting certain predators, this can result in higher mortality for edge dwelling prey species or species moving through narrow corridors [235]. A study in Washington state found that 95 percent of Steller’s Jay nest predations occurred within 50 meters of edges [374]. On the other hand, urban predators play a crucial role in maintaining a functioning ecosystem [35;343]. Larger predators such as coyotes help to maintain biodiversity by suppressing smaller predators such as raccoons and feral cats, and nest predators such as squirrels and mice. Small predators can be extremely destructive to wildlife, especially to ground and shrub nesting birds, when their populations increase above natural levels [343].

Edge effects can penetrate far into the interior habitat necessary for certain species, and the response of wildlife movement to and through edge habitat varies by species [214]. Some studies have shown that certain impacts such as invasion by exotic plants and predation can penetrate up to 1,640 feet (500 meters) into the forest [386]. California researchers found that the abundance of interior habitat bird species was reduced within 656-1,640 feet (200-500 meters) of an edge [43]. In Ontario, Ovenbirds, an interior habitat thrush species, select nest sites more than 820 feet (250 meters) from the forest edge,

rendering smaller habitat patches unusable for breeding [58]. Researchers in Pacific Northwest old growth forests found that changes in relative humidity could be measured 98-141 feet (30-240 meters) into the forest interior from the edge of a clear-cut, while changes in soil temperature extended 197 feet (60 meters) into the interior [67]. In the Portland area, one study documented a marked reduction in invasive plant and animal species approximately 200 feet (61 meters) from the edge of forested riparian habitat patches [164].

The size and shape of a patch, as well as the relationship with surrounding habitats, determines the edge effects on wildlife populations [161;289]. For example, the Streaked Horned Lark, a grassland species that has declined severely in the region, uses a relatively small breeding territory but selects territories within much larger areas lacking tall structures such as trees or buildings [296;297]. A large round or square patch has less edge habitat and more interior habitat than a long narrow patch [343], provides fewer movement barriers and allows for increased foraging efficiency [126]. Several studies showed increased insect abundance in large urban and rural habitat patches, benefitting bats [18] and insectivorous birds [58;216;237].

Some studies suggest that the following breeding bird species occurring in the region may be sensitive to habitat patch size during the breeding season (see Appendix 2):

- Forested habitats: Black-capped Chickadee [133], Black-headed Grosbeak [164], Brown Creeper [14;137;164;244], Cassin's Vireo [137], Downy Woodpecker [133;228], Golden-crowned Kinglet [87], Hairy Woodpecker [89;133], Hermit Thrush [14;161;194;244], Pacific-slope Flycatcher [137], Pileated Woodpecker [77;89;137], Red-breasted Nuthatch [161;244], Red-eyed Vireo [89;133;161;228], Ruby-crowned Kinglet [194;244], Steller's Jay [137], Swainson's Thrush [164;194], Varied Thrush [137], Winter Wren [137;164], Yellow-billed Cuckoo [77], Yellow-breasted Chat [133;194], and several small mammal species, including: short-tail weasel, Oregon vole, Northern flying squirrel, shrew-mole, white-footed mouse, Trowbridge's shrew, vagrant shrew, Douglas squirrel, Western gray squirrel and Townsend chipmunk [267]
- Grassland / savannah / oak habitats: Northern Harrier [6], Short-eared Owl [6], Western Meadowlark [6], Streaked Horned Lark [6], White-breasted Nuthatch (also need large oaks) [89;133]

The definition of a large habitat patch depends on many factors including species in question, habitat type, setting (for example, urban, agriculture, rural), geographic region or other factors. Only a few empirical studies have been conducted to determine the appropriate patch size for various species, especially in an urban landscape [179]. In the northeastern U.S., 5-acre (2-hectare) patches provided sufficient small mammal diversity to reduce Lyme disease incidence [4]. Several studies in different regions documented reduced insect/arthropod abundance near edges and in habitat patches less than 37-124 acres (15-50 hectares) [58;82;107;315]. Numerous studies in a variety of areas indicate that larger habitat patches are better for the survival and diversity of native species [42;43;107;386]. These findings support the underpinnings of the theories of metapopulation and island biogeography.

In fragmented habitats, edge effects are generally much more negative than positive [16;90;109;141;154;193;229]. To minimize edge effects, land use planners should try to maximize the ecological effectiveness of large or scarce habitats by: 1) protecting or expanding existing patches, 2) limiting the area of edge habitat through strategic restoration (for example, strive for more round or rectangular shapes), and 3) connecting habitat patches with well designed and strategically located corridors.

HABITAT PATCH SIZE IN THE PORTLAND-VANCOUVER REGION

Research suggests the importance of habitat patch size in the region. A study conducted in Portland examined 17 ecological variables associated with prevalence of the directly transmitted hantavirus in its wildlife host, the deer mouse (*Peromyscus maniculatus*) [96]. Only species diversity was statistically linked to infection prevalence: as species diversity decreased, infection prevalence increased. Larger habitat patches hosted higher small mammal species diversity. The results suggest that patch size affects species diversity, and species diversity affects disease emergence.

Two local studies suggest a minimum size at which “large” habitat patch characteristics begin to emerge. Metro staff collaborated with Dr. Michael Murphy at Portland State University (PSU) to compare results of his graduate students’ fragmentation studies [267] and a Metro field study assessing wildlife habitat quality related to habitat patch size [165]. The two data sets were analyzed separately and the findings compared.

The results were surprisingly similar. The Murphy lab’s research indicated that the following small mammals may need habitat patches of about 25 acres (10 hectares) or greater: short-tail weasel, Oregon vole, Northern flying squirrel, shrew-mole, white-footed mouse, Trowbridge’s shrew, vagrant shrew, Douglas squirrel, Western gray squirrel, and Townsend chipmunk. Conversely, non-native mammals tended to decrease in abundance in larger patches. Put another way, as habitat patches become smaller, the mammalian population shifts from one dominated by native species to one dominated by non-native species. Dr. Murphy’s students also found that avian species richness and abundance tended to increase with natural area size up to approximately 25 acres (10 hectares), and then declined somewhat in larger areas, possibly due to loss of early successional habitat in larger and older greenspaces [267;268]. Neotropical migratory songbird species continued to increase with greenspace size beyond 25 acres. According to Metro’s region-wide habitat study, Wildlife Habitat Assessment scores were highly variable up to approximately 30-acre (12-hectare) patches, after which habitat conditions seemed to stabilize at relatively high scores.

Thirty acres (12 hectares) seems to be an appropriate starting point for “large” habitat patches in this region – that is, where area-sensitive small mammal species, bird species richness and better habitat conditions relating to forest structure, native vegetation and increased key habitat elements such as snags and woody debris, begin to appear. This 30-acre size is probably close to a minimum “large” patch, with some species requiring much larger habitat patches.

Several other studies, scattered throughout a variety of forested regions, indicate that 25 to 30 acres (10-12 hectares) may constitute a significant habitat patch threshold for some species [133;244]. This general threshold appeared significant for birds in eastern England [175], understory insectivorous birds in the Amazon [351], birds across multiple seasons in Georgia [244], and potentially for headwater-associated amphibians in northwestern California [378]. On the other hand, some grassland birds may require 500 acres (200 hectares) or more, although species such as Savannah Sparrows may only require about 25 acres [372]. Note that most studies focus on abundance or likelihood of occurrence, which may not be comparable to pairing or breeding success [58;59].

There are benefits to preserving smaller or edge-dominated habitat patches [171]. Although wider is clearly better, long narrow habitats may provide key connecting corridors, and small patches may be sufficient to preserve some plants or vegetation communities [343]. Small patches interspersed between larger patches provide important stepping stones for wildlife movement. However, the effectiveness of such stepping stones may be lower in more hostile matrix areas (see next section) such as roads, buildings or those lacking vegetation [24]. Further, although small, isolated patches may have diminished habitat value, they may also become increasingly important because they begin to serve more of an "oasis" function and are the last remaining indicators of where the "ecological dots" can be logistically reconnected. Small patches near other patches also provide important functions for some wildlife species not dependent on interior habitat. Some species may be able to use small habitat patches that are individually too small by composing a home range made up of multiple habitat fragments [104;179;277]. Other species may survive in urban areas if they have a series of relatively small patches connected by movement corridors [42]. Proximity of small patches to stream corridors and wetlands undoubtedly elevates their significance for wildlife.

Large habitat patches benefit many of the region's sensitive species, but small habitat patches increase the permeability of a landscape to wildlife. Urban areas with trees and shrubs scattered throughout, combined with larger natural areas connected by corridors, are likely to hold more species and more animals than large patches and corridors embedded within an entirely urban matrix. Back yards, street trees, right-of-ways and green roofs can all provide valuable opportunities to increase permeability.

MATRIX: WHAT LIES BETWEEN HABITAT PATCHES

The area that surrounds a habitat patch but that differs in terms of land use, physical and biotic conditions is called the matrix [174;295]. Island biogeography effectively explains concepts such as area and distance effects, but the theory was developed for islands and the seawater matrix surrounding islands is consistent. This simple scenario is not the case for land-based systems, where the matrix can affect a habitat patch's wildlife and habitat in a variety of ways.

Different matrix conditions affect species differently, and may change or increase ecological effects [121]. Some types of matrices, such as urban areas where human disturbance is high and busy roads can form an absolute barrier to wildlife passage, may exert stronger influences than others. The transition from a forested habitat to a densely populated urban area can be quite abrupt. In such cases, edge effects can be stronger and extend further into a habitat patch.

This effect is not always negative, and seasonality can play a role. An Ohio winter riparian bird study revealed a positive relationship between the amount of urban development within 0.6 mile (1 kilometer) and species richness, total abundance, and numbers of nine of ten native bird species [15]. A winter-spring bird study in the Portland, Oregon area found more non-native birds but also more species overall in winter urban residential habitats compared to more rural habitats, and highlighted the importance of conifers to winter birds [166]. In spring, Neotropical migrants were associated with low urbanization and more native shrub cover, but there were more birds overall, native and non-native, in urban habitats. Increasing native tree and shrub cover, and decreasing non-native shrub cover, appear to increase habitat value for Neotropical migratory songbird communities, and also appear to control non-native birds in this region.

Researchers in Ontario, Canada found that the edge effects of residential development impacted migratory songbirds in forested habitat patches regardless of patch size, from patches of 10-62 acres (4-25 hectares) [131]. In Pennsylvania, spring bird species richness and abundance generally decreased with distance from the stream in urban watersheds, but remained relatively constant in agriculture-dominated watersheds [82]. In Rhode Island, human-intolerant species predominated in less developed areas (below 12 percent residential development and 3 percent impervious surface), whereas human-tolerant species predominated above these levels, at several spatial scales [219]. A study conducted near Ottawa, Canada found that agricultural matrices tended to affect bird species at broad scales (within 3.1 miles, or 5 kilometers), whereas urban matrices tended to affect birds at narrow (1.1 miles, or 1.8 kilometers) as well as broad scales [103]; these researchers suggested that limiting urban land use within approximately 656-5,906 feet (200 – 1,800 meters) of forest patches would benefit Neotropical migratory birds.

Changing environmental conditions can also influence matrix effects. A controlled experiment in western Oregon tested the relative movements of *Ensatina* salamanders along two different (vegetated versus non-vegetated) 10 x 131-foot (3 x 40-meter) pathways between small plots [316]. Under normal weather conditions, the salamanders selected vegetated pathways more often but moved more quickly through non-vegetated pathways, thus the immigration rate resulting from each corridor type was similar. In drought conditions, the animals still preferred and moved more slowly along vegetated corridors, however, the rate of movement along non-vegetated pathways increased and these animals experienced weight loss and increased mortality. Therefore, fewer *Ensatina*s arrived at the next patch and they arrived in poorer condition compared to vegetated corridors. This study suggests the increased importance of high-quality corridors to mitigate climate change impacts on wildlife.

The effects of the matrix surrounding a patch are often species-dependent. For example, starlings thrive in edge habitats and easily cross wide matrix areas to visit another habitat patch. Both starlings and Brown-headed Cowbirds are associated with low tree cover in this region [164;169]. In contrast, many migratory songbirds are sensitive to disturbance and tend to avoid edge habitat except when migrating. For these species, edge habitat essentially becomes another type of matrix that must be navigated to move between patches; effective patch size shrinks, the matrix area expands, and species unwilling to cross gaps larger than a certain distance are blocked (see Appendix 3). Nonetheless, many birds can readily cross areas that are barriers to other species. Some wildlife species, such as amphibians and

turtles, cannot move very fast or very far, particularly on dry land. These types of species are most vulnerable to matrix effects.

Environmental conditions, habitat selection, life-history requirements and mobility help determine matrix effects and what connectivity means to a species. Many matrix habitats do offer some degree of connectivity. The characteristics unique to each species provide important clues to help identify key habitat patches and provide connectivity between them. Roads, residential and industrial areas, which are common in urban matrix areas, can impose a variety of disturbances including noise, sound, light, and human and pet impacts. These are discussed in the next section. In addition, there are many ways to improve the matrix quality in our urban landscape, such as retaining and adding street and yard trees, green roofs, and “feathering” habitat edges with native shrubs and plants.

URBANIZATION AND DISTURBANCE ISSUES

More than half of the world’s people live in metropolitan areas, and the proportion is expected to increase [252]. Scientists recognize urban areas as a unique type of ecosystem, with similar characteristics worldwide. A relatively large body of scientific literature documents effects due to urbanization that are similar regardless of geographic location. For wildlife, urban areas typically mean fewer specialized species and more generalist and invasive species [1;32;233]. However, some species appear able to adapt to urban areas by modifying their life-history traits [95].

Most of urbanization’s adverse impacts originate from changes in the amount and timing of water runoff, loss and fragmentation of native habitat, increased edge effects, invasive species and disturbance [45;61;302]. Structural simplification is another hallmark of urban habitats, and structural complexity and total vegetation volume are well-known contributors to wildlife species richness in forested areas [12;32;130;145;205;232;258;326]. These systemic alterations harm water quality, wildlife habitat and sensitive species [1;32;166;250].

In general, species best adapted to urban environments are those not limited to a single habitat type, those with populations easily maintained by outside recruitment, and those that can exploit the urban matrix [88;290;324;361]. For example, in this region, habitat generalists such as Scrub Jays, American Robins and European Starlings are abundant, and Vaux’s Swifts, which will nest in chimneys, are increasing [167;169;325]. Backyard bird feeders and other supplemental feeding may increase bird, feral cat and raccoon density [15;135;305;355]. The overall and species-specific impacts from supplemental feedings are not well known, and pose an interesting research question in the region [22].

Development patterns and the quantity, environmental conditions and location of undeveloped land strongly affect urban wildlife and habitat [220]. The amount and placement of a few key landscape features, especially trees, shrubs and hard surfaces, significantly influence the types of wildlife that can survive in urban areas. Habitat type, quality and human behavior also influence wildlife.

The next section discusses some of the impacts of roads, noise, light and trails on wildlife and habitat.

ROADS AND ROAD EFFECTS

The ecological footprint of a road can extend far beyond the road itself [125]. There are nearly 4 million miles of roads in the United States [28], and about one-fifth of the U.S. land area is directly ecologically affected by the public road system [125]. The issues reviewed below are covered in more detail in Metro's Wildlife Crossings Guidebook, and the book also offers a variety of solutions to wildlife movement barriers [91]. In brief, key road effects include:

- barriers to wildlife movement and wildlife killed by traffic
- habitat loss and fragmentation, increased edge habitat and edge effects
- changes in plant and wildlife composition; invasive species spread and establishment
- wildlife-vehicle collisions resulting in human injury, death and economic damages
- wildlife avoidance or behavioral changes due to noise, air quality, light and activity levels
- reduced air and water quality affecting aquatic and terrestrial ecosystems

A review of 79 studies found that negative effects of roads on wildlife outnumbered positive effects by a factor of five [110]. The review indicated that amphibians and reptiles tended to show negative effects. Birds primarily showed negative or no effects, small mammals generally showed either positive effects or no effect, mid-sized mammals showed either negative effects or no effect, and large mammals showed predominantly negative effects. The findings indicated that roads most negatively impact certain groups of species, including species that are attracted to or do not avoid roads and are unable to avoid individual cars (for example, amphibians) and species with large movement ranges, low reproductive rates, and low natural densities (for example, large carnivores).

Reptiles and amphibians are particularly vulnerable to road effects, and some species may experience high mortality when migrating to or from breeding areas [75;140;144;204;241], and such casualties do occur in this region. Observant residents who walk or bicycle in such circumstances have probably seen major rough-skinned newt or red-legged frog kills, all in the same short section of road. Road-kill was a major source of amphibian mortality in Indiana, where water, forest habitat, and urban/residential areas were the variables that best predicted mortality [144]. Turtle research across the U.S. indicates that sex ratios have become more male-dominated, presumably because females need to travel further overland to nest and suffer higher road mortality [11;51;140;348;349]. Researchers studying snakes in South Carolina found that smaller species tended to avoid roads altogether, some species immobilized in response to approaching vehicles, and some could not cross roads with high traffic densities [9].

Birds are frequently killed by vehicles, and mortality may be influenced by a variety of factors including species, habitat and road design. One literature review stated that birds often killed from highway-related causes include non-flying birds such as gallinaceous birds and ducklings; waterbirds such as terns; owls; ground-nesters; scavengers; Neotropical over-water migrants; and fruit-eating birds [183]. The review also offers several mitigation suggestions. In Virginia, researchers found a close association between a median planted with fruit-bearing shrubs and Cedar Waxwing mortality, and collected 459 dead birds along a 500 meter highway section in a 7-week period [379].

A recent estimate indicates there are between one and two million collisions between large animals and vehicles in the United States annually, and that collisions between animals and vehicles comprise five percent of all reported motor vehicle collisions [180]. Although reported vehicle-vehicle collisions have remained relatively steady from 1990 to 2004, reported animal-vehicle collisions have increased by 50 percent, a likely result of more people driving more miles and increases in deer populations in the United States [180].

Roads may also impact wildlife through noise and artificial light, as discussed in the following sections.

NOISE

Excessive noise, or noise pollution, can affect wildlife in a variety of ways including mortality, altered habitat use and activity patterns, increased stress response, decreased immune response, reduced - or sometimes increased - reproductive success, increased predation risk, degraded same-species communication, and damaged hearing if the noise is sufficiently loud [97;105;128;132;291;292;311-313;337;338]. Traffic volume and distance from road appear to play key roles in noise effects [105;107;132;291].

The loudest road noise occurs at lower pitches and can influence wildlife communication. Various studies, including one in Portland [393], show that some bird and frog species change the pitch of their songs to higher frequency near noisy roads [105;291;292;311;338]. This may represent a potential tradeoff between audibility and attractiveness to potential mates or territory defense. Densities of such species are often reduced near roads [313].

Animals may avoid or select noisy environments, disproportionately affecting some species. Researchers in Ontario [105] found thresholds of at least 250-1,000 meters within a busy highway where frog abundance was significantly reduced. In Arizona, researchers studying elk use of underpasses found that traffic over the crossings, particularly semi trucks, caused flight behavior [132]. On the other hand, a Utah study suggested neutral or positive effects for the majority of small mammal species captured near a noisy interstate highway [39]. Some species, such as deer, may become habituated to noisy environments [99].

Noise pollution appears to reduce reproductive success in some species [97;128;189]. However, other species may selectively and more successfully nest near noisy sites to avoid nest predators such as jays [128;338], potentially contributing to their increased reproductive success in urban areas.

Several noise mitigation measures can be employed, including noise barriers and reducing the source of noise [183;313;338]. Changing road elevation, such as elevating roads above habitat level, may help because most of the noise derives from the road surface. Sound walls can be effective noise barriers, but can also block wildlife passage; vegetation can help block noise without blocking wildlife movement, but if the vegetation attracts wildlife to road areas then crossings or other measures should be considered. Smoother road surfaces and road design can reduce noise.

ARTIFICIAL LIGHT

Longcore and Rich provide an extensive review of the consequences of ecological light pollution, which alters natural light regimes in terrestrial and aquatic ecosystems [217]. Light pollution includes chronic or periodically increased illumination, unexpected changes in illumination, and glare. The effects of ecological light pollution have been studied for some species, but the more subtle influences of artificial night lighting on the behavior and community ecology of species are less well recognized, and constitute a new focus for research in ecology as well as a pressing conservation challenge [26;269].

Some impacts of artificial light pollution arise from changes in orientation, disorientation, and attraction or repulsion of various wildlife species. Orientation and disorientation are species' navigational responses to the amount of light falling on objects in the environment, whereas attraction and repulsion derive from species' behavioral responses to the actual light sources and brightness.

Nocturnal animals accustomed to navigating in darkness can become disoriented in artificial light. Rapid increases in light may temporarily blind and disorient certain species, including some frogs, making them vulnerable to predation or traffic [26;217]. Researchers have documented that night lighting can interfere with the ability of moths and other nocturnal insects to navigate [129]. Some animals navigate at night by stars, and light pollution can cause disorientation by making stars less visible [183].

Artificial light attracts some species and repels others. Migratory birds seem to be attracted to buildings lighted at night, causing significant mortality [217]. Many migratory songbirds are attracted to lights and are killed at lighted towers; the U.S. Fish and Wildlife Service estimates that the number of birds killed after being attracted to tall lighted towers ranges from at least 4-50 million per year [230]. Large carnivores may avoid artificial light, creating an unintentional barrier effect for lighted areas [25]. Insects and other arthropods may be attracted or repelled by light, and certain bird and reptile species typically active only during daylight hours will forage under artificial light, potentially benefiting those species but not their prey [173].

Artificial night light may change animal behavior, inducing diurnal birds to sing territorially at night or earlier in the morning, wasting valuable energy [217;255]. Light pollution can negatively impact the migratory and breeding behavior of frogs and salamanders [217;321;392]. It can also change the duration and timing of bat foraging, with unknown consequences [41]. A European study of house-dwelling bats found that juveniles were smaller in night-lit houses than in those that were not lit [41].

In certain situations, artificial lighting may provide a conservation tool. For instance, lighting, in combination with other mitigation measures such as fencing and modifications to bridges, can reduce wildlife-vehicle collisions [243]. Night lights are sometimes used to attract fish to ladders near dams [217]. However, the majority of the science points to negative or at best, unknown effects for wildlife.

Light pollution can be mitigated, including using newer designs that meet the Illuminating Engineering Society of North America's standards and also reduce light pollution [183]. Directing light downward or away from habitat, reducing glare and using lower wattage flat lens fixtures on highways and city streets reduces light pollution, and increasing reflectivity of signs and road striping in appropriate areas may

increase driver visibility while reducing the need for artificial lighting. One easy solution is to turn off unnecessary lights at night. Some urban areas are making strides toward reducing night lighting, as with the City of Chicago's "Lights out for Birds" campaign [71]. This has the added benefit of reducing cost and energy use.

TRAILS

Trails create edge habitat and may cause a variety of ecological impacts including trampling, soil compaction, erosion, pollution, fragmentation and edge effects, and introduction or spread of invasive plant species [188]. Some wildlife species may be particularly susceptible to predation, noise and motion disturbances near trails. Trail disturbances sometimes parallel road effects relating to light, noise and disturbance in that higher traffic volume tends to exert a stronger influence [114].

Several studies examined the influence of trails on wildlife, most notably on bird species [253;257;353]. Trails introduce human disturbance, causing a flight response in birds at various distances from people (the "flush distance"). Nearly all bird species will flush if approached too closely by humans, and larger species or those species active near the ground tend to be less disturbance-tolerant [107;116;148]. Energy that could be used for critical activities such as feeding, territory maintenance and breeding may be spent on avoidance behavior. Trail planning efforts should consider these factors if species of conservation concern are known or suspected to inhabit the study area.

Trails may reduce nest success [188]. However, species, habitat, disturbance types, and study methods sometimes show apparently opposite trends. For example, a Portland, Oregon study revealed increased Spotted Towhee reproductive success for nests within 33 feet (10 meters) of a trail [22]. A Colorado artificial nest study in lowland riparian areas showed lower predation rates closer to trails [253]; birds attacked more clay eggs in artificial nests near trails than away from trails, whereas mammals appeared to avoid nests near trails to some extent. However, artificial nest studies do not necessarily reflect reality [215;227;293;388]. Another researcher in Colorado studied real bird nests in grassland and forest ecosystems and found proportionately more generalist species near trails, fewer birds nesting near trails in grasslands, and reduced nest success near trails in both habitats [257]. Trails did not appear to affect cowbird parasitism. In northeastern California, one study showed greater bird nest desertion and abandonment – but reduced predation – on shrub nests less than 328 feet (100 meters) from off-highway vehicle trails compared to nests further from trails [21]; two of 18 bird species were less abundant at sites near trails than at sites 820 feet (250 meters) from trails, and no species were more abundant closest to trails.

Researchers in Spain found that 16 of 17 bird species were negatively affected by increasing pedestrian rates [113]. In Boulder, Colorado some species occurring in this region, including Western Meadowlarks, Chipping Sparrows and Western Wood-peewees, were significantly more abundant in areas away from trails, whereas American Robins and House Finches were more abundant near trails; nest failure for most species and cowbird parasitism on forest-dwelling species were more common near trails [257]. This study identified a trail "zone of influence" of about 246 feet (75 meters) from the trail for most species. As with roads, some species seem able to habituate to trails, including some habitat generalists

and urban-associated species [107;114]. A southern California study suggests that deer, bobcats and coyotes become less active during the day in recreation areas, and effects were stronger in areas with heavy recreation [136].

One researcher [188] reviewed literature pertaining to trails and wildlife, in which studies indicated several key points:

- direct approaches cause greater wildlife disturbance than tangential approaches*
- rapid movement by joggers is more disturbing than slower hikers (no studies specifically addressing bicycles were found)**
- children and photographers are especially disturbing to birds
- passing or stopping vehicles are less disturbing than people on foot
- trails are associated with invasive plants, with more effect on higher-use trails (emphasizes the importance of cleaning boots and shoes between sites)

*Note: We located one study in Spain in which numerous bird species were substantially more sensitive to tangential than direct approaches [117]

**We located two studies demonstrating significant negative effects of bicycling activities on elk and waterfowl [270;298]

Research indicates that dogs on or near trails have negative impacts on wildlife beyond that of humans alone. This has been demonstrated for small mammals, mule deer, grassland bird species and bobcats [211;256]. A Colorado study showed reduced deer activity within 164 feet (50 meters) of trails where dogs were prohibited, but the distance doubled to 328 feet (100 meters) for trails that allowed dogs, with similar effects on a variety of small mammals [211]. Dog walking in Australian woodlands led to a 35 percent reduction in bird diversity and 41 percent reduction in abundance [19]. Off-leash dogs may be particularly detrimental, because some wildlife species can habituate to predictable disturbances but the behavior of off-leash dogs is unpredictable [95;211].

In South America, trail-wildlife researchers note that implementing restricted use buffer zones can moderate the effects of cars and pedestrian traffic, but can also conflict with recreational activities. They recommend re-distributing human disturbance by varying the number of visitors and area of visitation according to the spatial requirements of differently sized species [116]. This type of approach could be used in this region by determining what kinds of trails to install based on habitat and target species, and where and how to build them.

Despite the potential for negative wildlife impacts, trails can provide opportunities to increase wildlife connectivity. If humans can walk or bike along a natural area trail, most wildlife species can as well, although behavioral responses may limit passage depending on factors such as species, traffic volume, region, etc. A crossing structure may be incorporated into the design of bicycle/pedestrian facilities or recreational trails, but target wildlife species and their sensitivity to human disturbance must be considered. Metro's *Green Trails Guidebook* offers general recommendations on planning and implementation for trails in sensitive habitat areas. More studies on this topic are needed in this region.

INVASIVE SPECIES

Native plants are preferred for native wildlife because they tend to control non-native wildlife, support more insect prey, require little maintenance once established, and provide habitat diversity [32;57;66;166;169;245;267;299;299;395]. There are, however, species- or habitat-specific exceptions to this generality [162;317].

A Pennsylvania study comparing wildlife using native versus non-native suburban landscaping found that native properties supported significantly more caterpillars and caterpillar species and significantly greater bird abundance, diversity, species richness, biomass, and breeding pairs of native species; bird species of regional conservation concern were eight times more abundant and significantly more diverse on native properties [57]. Caterpillars are large and slow moving, and are particularly important to Pacific Northwest breeding birds [7]. Planting certain native caterpillar host plants, such as ocean spray (*Holodiscus discolor*), can significantly enhance habitat value for wildlife.

Habitat fragmentation, edge effects and climate change tend to increase invasive species. Invasive species are recognized as a major threat to ecosystems worldwide, but urban areas are particularly vulnerable due to high levels of habitat disturbance and the many routes through which such species can be introduced [100;265;278;299;304;373]. By one estimate, damage and loss from invasive species in the U.S. is at least \$120 billion per year [304].

The Oregon Invasive Species Council defines invasive species as those species not native to the region which out-compete native species for available resources, reproduce prolifically and can dominate habitats, regions or ecosystems [278]. The group notes invasive species' lack of natural predators and potential to transform entire ecosystems, as native species and wildlife that depend on them for food, shelter and habitat disappear. Oregon Department of Fish and Wildlife (ODFW) developed the Oregon Invasive Species Council Action Plan in 2005 [278]. The plan states that exclusion, early detection and rapid response are by far the most cost-effective ways of dealing with undesirable invaders. The Action Plan's goal is to facilitate efforts to keep invasive species out of the state, find invasions before they establish permanent footholds and do whatever it takes to eradicate incipient populations of undesirable species. Education and cooperation are key components to an effective strategy.

The region has formed a collaborative effort to control invasive plant species. The Clackamas, Clark, Multnomah, and Washington County Cooperative Weed Management Area (CWMA) was formed to create and support collaborative weed management among land managers and owners in the region [127]. The CWMA coordinates weed management activities across multiple boundaries and ownerships, enhances funding opportunities, and promotes weed education/outreach, weed inventory and prevention and weed control activities. The management plan and other valuable information, such as weed control methods, are available online (www.4countycwma.org).

CLIMATE CHANGE

Urbanization as land use conversion is likely to have stronger and more rapid effects on the local habitat than global climate change [323]. Nonetheless, climate change is an important ecological driver to consider as (a) it will likely trigger migration of animals and elevate the need for connectivity for wildlife and plant species as ranges shift; and (b) restoration and structural elements added now may be in place for decades, therefore anticipating species' ranges and habitat needs now may facilitate their future survival.

The Institute for Sustainable Environment issued a climate change report in 2009 for the upper Willamette Basin, where annual average temperatures are likely to increase from 8 to 12 degrees Fahrenheit (4 to 6 degrees Celsius) by around 2080 [98]. The report on the lower Willamette Basin is currently under revision, but projected impacts appear to be similar.

The region will see significant changes [98]. Storm events will be more severe and the region will have more water when it is not desirable, and less when it is needed. The result will be significantly altered hydrology from historic or current conditions. Existing habitat stressors including fragmentation, habitat loss and invasive species encroachment, will likely worsen; some rare habitats may decline and coniferous trees may be replaced by deciduous trees in certain areas, especially in lowlands. Some vegetation may become drought-stressed. Invasive species, disease and pests may increase and some new ones will likely emerge. The rate of change is expected to exceed species' ability to adapt. If they cannot adapt, the next best option is moving to appropriate habitat.

Scientists believe that corridors facilitating wildlife movement will be necessary for some species' survival [143]. The Institute for Sustainable Environment provides a series of recommendations that emphasize the need to maintain and restore ecosystem function and connectivity. Connectivity ensures that species can move to new areas, and "should become a priority of land management practices" [98]. In this region, wildlife that must undergo range shifts will need connectivity between important habitats within the urban area, to the Coast and Cascade mountain ranges, and north-south connections through the valley, including habitat on each side of major rivers.

Although climate change predictions have been made for some species, the overall changes expected in wildlife communities are not fully known [143;182;306]. Changes in some bird species' ranges attributable to climate change have been documented in Massachusetts and Maine [367;390], and for the majority of species wintering throughout North America [274]. Some species, such as habitat specialists or species already declining, will be more at risk. Intact ecosystems, best represented by large habitat patches, and associated species are less at risk.

The National Wildlife Federation reviewed the scientific literature pertaining to climate change adaptation and found that adaptation measures identified in the literature generally address the following five overarching principles (from [143]):

1. **Reduce other, non-climate stressors.** Addressing other conservation challenges, such as habitat destruction and fragmentation, pollution, and invasive species, will be critical for improving the

ability of natural systems to withstand or adapt to climate change. Reducing these stressors will increase the resilience of the systems, referring to the ability of a system to recover from a disturbance and return to a functional state.

2. **Manage for ecological function and protection of biological diversity.** Healthy, biologically diverse ecosystems will be better able to withstand some of the impacts of climate change. Ecosystem resilience can be enhanced by protecting biodiversity among different functional groups, among species within functional groups, and variations within species and populations, in addition to species richness itself.
3. **Establish habitat buffer zones and wildlife corridors.** Improving habitat connectivity to facilitate species migration and range shifts in response to changing climate condition is an important adaptation strategy.
4. **Implement proactive management and restoration strategies.** Efforts that actively facilitate the ability of species, habitats and ecosystems to accommodate climate change – for example, planting climate-resistant species and trans-locating species – may be necessary to protect highly valued species or ecosystems when other options are insufficient.
5. **Increase monitoring and facilitate management under uncertainty.** Because there will always be some uncertainty about future climate change impacts and the effectiveness of proposed management strategies, careful monitoring of ecosystem health coupled with management approaches that accommodate uncertainty will be required.

A new report by the Association of Fish and Wildlife Agencies provides a detailed approach for agencies wanting to incorporate the impacts of climate change into state Wildlife Action Plans and other wildlife and habitat management plans [74].

Habitat loss, fragmentation, invasive species and human disturbance already stress the region's fish and wildlife communities. Climate change will add to those stressors, but connectivity can help alleviate some of climate change's detrimental effects on the region's biodiversity.

OVERVIEW OF THE REGION'S HABITAT AND WILDLIFE

HISTORIC AND CURRENT HABITAT

Prior to European settlement the Willamette Valley consisted of a mosaic of large patches of riparian forests and wetlands, open white oak savannas and prairies, and hills of oak, Ponderosa pine and Douglas-fir [206]. Native Americans historically set controlled fires that maintained the prairies, savannas, and oak woodlands throughout much of the valley for many years [283;284].

Using data from land surveys for the General Land Office between 1851 and 1895, the Oregon Natural Heritage Program (now called the Oregon Natural Heritage Information Center) created a historical vegetation map for Oregon [69]. The map shows that this region was covered predominantly by closed and open canopy forest interspersed with prairie and savanna habitats.

Table 1 provides the estimated percentage breakdown for the types of vegetation that once covered the region compared to more recent land cover data. Forest canopy covered more than three fourths of the Clackamas, Sandy, Tualatin, and Willamette River basins within this region. The area inside the Portland area’s urban growth boundary is currently comprised of about 30 percent tree cover [168]. The Columbia River and Multnomah Channel contained significant amounts of riparian forest, wetland, dry prairie and savanna, and open water. The Tualatin River basin contained a significant amount of dry prairie and savanna habitat.

Table 1. Percentage of vegetation cover within the urban growth boundary of the Portland, Oregon area: estimated historical versus recent.

Vegetation Type	WATERSHED						
	Clackamas River	Columbia River	Multnomah Channel	Sandy River	Tualatin River	Willamette River	All
	<i>Percent historic/current</i>	<i>Percent historic/current</i>	<i>Percent historic/current</i>	<i>Percent historic/current</i>	<i>Percent historic/current</i>	<i>Percent historic/current</i>	<i>Percent historic/current</i>
Barren/Urban	<1 / 27	<1 / 52	0 / 3	0 / 45	<1 / 17	<1 / 29	<1 / 24
Upland closed forest canopy	68 / 28	40 / 3	53 / 32	82 / 8	47 / 23	52 / 25	49 / 22
Upland open forest canopy	16 / 9	4 / 10	1 / 3	0 / 16	28 / 8	30 / 15	25 / 10
Riparian/wetland forest	11 / 2	16 / 2	10 / 2	12 / 4	6 / 1	3 / 2	6 / 1
Wetlands and wet prairies	<1 / <1	4 / 2	8 / 2	<1 / 1	3 / 1	<1 / <1	2 / <1
Dry prairie, savanna, and shrubland	2 / 6	14 / 10	21 / 17	0 / 10	16 / 6	10 / 5	14 / 6
Ag riparian/wetland	0 / <1	0 / <1	0 / 2	0 / <1	0 / 1	0 / <1	0 / <1
Ag Upland	0 / 25	0 / 2	0 / 35	0 / 10	0 / 43	0 / 19	0 / 31
Water	2 / 2	22 / 19	7 / 3	6 / 6	<1 / <1	4 / 4	4 / 4
Total Acres	14,053	47,252	22,481	6,892	289,985	166,356	547,017

Source: Christy 1993, Metro 1998 land cover data [69;250].

Notes:

- 1) The Urban category underestimates the amount of land covered with urban development because it excludes urban uses that are also intermingled with open and closed forest canopy cover.
- 2) The table shows a 43 percent decline in forest cover from historic levels. Forest composition has also changed due to loss of conifers, old growth forests and white oak woodlands.
- 3) Current riparian/wetland forest is only 17 percent of historic levels. However, the difference is probably much greater due to the assumptions used to calculate current riparian/wetland forest cover. This cover type was estimated using 200-foot buffers along streams and wetlands. This significantly overestimates the actual amount of riparian forest given existing land use patterns.
- 4) Historic dry prairie, savanna, and shrubland have been largely converted to non-native grasslands and shrublands.
- 5) Agriculture and urban categories comprise 55 percent of the land area in the region, representing a total conversion from the original land cover.

Changes in the types and amount of habitat lead to changes in wildlife communities. Although comprehensive survey data, both past and present, do not exist, consultations with some of the region's leading wildlife experts helped compile the following species information currently living in the region [250].

There are nearly 300 native vertebrate species in the region, including 16 amphibian, 13 reptile, 209 bird, and 54 mammal species (Appendix 5) [250]. A variety of native upland and riparian habitats is necessary to maintain the region's existing wildlife diversity. Ninety-three percent of the region's wildlife species use riparian areas at some point, with 45 percent regularly dependent on those areas. Eighty-nine percent of the region's terrestrial species are associated with upland habitats, with at least 28 percent regularly depending on these habitats.

Local Breeding Bird Survey data document declines in species specializing on habitats such as native oak, grassland, and riparian, and studies suggest that riparian areas, native shrubs, tree cover, woody debris and habitat patches greater than 30 acres (12 hectares) are particularly important to the region's wildlife in forested habitats [164-169;267;268;300].

The sections below provide a brief description of the region's wildlife by taxonomic group. Metro's 2005 Vertebrate Species List is included in Appendix 5, and Metro's 2006 State of the Watersheds report includes an appendix cross-walk of the region's sensitive species with Oregon Department of Fish and Wildlife's Strategy Species, including brief information on these species' needs, threats and conservation recommendations [167].

FISH

Although this paper focuses on terrestrial wildlife, the riparian areas that provide wildlife corridors are also key elements of fish habitat, as are all fish-negotiable streams and rivers.

The Metro region provides habitat for at least 26 native fish species, plus at least one extirpated species. Fifteen more species (37 percent) are non-native. Seven anadromous Pacific salmonid species (all members of the scientific genus *Oncorhynchus*) are native to Oregon. They include chinook, chum, coho, sockeye, steelhead and cutthroat trout [52;65]. Salmon survival depends on high-quality, stable environments from mountain streams, through major rivers to the ocean. As such, salmon habitat requirements serve as an indicator of the conditions needed for other fish species. Thirteen salmon runs are federally ESA-listed, with two of these also state Threatened or Endangered. Another run is listed as Endangered only at the state level. Out of the entire genus, only resident rainbow trout are not considered to be at risk.

The adverse effects of urbanization on salmon habitat include increased temperatures, low dissolved oxygen, increased turbidity and sedimentation, changes in streamflow patterns and floodplain connectivity, loss of physical habitat (pools, riffles, gravel beds, off-channel habitats, hyporheic flow), and loss of invertebrate prey. Woody debris is the preferred cover [239;342], and its documented loss in urban streams degrades fish habitat quality [23].

Currently, the *Lower Columbia River Conservation and Recovery Plan* is in draft form, scheduled for public outreach during the first half of 2010 (see www.dfw.state.or.us). In 2006, the Oregon Department of Environmental Quality (DEQ) issued the Willamette Total Maximum Daily Load (TMDL), citing water temperature as a key, overarching pollution problem in the region [282]. The DEQ states that remedies to the region's TMDL issues include planting vegetation to reduce erosion and keep water cool; changing habits at home, at work, and at play to prevent or reduce pollutants entering waterways; improving fish passage and opening habitat that was blocked by past practices; and reducing erosion and sediment entering streams. These restoration activities will clearly benefit wildlife as well. Fish passage improvement projects can offer excellent, and sometimes inexpensive, ways to improve connectivity, sometimes as simple as installing a shelf or boulders to allow small animal passage through a culvert in high water periods.

AMPHIBIANS

At least 16 native amphibian species live in the region, including 12 salamander and four frog species (Appendix 5) [250]. Bullfrogs are introduced and biologists suspect they place considerable pressure on native species [138;260;286;309]. Eleven of these species rely exclusively on stream or wetland related riparian habitat for foraging, cover, reproduction sites and habitat for aquatic larvae [250]. Two species rely almost solely on uplands, although most species (94 percent) use upland habitats during their life cycles [250]. Six Metro-region amphibian species are state-listed species at risk; four species are considered at risk at the federal level.

This group of animals may be the vertebrates most vulnerable to extinction due to habitat isolation and climate change [281]. Amphibians have small home ranges and cannot travel as freely as other animals. Most of the region's amphibians require both aquatic habitats and terrestrial habitats close to water to complete their life cycle; most require ample woody debris. It may be difficult or impossible for these species to navigate the urban matrix. Amphibians are also particularly vulnerable to water pollution, in part because toxins may be absorbed through their skin [112].

Amphibians have suffered worldwide declines over the past several decades, with nearly a third of all species red-listed (threatened with extinction) under the International Union for the Conservation of Nature, or IUCN [352]. This group is highly sensitive to habitat loss and alteration such as microclimate changes [281]. For example, habitat fragmentation creates edge habitat and edge habitats tend to have elevated temperatures and reduced humidity. Unlike other species groups, amphibians' skin and eggs are not waterproof, and such microclimate changes may be lethal [112;198;281].

Many amphibians rely on stream connectivity and small stepping stone wetlands between larger habitat areas to move and disperse. Storm water detention facilities are emerging as a key factor in the region's wetland connectivity and provide regular feeding and breeding habitat for a variety of native amphibians. A Portland study of 59 wetlands found no difference in amphibian presence between natural and created wetlands [178]. In Gresham, 52 of 138 (38 percent) sites surveyed hosted native breeding amphibians. Of those 52 sites, more than half were constructed storm water ponds and swales [147]. These studies document the importance of small wetlands, often overlooked in conservation

planning as well as regulation, to the region's connectivity and biodiversity. Recent court decisions removed isolated wetlands from federal wetland protection [139;209;210;385], further emphasizing the potential importance of storm water detention facilities and small wetland conservation to amphibians.

Research suggests that amphibians in urban areas are susceptible to direct mortality, road noise, fragmentation and barriers [75;110;144;204;241;328]. Particularly affected species include those that require short hydroperiods (timing and amount of water in the wetland), early breeding activity, and substantial upland habitat use [303]. Because they require moisture and have limited mobility, habitat connectivity for amphibians will likely depend on stream corridors and natural and created wetlands in close proximity to one another. Passage between such habitats can be enhanced through appropriate wildlife under-crossings and by augmenting cover – for example, planting native herbaceous and low shrub cover and placing arrays of large woody debris between key areas.

REPTILES

Thirteen native reptile species live in the region, including two turtle, four lizard and seven snake species (Appendix 5) [250]. Two more turtle species, snapping turtles and red-eared sliders, are non-native and invasive. Reptiles depend more on upland habitats than other species groups, with 100 percent of species using upland habitat during their life cycles [250]. However, both native turtle species require riparian-wetland as well as upland habitats. These two species are listed as at risk at state and/or federal levels.

Reptiles are heterothermic (cold-blooded) and some species have special behaviors and habitat requirements in order to collect the sun's energy. Many lizard and snake species rely on upland cliffs and rocky outcrops to gather heat during cool periods. Crevices within these structures also provide important refuge during hot spells. However, some reptiles prefer riparian areas, fulfilling complex life history needs through the structural and functional diversity provided by riparian forests. For example, the common garter snake forages for amphibians, small fish and earthworms, and needs riparian denning sites with good cover, such as downed wood and good shrub and understory. Downed wood is also important in upland reptile habitat [55;294].

Western pond turtles and painted turtles are the two native turtle species living in the region, and they are both listed as Critical on Oregon Department of Fish and Wildlife's Sensitive Species list [285]. These species eat a variety of foods such as plants, insects and tadpoles, need basking logs or structures in the water, and require both riparian and upland areas for feeding and nesting [284]. Pond turtles are in jeopardy due to habitat loss, isolation and predation on eggs and hatchlings by predators such as raccoons, non-native turtles and fish [286]. Western pond turtles have dangerously restricted gene pools due to geographic isolation of populations [284].

Although no local studies have been conducted, studies elsewhere in the country demonstrate that turtle sex ratios have become skewed towards males [11;51;140;271;348;349] (see also roads section). A Texas study suggested similar difficulties with snakes [318]. Local pond turtle populations sometimes

contain only large older turtles, indicating unsuccessful reproduction, possibly due either to lack of or isolation from breeding habitat [286].

Providing safe connectivity between important habitat patches, including appropriate crossings, such as the Rivergate undercrossing created by the Port of Portland to connect two wetlands used by painted turtles, can increase the breeding populations of the two native turtle species. Conserving, restoring and creating wetlands and important nearby upland habitat will also benefit turtles and many other species.

BIRDS

Birds often represent a majority of vertebrate diversity in a region, and indeed the 209 native bird species comprise about two-thirds of the region's native vertebrate species (Appendix 5) [250]. Four more non-native species have established breeding populations in the area, and Barred Owls appear to be establishing a breeding presence. Birds are probably the most researched vertebrate group in the country, and thus provide much of the research cited in this report.

There are many upland-associated bird species - 61 species, or 29 percent, depend on uplands and 86 percent use uplands at some point - although about half of the region's native bird species depend on riparian habitats for their daily needs and most species use riparian habitats at various times during their lives [250]. Twenty-two bird species on Metro's list are state or federal species at risk; 19 of these are riparian obligates or regularly use water-based habitats. An additional riparian obligate, the Yellow-billed Cuckoo, was extirpated in the region; however, a single bird was observed in 2009 in the Sandy River Delta – a very hopeful sign and a good reason to continue restoring contiguous bottomland hardwood habitat. This species does an excellent job controlling tent caterpillar infestations and unlike European cuckoos, is not a nest parasite.

Urban bird communities are typically less diverse compared to those in undisturbed habitats, but contain higher numbers of birds due to domination by a few non-native and urban-associated species. Richness of urban bird species, particularly of habitat specialists, tends to decrease over time [1-3;142;166;167;169]. Long-distance migratory species that breed here and winter south of the U.S.-Mexico border (Neotropical migrants) appear to respond negatively to urbanization here and elsewhere [131;164;169;299], perhaps related to noise, fragmentation, food or nesting resources, or predation. However, the region still hosts a substantial number of bird species, as demonstrated by several local field surveys [38;166;169;267;268].

The European Starling, an abundant and highly edge-associated non-native species, is closely associated with the region's riparian habitats during breeding season and can comprise 50 percent or more of total birds in the region's narrow riparian forests [166;169]. Starlings aggressively out-compete natives for food and breeding habitat [181;192;301]. Neotropical migrants rely heavily on riparian areas for breeding and migration, therefore widening narrow riparian corridors will reduce starlings and benefit migratory songbirds.

Some bird species, such as the Rufous Hummingbird, Swainson's Thrush, Winter Wren, Brown Creeper and Pacific-slope Flycatcher, may be particularly sensitive to habitat fragmentation or disturbance in this

region and appear to require large habitat patches during the breeding season [165;169]. Species that tend to be edge-associated, utilize urban habitats, or are habitat generalists may thrive in urban areas (for example, House Sparrows, European Starlings, Scrub Jays, American Crows and House Finches) [38;165;169]. Some cavity-nesting species such as swifts, swallows and Bewick's Wrens appear to be faring well in the region [167;325] and in other urban areas [40], possibly because cavity nesters are less vulnerable to small predators. Open-cup nesting species that nest lower to the ground are disproportionately declining, seeming to bolster the small predator theory [167].

It is likely that simplified vegetation structure associated with edge habitat and urbanization in the region, including lack of native shrubs, reduces the amount and quality of breeding habitat available for forest-dwelling songbirds [165;166]. Research suggests that birds respond to vegetation composition and structure, and urban areas with more native vegetation retain more native species [66;299]. Primary stressors for area-sensitive forest breeding birds in urban environments may include disruption of ecosystem processes, urban- and edge-associated predators, disturbance, connectivity barriers, habitat alteration (for example, invasives; loss of large wood) and outright habitat loss [43;107]. A local study suggested that conifers may be especially important to native wintering birds and that native shrubs are important to both breeding and wintering native birds [166].

The effects of habitat fragmentation are not limited to forest habitats. Grassland-dependent bird species are declining disproportionately in the region [5;6;167;325;371]. Many of these species require large habitat areas, and most of the region's native meadows and grasslands have vanished [5;6;314;372].

The effects of climate change are already being seen for some wildlife, including birds. Bird ranges are shifting and some species are migrating earlier [367;390]. For example, analysis of 40 years' of Christmas Bird Count data revealed significant northward range shifts by 68 percent of observed species, with an average distance moved by all bird species of 35 miles (56 kilometers) northward, but grassland species did not appear to be shifting ranges and the average distance was larger when the latter were excluded [274]. The National Wildlife Federation and the American Bird Conservancy modeled predicted U.S. bird changes due to climate change [306]. According to these models, 32 percent of Pacific Northwest neotropical migratory songbird species may disappear. New species will also appear as they undergo range expansions, for a predicted net loss of 16 percent. *The Birdwatcher's Guide to Global Warming* includes a CD (also available online at www.abcbirds.org) predicting bird species changes by state. These potential changes are summarized for the region (species not typically present here during summer are excluded in lists 1-4).

1. **Species whose future range may exclude Oregon in summer:** Black-capped Chickadee, Red-eyed Vireo, Townsend's Warbler, Savannah Sparrow, Dark-eyed Junco, Red Crossbill and Evening Grosbeak.
2. **Species whose summer ranges in Oregon might contract:** Olive-sided Flycatcher, Willow Flycatcher, Hammond's Flycatcher, Streaked Horned Lark, Tree Swallow, Cliff Swallow, Red-breasted Nuthatch, House Wren, Winter Wren, Marsh Wren, Cassin's Vireo, Warbling Vireo, Nashville Warbler, Yellow Warbler, Yellow-rumped Warbler, MacGillivray's Warbler, Common Yellowthroat, Wilson's Warbler, Western Tanager, Lazuli Bunting, Chipping Sparrow, Fox

Sparrow, Song Sparrow, White-crowned Sparrow, Western Meadowlark, Yellow-headed Blackbird, Bullock's Oriole, House Finch, Pine Siskin and American Goldfinch.

3. **Species whose climatic summer ranges in Oregon might undergo little change:** Western Wood-Pewee, Pacific-slope Flycatcher, Say's Phoebe, Western Kingbird, Violet-green Swallow, Northern Rough-winged Swallow, Barn Swallow, White-breasted Nuthatch, Hutton's Vireo, Orange-crowned Warbler, Black-throated Gray Warbler, Hermit Warbler, Black-headed Grosbeak, Spotted Towhee, Red-winged Blackbird, Brewer's Blackbird, Brown-headed Cowbird, Purple Finch and House Sparrow.
4. **Species whose climatic summer ranges in Oregon might expand:** Black Phoebe, Ash-throated Flycatcher, Purple Martin, Chestnut-backed Chickadee, Oak Titmouse, Bewick's Wren, Northern Mockingbird, Loggerhead Shrike, Yellow-breasted Chat, California Towhee and Lesser Goldfinch.
5. **Species whose future climatic summer ranges might include Oregon:** Phainopepla, Bell's Vireo, Blue Grosbeak, Dickcissel and Cassin's Sparrow.

This type of species modeling can help focus conservation interest on certain species that are not yet, but may become, at risk. In contrast, species that are unlikely to persist in the region over the long term may not be good conservation candidates.

MAMMALS

Mammals are another diverse group of species in the region, with at least 54 native species (Appendix 5). Mammals are not as strongly associated with riparian habitats as amphibians and birds: 28 percent are closely associated with riparian habitats, with another 64 percent using these habitats at various points during their lives. Eighteen of the region's mammal species (33 percent) depend on upland habitats, and nearly all species (92 percent) use upland habitat at some point in their life cycles [250]. Six out of nine bat species are state or federal species at risk. Three native rodent species are similarly listed.

The region harbors at least eight non-native species; most are rodents. Nutria are the primary non-native mammals using the region's streams and can be detrimental to wildlife, inflict wetland and agricultural damage and compete with beaver and muskrat for resources [202]. Introduced fox and eastern gray squirrels are abundant in the region, and squirrels frequently plunder bird nests [47;225;253;263]. Domestic cats and dogs are disruptive and often lethal to smaller native wildlife, as described in the Trails section [19;211;256].

Mammals are a diverse group, but many require some of the same habitat characteristics important to amphibians: complex habitat structure, woody debris, (particularly small mammals), good connectivity and access to water. A Washington state forest study indicated that multispecies canopies, coarse woody debris, and well-developed native understories are important to small mammal biodiversity across a broad suite of spatial scales [63]. Other studies in western Oregon and the Pacific Northwest show increased small mammal abundance or diversity with increasing coarse woody debris [60;242;389]. Riparian forests often contain high amounts of coarse woody debris, and this may help

explain why some studies document higher small mammal abundance in riparian habitats than in uplands [33;101;247].

Mammals can profoundly influence habitat conditions. For example, the beaver, a keystone riparian species, plays a critical role in the creation and maintenance of wetlands and stream complexity and may have broad effects on physical, chemical and biological characteristics within a watershed [70;327;341].

Forest management practices can reduce the habitat characteristics important to mammals. In urban areas, dead or dying trees are often removed for safety and aesthetic purposes and local studies document simplified structure and reduced wood debris in small forest patches or narrow riparian areas compared to larger or wider areas [165;169].

In the Pacific Northwest, bats are both more abundant and diverse in habitats with increased roost availability including a variety of tree, cliff and cave roosts. Bats often roost in artificial structures and bat-friendly habitats may be provided in both new and existing bridges and other structures at little or no extra cost. Canopy cover and structural complexity are very important to this sensitive group, in part because these attributes provide roost sites and are also associated with insect abundance [18;279;300].

A study in the Oregon Coast Range suggests that vegetation at the local scale is closely correlated with bat foraging activity and that shrub- and forest-association is species-dependent – larger species may prefer more open stream channels for mobility reasons; the researchers recommended creating a diversity of riparian structure to accommodate the variety of western Oregon bat species [279]. Studies in northwestern California and Arkansas indicate that bats preferentially forage over seasonal streams compared to upland sites during the dry season, suggesting that even dry streams support increased insect abundance compared to uplands [72].

A Portland, Oregon study found weak but significant correlations between bat abundance and natural area park size; the weak results may be attributable to three of the natural area parks showing lower than expected abundance, possibly due to lack of daytime roost sites because of the young age of dominant trees [300]. The researcher noted that the species richness was unusually high for an urban area, and commented on the importance of native shrubs and riparian areas to insects and therefore bats. A study in Mexico found overall bat activity was significantly higher in large urban parks than in smaller parks [18].

Graduate level research at Portland State University suggests that the following small mammals may need habitat patches of 25 acres (10 hectares) or greater: short-tail weasel, Oregon vole, Northern flying squirrel, shrew-mole, white-footed mouse, Trowbridge's shrew, vagrant shrew, Douglas squirrel, Western gray squirrel and Townsend chipmunk [267] (see also Edge effects and habitat patch size section). The study also found that non-native mammal abundance decreased in larger patches.

Loss of habitat, connectivity, forest structural diversity and large woody debris commonly seen in urban areas alter the region's mammal populations and may lead to local extinctions over time [2;42;55;165]. Restoring these elements will improve the region's diversity and persistence of native mammal species.

In general, research suggests that larger habitat patches, connectivity and woody debris significantly improve habitat conditions for many mammal species. For homeowners, leaving the property somewhat “messy,” with leaves, woody debris and snags when possible, can improve wildlife habitat. As discussed in the road impacts section, roads can be a major cause of mortality for many mammal species. Within identified corridors or where road-kill is an identified issue, installing appropriate wildlife crossings can help maintain mammal diversity in the region.

SUMMARY: WHAT DOES WILDLIFE NEED?

The preceding literature described issues relating to habitat fragmentation, urbanization and disturbance issues, and the region’s habitat and wildlife, with emphasis on the role of connectivity in maintaining or restoring the region’s substantial existing biodiversity.

The region’s wildlife habitats – native oak, prairie, wetlands, riparian, upland and various forests types, as well as agriculture and urban – host nearly 300 native, terrestrial wildlife species. This wide variety of species translates to an unimaginably complex suite of life-history requirements. Existing and future threats to these species are equally complex. Local wildlife studies, particularly population and genetic studies, are lacking. It is not feasible, nor is it necessary, to conserve each species individually. Conservation efforts focused on sensitive, keystone or representative species, declining and high-quality habitats, threat reduction and connectivity may also conserve most of the region’s native species.

However, an ecosystem approach to habitat and wildlife conservation is bound to be more effective than managing for a single or a few species. While it is not feasible to explicitly plan connectivity for every species, most of the current at-risk species would not be in trouble if their habitats and life history needs had been

proactively considered earlier; focusing solely on at-risk species could jeopardize the future of other species not currently at risk. Paul Beier, in his introductory remarks at a recent Portland-Vancouver ecology symposium, offered his principle for wildlife connectivity: “No species left behind” [27].

This region’s conservation efforts fit into the broader, statewide strategy and the statewide strategy should be used as a guiding document for regional and sub-regional plans. The goals of the statewide Conservation Strategy are to “maintain healthy fish and wildlife populations by maintaining and restoring functioning habitats, prevent declines of at-risk species, and reverse any declines in these resources where possible” [284]. The Conservation Strategy outlines six key statewide conservation

General suggestions from Environment Canada can help guide conservation of the region’s habitat system (adapted from [107]):

- Increase native vegetation structural diversity (ground cover, shrub, understory, canopy)
- Maintain native vegetation and dead wood
- Provide adequate functional habitat corridors, which can include parts of the matrix such as back yards and street trees; make the urban matrix more like the forest fragments
- Manage edge effects; soften the edges with greener matrix habitat
- Recognize that human intrusion may not be compatible with interior habitat conditions
- Discourage open lawns (which attract starlings – [164;166;169]) and encourage back yard habitat
- Realize that habitat fragments may not support all target species
- Develop monitoring programs that focus on reproduction, survival, migration and dispersal
- Practice adaptive management

issues – land use changes, invasive species, altered disturbance regimes, barriers to fish and wildlife movement, water quality and quantity, and institutional barriers to voluntary conservation – and lists actions that can be taken to prevent wildlife and habitat declines. The statewide Conservation Strategy provides a big-picture approach, and smaller-scale efforts such as a regional wildlife corridors plan can be knit together to better integrate natural resource work in the state and increase efficiency and effectiveness. Local plans provide the details needed to step down and implement the work on the ground. For example, the statewide strategy identifies key Conservation Opportunity Areas, but does not include mapping of connectivity between them, nor does it identify habitat areas that are very important at smaller spatial scales. That is our job.

Connectivity is one of the key elements needed for a regional conservation framework. Previous sections provided background information about connectivity, wildlife and habitat, including regionally specific information. The following sections delve more deeply into the process of creating a wildlife movement strategy, including methods to identify, enhance and create the connectivity needed to maintain the region’s biodiversity. To aid in identifying focal species and their needs, appendices to this document include species-specific information about species’ needs relating to corridor width, area requirements and gap-crossing abilities, as well as a review of some of the methodologies used to model wildlife connectivity.

MORE ABOUT CORRIDORS

DIFFERENT TYPES OF CORRIDORS AND CONNECTIVITY

Connectivity is the degree to which the landscape facilitates or impedes the movement of organisms among patches [320]. Wildlife corridors are key landscape elements that serve to provide and increase connectivity between habitat patches, especially in urban areas where the permeability of the surrounding matrix is relatively low [31;152;214]. They often follow stream corridors but may also consist of upland connections, greenways, windbreaks, wooded streets, field margins or hedgerows [36;37;113;174;185;231]. Corridors are not necessarily continuous and are best defined by functionality; for example, a well-placed linear sequence of “stepping stones” or a traversable matrix may provide effective connectivity for some species [174].

Corridors can also encompass complete home ranges to some animals, particularly edge-dwellers and species with small home ranges such as small mammals [316]. Thus, corridors serve as both movement pathways and as habitat for some animals.

The general scientific consensus is that connections between habitat fragments are crucial to the persistence of many species and populations, and that well designed corridors can play a key role in maintaining ecosystem functions [2;2;28;29;31;56;76;86;90;113;118;160;186;214;248;316;343-345;354;356;385;394]. Corridors provide the opportunity for many species to traverse through habitat that is not suitable for permanent residency to locate better habitat, find a mate, disperse from natal

areas, escape predation or other dangers, and access habitats needed seasonally or at different life history stages [25;34;139;214].

In addition to corridors, there are other ways to improve connectivity for certain species, particularly some birds and invertebrates. For example, recent studies reveal opportunities to improve habitat quality in the intervening matrix by increasing spatial heterogeneity through semi-natural features such as vegetated buffers, storm water treatment facilities and edible gardens [147;178;218]. Green roofs and street trees are an emerging but potentially important connectivity element [64;113;280;361]. Residential yards can comprise a significant percentage of the “green” in an urban area [234;319], and the recent partnership between Portland Audubon Society and the Three Rivers Land Conservancy – the Backyard Habitat Certification Program – provides excellent opportunities to increase habitat and connectivity, as well as ways to soften the edge effects around habitat patches. Many other organizations, such as Soil and Water Conservation Districts, nonprofits and various cities and counties in the region, continue to work hard to restore habitat and connectivity. However, some species, such as many migratory songbirds, may be unwilling or unable to traverse developed areas [166;219;360]. Developing a regional map of core wildlife habitats and existing or desired connectivity provides a way for such programs to target specific species and areas to yield the highest ecological return for dollars spent.

CORRIDOR WIDTH, LENGTH AND SHAPE

The size and shape of a corridor can directly impact the effectiveness of the corridor for wildlife movement [118;177;186;223;330;345]. There are no hard-and-fast rules, but certain concepts can aid in corridor design. The key questions are: what habitat areas are we trying to connect, and which species do we want to use the corridor? Answering these questions through spatially explicit, species-specific analyses can help identify optimal corridor designs to best address a landscape’s opportunities and constraints [122].

In general, corridors tend to be most effective if they are not overly long relative to species’ movement abilities, there are few gaps and blockages, the width is sufficient to meet species’ needs, and the corridor does not harbor an excessive number of predators [214]. Habitat quality is a very important corridor attribute and can be the determining factor in corridor functionality [8;120;122]. Other attributes such as surrounding matrix and topographic position in the landscape can also significantly influence corridor value [108].

The most effective way for wildlife to move is generally via the shortest route, or the one that most effectively minimizes the amount of travel time or risk to the animal [122;343]. In addition, animals need to be able to find the entrance to the corridor, and this can be harder for smaller and slow-moving animals. An effective corridor is one that “costs” the animal the least in terms of effort and risk. Multiple corridor options are more effective than a single corridor because more animals are likely to find it and if something disrupts one corridor, another is available.

Studies and models suggest that wider corridors direct and increase animals' movement rates between patches, acting a bit like drift fences or funnels guiding animals toward habitat patches [150]. Some researchers suggest that larger habitat patches require larger movement corridors [201]. Wider corridors are obviously preferred, but land use and cost constraints favor narrower corridors [28]. The key goal should be to provide connectivity between populations and prevent reproductive isolation. There are no hard-and-fast rules for corridor width design; educated but subjective decisions must be made. Some species- or guild-specific corridor width studies have been conducted, as summarized in Appendix 1.

Connectivity research varies widely by geographic area and species or guild, but it is clear that narrow corridors, hedgerows, field margins, fencerows, and street trees can improve connectivity for some songbirds, small mammals and other species during various life cycle stages [37;113;119;185;231;332;377]. Researchers studying urbanized California chaparral habitat report that for some species, extremely narrow wildlife corridors can function quite well [344]. Their studies showed that Spotted Towhees traveled along habitat strips just three feet (1 meter) wide, and three other species of chaparral birds used strips only 33 feet (10 meters) wide. These findings argue that even a narrow corridor will conserve at least some biodiversity. However, many of the region's species are likely to require wider movement corridors.

Most wildlife corridor studies focus on forest and woody vegetation or aquatic connectivity. It may also be important in this region to consider species that need open habitat such as farm fields and meadows to live and move. A large-scale study in South Carolina demonstrated that for a diverse range of open habitat species, 32 meter wide corridors between forested patches directed animals' movement to the next appropriate habitat patch [152]. Interestingly, the same number of animals left a given patch with or without corridors, but corridors increased their arrival at the next patch by more than 68 percent for each of 10 species. Moving to other appropriate habitat rather than landing in unsuitable (or less suitable) habitat increases animals' odds of survival and reproduction.

The scientific literature shows a remarkable range of recommended movement corridor widths, ranging from a few to thousands of feet, depending on species or guild (see Appendix 1). Small mammals and less sensitive songbirds seem to lean toward the narrow end of this range [44;48;78;113;196;332] whereas carnivores, area-sensitive breeding birds and other sensitive species or those requiring large home ranges tend to need wider corridors [77;82;87;93;196;224;240;299;345;350]. Amphibian requirements are highly variable but often seem to fall somewhere in between, depending on whether these species' rather complex requirements are met – for example, interspersed wetlands and uplands, with relatively short distances between wetlands or other key habitat [56;62;163;322;329]. Several studies and synthesis reports suggest corridors should be at least 328 feet (100 meters) wide to provide for most wildlife movement and habitat functions [56;108;146;224;350].

Few studies are long-term, multi-season, conducted in urban areas or conducted in this region, therefore most of the reported or recommended corridor widths must be taken within context. For many species, corridors link different habitat types (for example, aquatic and terrestrial) important to

species' life-history requirements. This highlights the critical importance of ascertaining the seasonal life history requirements of species of conservation interest.

For example, area-sensitive species are unlikely to breed within most corridors, but often use them for dispersal or migration. For some edge-dwelling species, short corridors may not provide sufficient home range sizes but will facilitate inter-patch movement; increasing shrub cover, a characteristic component of forest edge habitats, may particularly benefit these species. Some species may be highly susceptible to human disturbance, and corridors for these species should limit or exclude trails and be placed away from busy roadways as much as possible. Some species of conservation interest, such as butterflies and bluebirds, depend on open habitat and may be best accommodated by early successional corridors embedded within a forested matrix [149;151;153].

CORRIDOR RISKS

The benefits of habitat corridors have been heavily debated in the scientific literature, as demonstrated by the unusually high number of published responses to corridor articles – some of them rather heated [2;172;214;276;277;333;334;343]. There are some potential disadvantages to corridors, often specific to a given situation, although they have not been well quantified [334]. Problems may be more pronounced in narrow corridors and where human disturbance is high, such as along trails or busy roadways. However, even scientists speculating that wildlife corridors may cause some problems also consistently comment about corridors' known or likely conservation values [31;158;172;275;276;307;334].

Scientists theorize that corridors may promote the spread of invasive species and serve as reservoirs of such species, as well as changing seed predation and pollination dynamics [333;334]. This is certainly possible simply due to edge effects associated with relatively long, narrow habitats. A study in South Carolina found that seed predation for two early successional plant species, the latter which are often weedy, was higher in connected patches because more rodents were present [288]. Predation rates differed among the two plant species, depending on the key predator – rodents or invertebrates. The same experimental study area showed that butterflies moved more between connected patches, thus influencing pollination in both patches [149]. This could be good news or bad, depending on whether the plant is desirable, how seeds are dispersed, and whether seeds germinate after passing through animals' digestive tracts. The point is that in areas where corridors successfully enable inter-patch travel, there may be unanticipated effects and the effects may be positive, neutral or negative. That is one reason why ongoing corridor studies are useful.

Corridors may allow for easier transmission of disease and faster predator movement or more effective predation [2;102;334]. On the other hand, lack of corridors may block predator movement and substantially change ecosystem dynamics, including herbivore overpopulation and resulting habitat loss [25;35]. If disease causes a species to go extinct in one patch, the species will stay extinct without connectivity. Many of the potential disadvantages of corridors could be avoided or mitigated by enlarging corridor width [277].

Corridors may create population sinks – that is, lower quality habitat in which a species' reproductive output is insufficient to maintain the population, necessitating immigration for long-term species persistence [174]. The sink may be due to habitat within the corridor, or because the corridor provides connectivity that actually diminishes wildlife populations.

For example, corridors may create colonization routes to habitat patches where species will breed unsuccessfully, such as male Ovenbirds - a species related to Swainson's and Hermit thrushes - selecting small habitat patches that lack sufficient insect prey and which females avoid [58]. Corridors may facilitate population sinks where significant barriers, such as roads, cause mortality. In a Florida study, 95 percent of turtles were killed attempting to cross a 4-lane highway prior to construction of an undercrossing and associated drift fences to guide turtles, whereas only 84 of 8,475 turtles climbed or penetrated the drift fences after construction [10]. In such a case, without the crossing an absolute barrier may be preferable over access to the roadway. Finally, habitat within the corridor may increase threat of direct predation due to increased prey vulnerability in narrow or less than ideal habitats and elevate nest predation or nest parasitism due to increased edge effects [174;213;236;381]. These effects are not always readily apparent; bird counts may show increased abundance for some species, but they may not be breeding successfully.

Beier and Noss reviewed scientific studies on the benefits and negative aspects of corridors [31]. While the overall conclusion was that the literature is not yet sufficient to declare the positive value of corridors, several studies showed that corridors function as travel connections for wildlife in real life, and no studies provided empirical evidence of negative impacts from corridors. The literature appears to indicate that the benefits of a connected landscape typically outweigh the potential negative effects of corridors, especially in urban environments where the matrix may be too harsh for many species to navigate [31;344].

SPATIAL SCALE

The spatial scale of conservation is an oft-debated topic among ecologists. Are sites, areas, or broad landscapes most important?

Researchers attempted to answer this question by systematically assessing the appropriate spatial scales of conservation for 4,239 threatened vertebrate species based on a literature review [46]. The answer, not surprisingly, was that all scales are important, but different animals respond to different scales. Neither site scale nor broad-scale approaches alone can prevent extinctions. "Spatial plans and systematic conservation exercises," state the authors, "must look beyond sites to include the additional area and connectivity requirements of these threatened species" [46].

Spatial scale is a key consideration in improving wildlife connectivity. Which habitat patches are most important? The patches are the region's "sites," within which the finest scale analyses generally occur. How should these patches be connected? Watersheds or jurisdictions may be used to sub-divide the region for mid-scale analyses. The region is the broader scale – patches, corridors and matrix. How can

we expand those connections to important habitat areas outside the region? This is the largest (landscape) scale, and it can extend as far as is deemed important.

Applying metapopulation theory may be quite useful at broader scales. What are the target species for specific habitat patches? If local populations go extinct, how could they be repopulated? Elk provide a good example. Elk move back and forth between the region and specific habitat areas near the Coast range, from the north, and from the eastern forested hills leading to Mt. Hood. Are there habitat patches in the region, such as Forest Park and the East Buttes, where elk might be a conservation target species? If so, it will be important to identify population sources outside the region and provide connectivity appropriate for this species. Is there an area near the selected habitat patches, for example urban Gresham, where elk are undesirable?

In all cases, consider each conservation target species when designing corridors. Wildlife corridors can provide elk passage between elk habitat patches within and outside the region. Wildlife corridors and crossings can be designed to exclude large mammals but provide passage for other species. In this case at least five spatial scales are important: landscape scale, region, general area such as a watershed, habitat patch, and essentially a point on the map – the wildlife crossing. Metro's *"Wildlife Crossings Guidebook"* provides a wide variety of examples and solutions relating to mitigating movement barriers [251].

CONNECTING HABITAT: HOW IT'S DONE

Connectivity can be difficult or impossible to regain after urbanization, and whenever possible, should be considered early in planning processes. Without specific yet broad-scale planning, connectivity will be haphazard, sometimes accidental, or absent. What can be done?

The first important activity is to create and agree upon a map depicting potential core habitats and corridors, as described in previous sections. Planners and key stakeholders should be involved. The draft map should identify all potential habitat patches and corridors that meet the group's criteria. When this stakeholder group agrees on a final product, politicians and decision-makers and potentially a broader public audience, all who were preferably kept in the loop during the mapping process, can support the map and facilitate integration of the results into planning, acquisition and conservation efforts.

The following sections describe the general steps needed to create a wildlife movement strategy, as summarized in Figure 2 below. The steps are outlined as a linear process for clarity, but the actual process is likely to be more organic, and include overlap and revisiting of some of these steps along the way. In some cases it may be appropriate or necessary to simplify the process, such as omitting the focal species concept or reducing outreach efforts. The most important outcome is to produce an agreed-upon map for planners, restoration practitioners and others to focus some of their activities. If the tradeoffs of a more complex process are too steep - for example, if it adds a year or more to the project during a period of rapid land use change - it may be preferable to simplify the process and get the job done before more connectivity is lost.

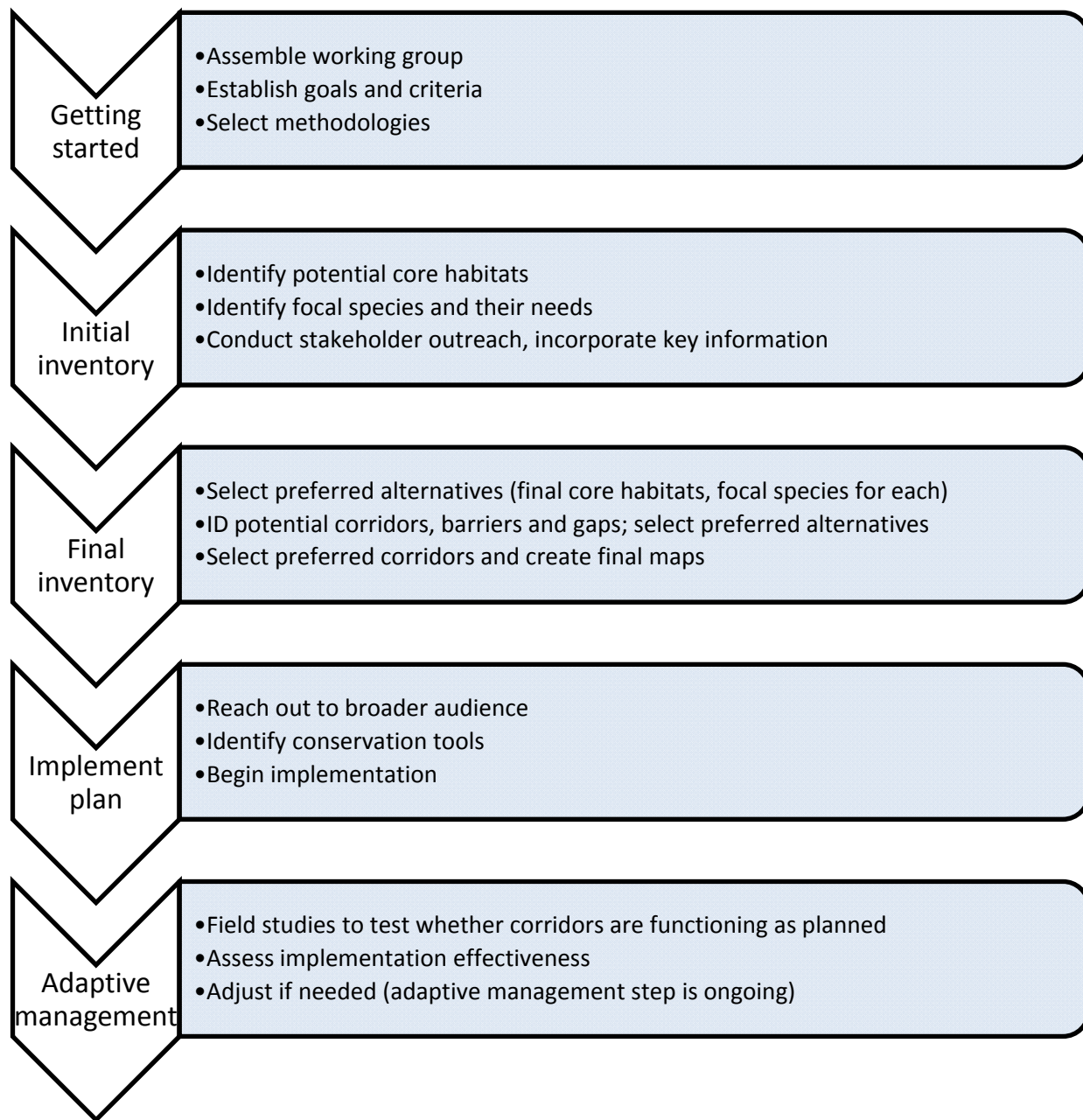


Figure 2. General steps involved with creating a wildlife movement strategy.

ASSEMBLING THE WORKING GROUP

The first step in developing a wildlife movement strategy is to assemble a working group. This step is crucial to the success of the project, and may require some background research to identify the key players.

Beier et al.'s wildlife corridor design website, *Conceptual steps for designing corridors*, concisely summarizes the “big picture” [28]:

“We have contributed to over 30 linkage designs in California and Arizona. We failed at this task when we tried to tell managers what to do. We succeeded when we asked management agencies and conservation organizations how we could help them identify wildlife linkages at risk and develop plans to conserve them. We share four lessons.

- It is more exciting and rewarding to work for connectivity than against fragmentation.
- Be a team player on everything—and that means involving non-scientists in science.
- Corridors must be designed for multiple species.
- The connectivity design plan must be comprehensive. It must address land conservation and roads and management practices and involving landowners as stewards. It's not just about getting the animal across the road.”

The region can benefit from the experience of local biologists, natural resource planners and land managers. Some local governments and conservation groups have already identified the most important habitats in their jurisdiction, although few directly address connectivity, and local conservation groups may have conducted similar work. Locals usually know more about the land than people working at broader scales. Considering these efforts can add key information and reduce the amount of time and resources needed; failing to consider them may alienate the people who will ultimately influence whether and how well the plan is implemented. Spend the time to find out who should be involved.

ESTABLISHING GOALS, CRITERIA AND SELECTING METHODOLOGIES

Developing a draft set of goals and criteria before the working group first meets can save time. It is easier to revise something than to create it to begin with, and giving the group something with which to start can produce tangible results quickly. Another good pre-meeting task is to ask invited members to come prepared with any habitat inventory and associated guidelines already established under their own work. An early part of the process includes identifying the study area, or the overall area of interest (see the following *Identifying potential core habitat areas* section).

Criteria can include specific “rules” for selecting core habitats. They might also include rules of engagement; for example, are identified, local high-priority habitats automatically included as core

habitat? If not, how should the information be used? Determine how final decisions will be made if general agreement is not apparent, such as by group vote. A skilled meeting facilitator can help limit digression from stated goals and ensure that quieter members' voices are heard.

Important core habitat characteristics may include habitat type(s), current and desired future conditions, species known or suspected to live within the core habitats and habitat suitability for those species (see section on focal species). Core habitats should represent unique or unusually important habitats, including very large habitat patches, at the study area scale. Otherwise, efforts and funding may be too diffuse to be effective, and the process and strategy may also lose credibility.

Specific criteria will help focus attention on the most important habitats. For example, criteria for selecting core forested habitats in the region might include:

- Size - minimum of 30 acres unless another qualifying criterion supersedes size, although not all 30-acre patches may be core habitats; for example, a 30-acre patch in a habitat-sparse area may be more important to wildlife than in a habitat-rich area
- Habitat quality, including current restoration efforts or plans
- Particularly unique areas or features that provide irreplaceable structures or functions for wildlife
- Habitats of concern such as native oak, native prairie, wetlands, bottomland hardwood forest, and river islands
- Protection level and risk to the resource
- Documented presence of species of critical conservation concern, such as native turtles or threatened or endangered plant species, could constitute a reason for adding a core habitat that doesn't meet any of the other criteria

To be included as a candidate core area, perhaps an area would need to meet at least two or three of these criteria. Key habitat areas already identified by local and regional governments in the Willamette Valley and statewide provide a starting point.

Once criteria are established, how are habitat areas meeting these criteria identified? It is important to develop a framework early in the process for how information will be collected. This will speed up the process with which potential core habitats, focal species and corridors can be identified and facilitate a reasonable estimate of time and resource costs.

This part of the process involves reconnaissance on available data sources. For example, it may include identifying existing data sets of important habitat areas, high quality vegetation, sensitive species locations, special or declining habitat areas, road-kill hotspots, development and conservation plans, tax lot size, and publicly-owned or protected lands. Local jurisdictions, watershed councils, and the section on "related efforts" below can provide foundation information with which to move forward.

The project's goals should drive the data collection. It is a common mistake to let available information shape a project. Focusing on the goals will help identify whether available data sets are sufficient for the project and if not, pinpoint the critical missing pieces to ensure that the data answer the key questions. This is often an iterative process - for example, key pieces may be in place to identify core habitats and

corridors, but information on barriers and gaps may be lacking and will require future fieldwork. Identifying and addressing such issues can be part of a longer term plan.

After the desired data sets are collected, what methods are most appropriate to identify specific core habitat areas on the ground? This may include the knowledge of local experts, Geographic Information Systems-based modeling, or a combination of both. These methods will be applied in the next step to identify the initial inventory.

INITIAL INVENTORY

IDENTIFYING POTENTIAL CORE HABITAT AREAS

As discussed in the Spatial Scale section, the study area is the overall area of interest. In the region, this includes the Metro Urban Growth Boundary, City of Vancouver and portions of Clark County, and adjacent or nearby areas that are either being conserved on behalf of the region or that could directly contribute to metapopulation dynamics (see Figure 1). For example, the latter may include portions of the Mt. Hood National Forest, the Coast Range, the Sandy River gorge and delta, and other major habitat areas outside but near the region, depicted in a more general way than the region's core habitat areas.

By now the working group has established criteria, collected existing or created new data sets, selected appropriate methods and is ready to create a draft map of core habitat areas.

This may involve a one-time mapping process, in which case the initial map is also the final core habitat inventory. It could also be an iterative exercise, depending on the criteria established by the group and the results of the first map. For example, the initial map may reveal an unrealistically large amount of "core" habitat that reflects more than just the most important habitat areas, or the map may reveal tiers of priority habitat areas, where some habitats meet all of the criteria. At this point, refining criteria and conducting stakeholder outreach may help in the map refinement processes.

IDENTIFYING FOCAL SPECIES

Metapopulation theory is frequently used to plan natural area systems in a conceptual sense, with good reason. However, in actuality we are limited by lack of population data. Even with such data, we are often unsure what constitutes a viable population.

To partially overcome these limitations, experts recommend working with biologists who know the analysis area to select 10 or more focal (target) species, or groups of species such as guilds, that collectively will serve as an umbrella for all native species and ecological processes [28;30;156;203]. Select a subset of these focal species for each core habitat. Focusing on providing habitat and passage for these specialized species will, in theory, provide for the more generalist species as well. Species with the following traits should be included:

- area-sensitive
- habitat specialists
- dispersal limited
- sensitive to barriers
- sensitive to climate change
- otherwise ecologically important, including at-risk species

It may also be appropriate to select focal species that evoke strong public interest or for which long-term or extensive survey data are available. Once a subset of focal species for each core habitat is selected, ascertain species-habitat relationships, including known movement requirements, and conservation potential based on existing habitat, then use the information to selectively conserve or restore connectivity. Species-habitat relationships may be documented through a variety of sources, including local studies and knowledge; published studies; published habitat suitability indices (HSI) or software to develop them [94;365]; on-the-ground habitat evaluation procedures (HEP) or similar habitat assessment tools [362]; and various GIS-based modeling techniques.

The U.S. Fish and Wildlife Service uses habitat-based focal species to represent conservation targets – that is, species, species groups, or communities of particular interest for a refuge [364]. U.S. Fish and Wildlife’s Willamette Valley focal species include invertebrates, fish, turtles, birds, and plants. These species help the agency define the specific habitat and environmental attributes to be maintained or achieved for each conservation target. The Nature Conservancy uses a similar focal species approach [357], as does Partners in Flight [6].

Several questions arise for focal species. How large are the species’ home ranges? Where do they occur, and where could they occur? How sensitive are they to disturbance, what types of disturbance, and what are their movement needs? Do these issues vary by season? What are the key habitat features - the “must-haves” - for corridor habitat? These questions might be answered in part through literature and professional knowledge (see Appendices 1, 2, 3).

Because most bird species fly, they are not as hindered by terrestrial barriers as other wildlife species. Although this would suggest that improving connectivity for a particular bird species may be easier than for species in other wildlife groups, the great diversity of bird species poses a challenge to designing wildlife corridors. There are over 200 species of birds in the region, each with unique life history requirements. For this reason, biologists often separate birds into guilds - groups of species with certain similar functional requirements or shared life history traits - and plan according to guild needs [53;68;82;114;330]. This approach, for birds and other species groups, can also be used for focal species in planning wildlife corridors. Season and location must be accounted for when considering research findings. Some examples of potential guilds in the region could include:

- Area- and disturbance-sensitive species for patch size and shape consideration
- Species requiring movement corridors of a certain minimum width (for example, amphibians; selected bird species with similar requirements; native turtles)

- Road avoiders or species that change behavior near roads (for example, Neotropical migratory songbirds, frogs, snakes)
- Urban-adapted native species (for example, Song Sparrow, American Robin, deer)
- Birds adapted to specific habitats such as native grassland, shrub or coniferous habitat (for example, Savannah Sparrow, White-crowned Sparrow and Common Yellowthroat for grasslands; Spotted Towhee, Willow Flycatcher for shrub; Western Tanager, Golden-crowned Kinglet and certain warbler species for conifer)
- Riparian specialists such as Willow Flycatcher, Black-headed Grosbeak, beaver and otter
- Larger species with shorter flush distances, especially when considering where to put trails (for example, quail, sensitive waterfowl species, Northern Flicker, Pileated Woodpecker)
- Species reluctant to cross gaps of a certain size (for example, Red- and White-breasted Nuthatch or Downy Woodpecker);
- Migratory songbirds during migration

The Oregon Department of Fish and Wildlife and a number of agency partners hosted a series of wildlife linkage workshops in 2007 to support the Oregon Wildlife Movement Strategy [160]. Workshop participants identified linkage areas for three groups of focal species, including large game mammals, small mammals, and amphibians and reptiles. The three groups, essentially large guilds, were selected to encompass a broad array of animal movement needs.

Focal species may also be used to evaluate connectivity under alternative scenarios for disturbances such as climate change, urban development, and new trails and roads. The key is to know what questions need to be answered, and select the species that can help answer them. Some information about focal species' needs may be derived from literature (see Appendices 1, 2, 3). However, these studies were usually conducted in different geographic regions and in non-urban areas, and may have limited applicability in the region. Combining information from available studies with local wildlife knowledge can help guide development of focal species' requirements for habitat and connectivity.

Wildlife-vehicle collision and road-kill data may help with connectivity planning. Metro and the Oregon Department of Transportation (ODOT) have selected information on wildlife-vehicle collisions and road kills, but at present no comprehensive data set exists for the region. In addition, existing data is heavily weighted towards large mammals due to human risk, and also because they are more visible than smaller animals. ODOT's data is for the state-owned road system, constituting a fraction of the region's roads, and Metro's data is incomplete and somewhat outdated. To effectively use this type of data, the region would need a more up-to-date and comprehensive data set. Wildlife-vehicle collision or road-kill data sets do not account for absolute wildlife barriers, where animals do not even enter the roadway. In addition, such data fail to account for connectivity issues not related to roads. Wildlife-vehicle collision data is retrospective and not necessarily relevant in newly urbanizing areas or those with increasing populations. Nonetheless, such data can provide important supplemental information, particularly to identify some areas within a corridor where wildlife crossings are needed.

Indicator species and guild approaches are time tested and valid approaches to ecological assessment and problem solving, but there are other approaches as well. For example, simply identifying and

conserving the best remaining corridors, along with addressing gaps and barriers over time, may successfully facilitate higher fish and wildlife permeability. These might be used as reference corridors to inform protection and restoration decisions in other corridors that are threatened by new development.

STAKEHOLDER OUTREACH – LOCALS KNOW MORE

It is important to include the public in natural resource management, from pre-planning through implementation. Local residents usually know what wildlife uses their lands. In addition, without support from the public and private landowners, little meaningful conservation beyond acquisition can be accomplished. Public participation costs money, time, and may yield unanticipated or even unwanted results; it means involving non-scientists in science. But it can also bring about surprisingly creative and effective solutions.

Lyman and others reviewed tools for incorporating community knowledge, preferences and values into natural resource decisions [221]. Such tools can be clustered into three general groups: (a) extractive use, in which knowledge, values or preferences are synthesized by the lead group (for example, scientists) and the preferred solution(s) referred to a decision-making process; (b) co-learning, in which syntheses are developed jointly and the implications are passed to a decision-making process; and (c) co-management, in which the participants perform the syntheses and include them in the joint decision-making process. Generally, the time and level of effort required increase from extractive use to co-management processes. However, an important trade-off is the extent to which citizens become involved, invested, and gain a sense of ownership of the project, which may increase project implementation and success, particularly on private lands.

In a corridor proposed by NGOs and academic institutions linking southern Ontario and Adirondack Park in New York, much of the land was private property [50]. A random survey of households within the proposed corridor zone revealed that landowners knew little of the proposal and had no contact with its advocates, placed high value on conserving biological diversity, and were worried about restrictions being placed on their land. Without private landowner buy-in and participation, any plan would be likely to fail. More work to disseminate information and engage citizens in formulating the corridor plan could allay fears, create corridor advocates and instill a sense of pride and community rather than creating resentment.

During the concept planning process for the City of Damascus, Oregon, planners held a series of community forums to keep the public informed and ask for input. One forum was laid out in a series of stations, including a natural resource station with draft inventory maps and aerial photos where residents could find their property and identify habitat areas for deer, elk, coyotes, owls, herons and other wildlife they considered important, as well as road-kill problem areas. They also pointed out important habitat features such as older forest, oak habitat, unmapped wetlands, etc. These features provided background for core habitat areas and were used to help refine the draft wildlife corridors map.

If public participation is invited, allow the residents to document anything they think is important. The criteria established by the working group will help sort out which new areas identified by the public should be added to the inventory, if any. This type of information can be very useful in documenting the importance of potential core areas, and can also be used to think about focal species for different habitat areas.

FINAL INVENTORY

SELECTING PREFERRED ALTERNATIVES (CORE HABITATS, FOCAL SPECIES)

At this point the working group has established goals and implemented methods to identify potential core habitat areas. Public outreach has revealed more about the wildlife using habitat areas and places that are special to local residents. Now is the time to document in detail why each core habitat area is important, what wildlife species are known or likely to use it, and incorporate new areas identified by the public if needed.

The documentation should focus on and revisit the criteria established by the working group early in the process. Determine which and how many criteria each core habitat area meets. Information from the public can help this process - for example, known sensitive species locations - and may alter the results. On the other hand, residents have likely advocated for the inclusion of areas that do not meet the criteria, and this part of the process helps explain why such areas were excluded from the final inventory.

The working group now decides which draft core habitat areas are to remain in the final inventory. The next step is to identify a final set of focal species for each core habitat area. This will provide the key information for the subsequent step: identifying corridors appropriate for moving focal species between their core habitat areas.

IDENTIFYING CORRIDORS

As is often the case with natural resource planning, identifying priority wildlife corridors in an urban environment is a blend of science and professional judgment. There is no one formula to use, especially in urban areas, where the complexity of analysis increases significantly due to the number of factors and issues to consider.

After identifying potential core habitats, focal species, and the needs of these species, the next step is to delineate potential wildlife corridors. There are several ways to accomplish this, from looking at maps and aerials and simply drawing lines - although this will not explicitly address focal species' needs - to complex models. Models can be used to identify potential movement corridors, assess or validate corridors identified by ecologists, identify gaps or constrictions or help decide which of several corridors may provide the best alternative. A combination of published empirical data, local professional knowledge and modeling methods can be effective [73] (see Appendix 4).

One or more of the modeling approaches described in Appendix 4 could increase technical rigor, but modeling is not necessarily the best way to identify corridors. Identifying existing connectivity by drawing lines on a map, then using focal species to delineate where corridors are adequate and where restoration may be needed, can be simple and effective. In urban areas, sometimes existing connectivity is obvious and often lies along stream corridors. In such cases, modeling efforts may be unnecessary, but the needs of focal species including corridor widths, barriers and gaps must be addressed. Regardless of whether modeling is used, some of the decisions will likely be judgment calls based on the established criteria for selected focal species and group consensus. For this purpose we reviewed the scientific literature for research-based recommendations about species' corridor needs in Appendix 1.

Recapping the information reviewed regarding corridor width and shape: in general, corridors should be as wide and short as possible, barriers or breaks in the corridor should be minimized, and width and corridor conditions should be based on the requirements of focal species. Keep in mind that although forests benefit many species, there are other habitat types, such as oak savannah, wetlands and grasslands, to which similar principles may be applied.

There may be cases where there is no clear corridor or there are several potential corridors, and some sort of permeability analysis, modeled or otherwise, may be useful. In any case, a consistent algorithm - a step-by-step problem-solving procedure - can help determine the best existing or potential route(s). The next few paragraphs describe one common modeling approach for situations of uncertainty, the "cost-distance" approach (Figure 3) [28].

Cost-distance modeling is a raster-based GIS exercise in which resistance to wildlife movement is identified, and the pathway with least resistance is a potential corridor. Resistance is the cost of travel for an animal through a given area in terms of energy expenditure or risk of dying. If an animal can easily travel through an area, that area has good permeability, or is suitable habitat for focal species [28]. These two concepts represent polar ends of a gradient:

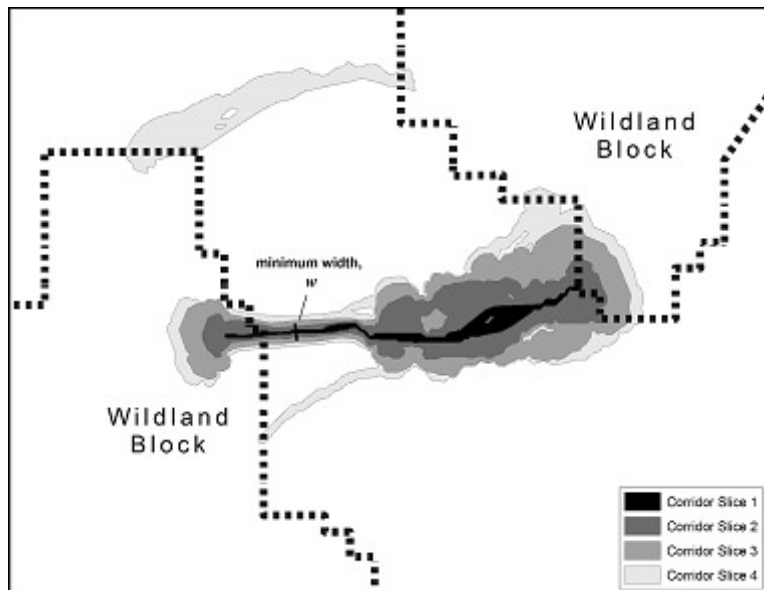
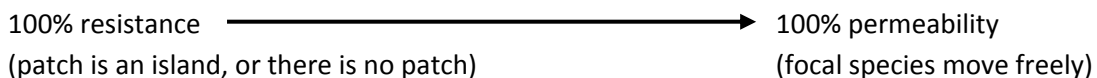


Figure 3. Example of a graded cost-distance map (also called an effective distance or cost-weighted distance map), used with permission from Beier and colleagues' web site [28].

Cost-distance modeling involves three steps to modeling corridors, briefly summarized here. The first step is to use the inverse of the focal species' habitat suitability as a measure of resistance. This can be represented on a scale of 1-100 on the resistance-permeability gradient.

The second step is to select "terminals" in each core habitat as the start and end points for corridor modeling. These can be points, lines, or polygons. Often there are several terminals in each core habitat.

The third step is to calculate a cost-distance for each pixel. This produces a "graded cost map" revealing where the best connectivity lies, followed by next-best and so on (Figure 1). The results are limited by data quality.

BARRIERS AND GAPS

Regardless of how they are created, maps are an artificial depiction of reality. A corridor that looks good on a map might actually contain numerous unseen barriers and gaps, or field surveys might find that a focal species actually moves through the corner of a field not within a mapped corridor. Perhaps what seemed appropriate based on the scientific literature does not, in fact, accommodate focal species movement in the region. That is one reason field-based studies are important to successfully implement a wildlife connectivity strategy (see *Monitoring and research* section). If implementation is not working, a new approach is needed and we cannot know whether it is working without looking on the ground.

Barriers are natural or man-made structures or situations that prevent an organism from moving through a corridor. They can be physical or behavioral. For example, if a bird species will not cross an unvegetated gap of 50 meters, that gap becomes a barrier. However, not all gaps are barriers; if an otherwise forested corridor has a gap in vegetation, some species may be willing to cross the gap, but these animals may be exposed to elevated risk of predation or other hazards. On the other hand, species such as bluebirds are more willing to travel through open areas than forested areas; for bluebirds, corridors are comprised of openings, whereas forest patches may act as gaps or barriers [212]. Habitat conditions in the gap (matrix) - for example, a busy road - may influence species' behavior, and the gap can become a barrier. Other types of barriers may arise from artificial light, noise and disturbance, steep inclines, unsuitable substrate, etc.

Barriers and gaps are species-dependent [251]. A deer can jump over a fence that might block a coyote. A coyote can traverse a much longer corridor than a frog, and in much more varied conditions. The barriers or gaps in corridors connecting core areas should be addressed based on the needs of the focal species with greatest requirements, but the specialized needs of each focal species must be considered. Appendix 3 provides species-specific gap information identified during the literature review.

Interestingly, the definition of a "gap" for one species may sometimes depend on the presence of another species. A study in Florida found that more individuals and more species of winter songbirds crossed forest gaps to mob Eastern Screech-owls (using recorded vocalizations) when more titmice were present, and the effect was additive [331].

Producing a regional plan to address physical and behavioral barriers and gaps within corridors will be an essential element of a functional system of core habitats and corridors [111]. Barriers and gaps can be identified through a variety of means including road-kill surveys, anecdotal evidence from area residents and field studies to identify physical barriers to focal species' movement. Aerial photos and GIS-based analyses help, but at some point, on-the-ground studies will be necessary to identify, assess and address barriers and gaps within a corridor, then to ensure that corrective measures are successful.

In 2009, researchers at Portland State University collaborated with ODOT and others to develop a mobile GIS tool to characterize wildlife passage conditions at intersections of potential wildlife corridors and road crossings [191]. Applying such tools in field studies can help determine the level of effort, investment and time that may be needed to make corridors fully functional.

SELECTING PREFERRED CORRIDORS AND CREATING FINAL MAPS

Between the draft map of potential corridors and the final map, an important filtering step is needed. Political realities, financial limitations and land ownership necessitate focusing efforts on the most important, achievable goals first. The draft map may have too many corridors for realistic implementation, and may need revision. Analyzing land ownership, zoning and future plans can help.

Land ownership is an important consideration for maintaining and improving wildlife connectivity. It influences what conservation tools may be used and may help or hinder conservation efforts. For example, ODOT evaluated connectivity between several large habitat patches in the proposed Sunrise Corridor alignment area leading to Damascus [360]. Using migratory songbirds and larger mammals as focal species, ODOT identified several movement corridors. Based on current zoning and land use ordinances, about half of the existing habitat patches and movement corridors are vulnerable to development.

Many of the region's jurisdictions provide for natural areas and open spaces, but planning for wildlife connectivity between such areas is often overlooked and can be greatly influenced by ownership and zoning. Most land use planners are not wildlife biologists, may not be familiar with wildlife or their needs, and tend to consider smaller spatial scales than are necessary to maintain many wildlife populations over time.

Consider a hypothetical case study. Three potential corridors, all along streams, are drawn on the draft map between two core habitats. The group wants to select two of the three for the final map. An analysis of land ownership reveals that:

1. Eighty percent of the first corridor lies within protected natural areas, and the areas between are already developed around a 150-foot wide protected stream corridor. This is the shortest distance between the two core habitats.
2. The second corridor is 50 percent protected, and a new highway alignment is proposed in 15 percent of the unprotected area, which currently constitutes a gap in the corridor. The remainder runs through large privately owned parcels, including residential and industrial areas.

Part of the residential area is outside the urban growth boundary but could become urban in the future. This corridor is the longest distance between the two core habitats.

3. In the third corridor, 75 percent is protected but most of the remainder is very constricted, with high-density development within 50 feet (15 meters) of the stream channel.

After analyzing land use and risk, the group's first selection (corridor #1) is easy. The second selection is more difficult, but corridor #3's constriction would be hard to repair, whereas #2 has potential if the right tools are employed. The highway alignment presents key wildlife passage opportunities - for example, a widened bridge and fencing to guide animals to the vegetated undercrossing - that may help the road builders, such as Oregon Department of Transportation, mitigate environmental damage, gain required permits and secure additional funds to help with the crossing project. Local jurisdictions and conservation groups can work with landowners to secure conservation easements and remove wildlife barriers.

Of course, sometimes this works and sometimes it doesn't, which argues for redundancy in movement corridors. The region will need to take a long-term approach and if necessary, shift strategies. For this reason, the wildlife corridor map will always remain a draft; conditions, land use, and wildlife change over time. However, consistently moving forward with a deliberate but adaptive strategy will ensure continued progress.

The preceding sections describe ways to identify potential core habitats and connecting corridors, link species' needs to each, refine the details and decide on the preferred alternative(s). Now the working group is ready to create final maps consisting of existing core habitat areas, corridors and in some cases, desired conditions for corridors that are not yet sufficient for focal species. An implementation plan will include these maps and identify ways to preserve or improve core habitats and corridors. The next section highlights some conservation tools to help achieve these goals.

IMPLEMENTING THE STRATEGY

CONDUCTING BROADER OUTREACH

A toolkit of approaches will be needed to successfully implement a wildlife movement strategy. Now is the time to identify these tools and conduct broad outreach to the agencies, organizations and citizens who can use the tools. These are the people who can implement the plan successfully, or cause it to fail.

A marketing strategy can be helpful, and consulting marketing and outreach professionals within the working group's organizations can be quite useful. Before reaching out to stakeholders and the public, identify in a general way the tools that may be most useful in a given situation based on variables such as habitats and species' needs, land use and likely future scenarios. Use this early reconnaissance to help identify approaches to various stakeholder groups.

The next section briefly describes some commonly used conservation tools.

CONSERVATION TOOLS FOR WILDLIFE CONNECTIVITY

Protection and restoration are critical components of an effective fish and wildlife habitat conservation program. In addition, a variety of non-regulatory tools comprise an important part of the strategy to conserve and enhance the region's wildlife corridor system. Some examples of non-regulatory tools are described below, and the Oregon Conservation Strategy describes selected tools in more detail [284]. These can all be important tools depending on the situation, and are not listed in order of priority.

Acquisition programs such as those currently funded through regional and local bond measures provide the most reliable means of conserving core habitats and corridors between habitats that meet the program's goals, although restoration and maintenance should accompany natural area acquisition.

Conservation easements are deed restriction contracts under which a landowner voluntarily gives up the right to conduct certain activities on the property but continues to own and sometimes, manage the land. Conservation easements are donated to or purchased by an agency or conservation organization. The landowner typically agrees not to subdivide, harvest timber, remove native vegetation, alter streams and floodplains, or otherwise engage in activities that may degrade the resource value.

Stewardship and recognition programs publicly acknowledge landowners, businesses and other entities for conserving open space, protecting or restoring habitat areas, making financial contributions or carrying out good stewardship practices. These include certification programs, such as the Audubon Society and Three Rivers Land Conservancy's Backyard Habitat program.

Financial incentives may include direct funding such as grants, incentives for specific activities in targeted areas, or property and income tax reductions.

Outreach can include technical assistance, targeted messaging, signage ("You are passing through an important wildlife corridor"), working with local schools and universities, habitat improvement workshops and other educational activities.

Volunteer activities including restoration, site steward programs and citizen monitoring can improve habitat and educate and engage citizens.

Transfer of development rights (TDR) programs allow landowners to transfer the right to develop one parcel of land to a different parcel of land. TDRs are often accomplished through zoning, and are meant to shift development from undesirable areas such as important wildlife habitat, to areas more suitable for development. TDRs can help address landowner equity and property rights issues.

Transportation and trail improvement projects can provide opportunities to improve connectivity through wildlife crossings (see [251]).

New urban area planning that explicitly identifies and protects or enhances core habitats and movement corridors can help retain biodiversity [234]. Providing a variety of types and arrangements of open space in new developments will meet the needs of more species.

Significant opportunities exist to combine multiple objectives to achieve wildlife connectivity. For example, replacing or retrofitting culverts and/or bridges can be planned to allow both fish and wildlife passage, and in fact some federally funded projects are now required to consider wildlife in new or retrofitted projects [251]. Trail construction or improvements, often tied to transportation funding sources, can offer similar opportunities. Where and how roads and trails are built can have profound influences - positive or negative - on the ability of wildlife to move across a landscape.

RESEARCH, MONITORING AND ADAPTIVE MANAGEMENT

Research and monitoring can help determine which habitats are most important, locate appropriate movement corridors, and determine whether corridors are functioning properly. Effective monitoring is necessary to inform adaptive management, leading to ongoing refinement and enhancement of wildlife connectivity efforts. Some research and monitoring ideas are discussed below. Many more are likely to emerge as the region continues to develop a wildlife connectivity program.

Research attention might be particularly important to assess high-value species - threatened, declining, or perhaps keystone species that influence many other species in an ecosystem. Such species studies could include population trends, presence/absence, abundance, species-habitat relationships, and research related to metapopulations and genetics. Another interesting question involves the overall and species-specific impacts from supplemental feedings.

Biological monitoring is notoriously difficult to fund, yet it is such a critical component for success. Resources are limited and species' needs vary by season, geography and other factors. Acknowledge and identify the most important research needs in initial project planning, and fund accordingly.

The Western Governors' Association established a Wildlife Habitat Council to deal, in part, with wildlife corridors [382]. The associated report states:

“...creating the scientific information base for wildlife corridor conservation is not a one-time project, but an ongoing effort that supports current and future decision-making in a dynamic landscape. Thus it is critical to establish funding streams for the continued development of information about crucial habitats and important wildlife corridors as land and water uses change. Funding is also needed to monitor the sensitivity of these resources to disruption, their responses to management activities, and to cover the cost of coordination among the many key players from both the public and private sectors.”

In an ideal world, long-term monitoring data would be available for each species and habitat of interest throughout the region. In fact, almost none of these data exist. Because research and monitoring are expensive and difficult to fund, it is important to spend resources where they will most effectively answer key research questions.

The first question is: what are the questions? Whether research is utilized to help answer key questions depends on resource availability (time and money), urgency of the question, level of uncertainty, and whether information can reasonably be obtained through other means, such as the scientific literature.

Once core habitats and focal species are identified, the region can begin to sort out what really needs to be accomplished through field studies.

Monitoring corridors is very important and in fact, often necessary for success. For example, field studies will certainly be needed along corridors to determine on-the-ground barriers and other issues that cannot be assessed using GIS or aerial photos. It is necessary to find out which species do and do not use the area and why, to inform corridor planning and implementation. Wildlife-vehicle collision and road-kill surveys can help inform this process, but are not by themselves sufficient. Patch-based monitoring combined with nearest-neighbor distance is often used to measure connectivity between populations (for example, [268]), but matrix conditions need to be considered as well.

When solutions such as wildlife crossings are installed to address barriers, conduct baseline monitoring before installation whenever possible, and collect at least three years' data after installation. Some species will not use crossings immediately but begin using them after two or three years [251]. In addition, it will not necessarily be clear that focal species are actually using corridors. Monitoring corridor use by focal species allows for adaptive management; if they are not using the corridors, more research will be needed to determine and correct the reasons.

We need more information about likely impacts of climate change on wildlife and habitat, and some of this could be acquired through literature searches and the knowledge of experts. How might habitats change, and how will those changes affect wildlife? How quickly will these changes occur? Are we likely to lose or gain some species, no matter what we do? Which wildlife species are most at risk, and how can we improve their chances? Amphibians are likely to fall in the latter category. Exploring questions like these as soon as possible can help guide selection of core habitats, corridors and restoration activities, including which plant species should be planted.

The basic process to develop a research and monitoring strategy looks something like this:

1. Identify objectives, goals and specific targets, and establish check-in dates to determine whether targets are being met.
2. Engage key agencies, such as Oregon Department of Fish and Wildlife, for technical advice.
3. Identify and prioritize key research questions and decide how they should be answered.
4. Identify available data, including field, electronic and other types, and assess their value to the process.
5. Identify information gaps.
6. Create a research and monitoring work plan.
7. Foster collaborative monitoring programs and secure resources and funding.
8. Implement work plan and document the results of studies.
9. Use the results to inform #1 and integrate research into ongoing activities and decision-making.

Find and use the information already available, such as local studies. Consult with biologists when developing a monitoring plan to ensure rigor and statistical validity of research projects. Partnering with

academic institutions for short- and long-term monitoring programs is an excellent approach; students often need research projects and want their studies to be useful in the real world. For example, Masters' of Environmental Management (MEM) students can conduct topical literature reviews as well as certain types of modeling processes, and research-oriented programs can address questions requiring field research. Capstone and GIS-based classes can take on specific research needs.

RELATED EFFORTS

Several regional or statewide efforts are linked to mapping core habitats and wildlife corridors in the region and should be integrated with the work being done here as appropriate.

The Western Governors' Association approved a resolution in 2007 to identify key wildlife migration corridors and crucial habitat in the West and recommends policy options and tools for preservation [382]. In response, the association launched the Wildlife Corridor Initiative to promote best practices for development, reduce harmful impacts on wildlife and integrate migratory and crucial habitat into planning decisions.

The Oregon Conservation Strategy articulates a vision for healthy fish and wildlife populations in Oregon by maintaining and restoring functioning habitats, preventing declines of at-risk species, and reversing any declines in these resources, where possible. The Strategy further articulates six key conservation issues that threaten wildlife and habitat, including barriers and lack of connectivity [284]. The Strategy provides a "Conservation Opportunity Areas" map and associated shapefile which should help inform the region's efforts, but note that it was conducted at a state-wide scale and will not include some of the region's core habitat areas. The current Strategy does not delineate wildlife corridors.

The Willamette Basin Synthesis Project combines results from five major Willamette conservation assessments: Pacific Northwest Ecosystem Research Consortium, ODFW's Conservation Strategy, The Nature Conservancy's Willamette Valley – Puget Trough Georgia Basin Lowlands (WPG) Ecoregional Assessment, Wetland Conservancy priority wetlands and the Oregon Biodiversity Project [287]. The synthesis delineates priority land and freshwater sites where investment in conservation or restoration would most improve the health of historically significant and functional habitats, survival or recovery of imperiled plants and wildlife dependent on those habitats, floodplain connections to benefit water quality for aquatic biodiversity, and overall watershed health. The project is a partnership between Oregon Department of Fish and Wildlife, The Nature Conservancy, The Wetlands Conservancy, the Willamette Partnership, Oregon Parks & Recreation Department, Defenders of Wildlife, Oregon Natural Heritage Information Center, Oregon Department of Environmental Quality, the Oregon Biodiversity Project and Metro. The Willamette Synthesis will be adopted as an update of both the ODFW Conservation Strategy and The Nature Conservancy's ecoregional assessment.

The Oregon Wildlife Movement Strategy is an interagency partnership to inventory and prioritize wildlife movement barriers on the state highway system, and directly implements the Oregon Conservation Strategy by addressing barriers to and landscape permeability for animal movement [284]. The goals are to: maintain and improve existing conditions suitable for natural movement of animals across the

landscape, improve safety for the traveling public, provide a venue for interagency cooperation and collaboration on wildlife movement issues in Oregon, and develop guidance and recommendations for stakeholders to address wildlife movement. The strategy identifies and prioritizes wildlife linkage opportunities to enable better decisions regarding transportation planning, design and mitigation. Data on wildlife linkages and collision hot spots can be used to help reduce animal-vehicle collisions and enhance landscape permeability for wildlife. However, while these data may be useful to the current effort they are at a state-wide scale, based on the state highway system and are not sufficient for the region's needs.

Two other related initiatives are taking place in the region now. First, the Intertwine Alliance is an initiative to create the world's greatest systems of parks, trails, and natural areas - the Intertwine - in the region. The Intertwine Alliance is a collaborative effort between non-profits, state and local agencies, businesses and citizens from across the region. The alliance includes a core organizing group and five key focus areas: conservation, natural area acquisition, trails, environmental education, and a regional system component. For more information or to get involved, e-mail info@theintertwine.org.

The other local initiative, currently under development, is a Regional Conservation Framework. The framework will be based on the Oregon Conservation Strategy, but with emphasis on local goals and opportunities, including improving wildlife corridors and connectivity for current and future climatic conditions. The framework and the Intertwine are likely to be linked. The current task of identifying core habitats and wildlife corridors will be linked to both.

SUMMARY – WHERE DO WE GO FROM HERE?

The region's existing habitat system is fragmented, often poorly connected and complex, yet the region holds many species representing substantial biodiversity. Connectivity has not been entirely lost; stream corridors, areas to be brought into the urban growth boundary, or those that are not yet fully developed offer key opportunities to plan ahead for wildlife connectivity.

Corridor ecology requires both science and creative thinking. Identifying wildlife connectivity may range from relatively simple drawings on a map to complex modeling processes. At its best, it is a collaborative and iterative process. Creating a wildlife movement strategy lays the initial foundation, but this is just the starting place for what may well be a long-term process relying on long-range planning, restoration, acquisition, easements and other tools. Leadership and public support will be important to the success of a wildlife movement strategy. Monitoring and adaptive management will help ensure success. There are plenty of examples from which to draw. Initiating a connectivity strategy simply requires selecting appropriate tools and approaches and moving forward.

The body of literature reviewed in this document highlights a few key considerations:

- Maps can be important tools to point resources in the right direction
- Species matter - different animals may have very different needs, and in different seasons

- Corridor habitat quality matters
- Matrix matters - probably less for birds, more for terrestrial animals, and most for amphibians
- More native vegetation in more places equals higher biodiversity
- A narrow corridor is usually better than none
- More than one corridor is best
- Formal modeling may not be necessary, but could prove useful
- Use focal species to identify and address habitat suitability, widths, gaps and barriers

It would be easy to become mired in arguments about specifics and take too long, perhaps forever, to complete a movement strategy, even as population increases and more houses and roads are built. Without a plan, there is no organized way to recognize or take advantage of key opportunities to strategically invest in habitat and connectivity.

In theory, however, this is a simple process that requires answering three questions:

1. What do we have?
2. What do we want?
3. How do we get there?

To answer these questions, the first step is to convene a group of key stakeholders and agree on the process. Next, identify potential core habitat patches, target species for each patch, and determine species' needs based on best available science and professional judgment. After that, evaluate existing connectivity and identify risks and alternatives, select preferred alternatives, and create a roadmap to achieve this combination of planning and reality over the long term. Vet the results to a broader audience to gain public support and assistance. And finally, implement the strategy, assess whether it is working, and adapt as needed.

The process will require a great degree of collaboration, communication and compromise. However, the long-term benefits for the region's biodiversity may be well worth the effort.

APPENDICES

- **Appendix 1:** Literature relating to corridor widths
- **Appendix 2:** Literature relating to species' habitat area requirements
- **Appendix 3:** Literature relating to species' gap-crossing abilities
- **Appendix 4:** Models and assessment techniques
- **Appendix 5:** Vertebrate species known to use region habitats at least once every year.
- **Appendix 6:** Literature cited.

APPENDIX 1. LITERATURE RELATING TO CORRIDOR WIDTHS

Research suggesting movement corridor widths (in feet and meters) required by various North American wildlife species. Widths are total corridor widths, including both sides of streams unless noted.

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Best [37]	Birds in Iowa agricultural lands May-November and March-April	<ul style="list-style-type: none"> • N/A – study relating to 3 types of fencerows (all narrow, width not quantified) • More species in fencerows with more woody vegetation 	In every season studied (spring, summer, fall), increase in species was substantial along hedgerows from herbaceous to scattered trees/shrubs to continuous trees/shrubs. Abundance trended in same direction, except summer (scattered trees/shrubs more abundant than continuous).
Brudvig et al. [54]	Experimental connectivity study at Savannah River site, South Carolina. Patches and corridors were early successional habitat within a pine forest matrix. Experimental forest setting. Vascular plants, not season-specific.	<ul style="list-style-type: none"> • 105-foot (32-meter) corridors enhances biodiversity “spillover” effect 	Corridors facilitate movement of organisms between patches, increasing species richness within patches. In patches connected by corridors vs. isolated patches, corridors created a biodiversity “spillover” effect extending approx. 30% of the width of the 1-hectare connected patches, resulting in 10-18% more vascular plant species around connected patches.
Burbrink et al. [56]	Reptiles and amphibians in Illinois	<ul style="list-style-type: none"> • 328 feet (100 meters) or more; depends greatly on patch characteristics and corridor conditions 	Wide (> 3,281 feet or 1,000 meters) riparian corridors did not support more species than narrow (<320 feet or 100 meters). Instead, proximity to core area and local habitat heterogeneity best explained species richness. Other literature suggested that lack of upland habitats and fishless pools, and hydroperiod inhibited many species from consistently occurring in corridor. Demonstrates importance of local conditions and natural history.
Calhoun and Clemens [62]	Amphibians	<ul style="list-style-type: none"> • 98-755 feet (30-230 meters); salamanders at lower end of range, frogs at upper end. 	Recommend 3 management zones: the wetland depression, the wetland envelope (i.e., land within 98 feet or 30 meters of the wetland), and the critical terrestrial habitat (i.e., 98-755 feet or 30–230 meters from the wetland).
Conner et al. [77]	Riparian (intermittent stream) forest breeding bird communities in eastern Texas; used 3 widths: narrow (16-82 feet, or 5-25 meters), medium (98-131 feet, or 30-40 meters) and wide (164-328 feet, or 50-100 meters). Young pine plantations in rural setting.	<p>(extracted species occurring in W OR)</p> <ul style="list-style-type: none"> • Steadily increased with increasing width: downy woodpecker • 197-230 feet (60-70 meters): abruptly increased after threshold reached: pileated woodpecker, yellow-billed cuckoo • Steadily decreased with forest width: yellow-breasted chat • Not associated with forest width: hairy woodpecker, brown-headed cowbird 	Detected many Neotropical migrant species in narrower widths, suggesting these zones do have some value. Shrub-breeding birds more associated with narrow widths.
Constantine et al. 2005 [78]	Small mammal study conducted in mature loblolly pine stands in South Carolina. Considered edge effects of 328-foot (100-meter) wide mature pine corridors through clear cuts.	<ul style="list-style-type: none"> • In some areas, 328-foot (100-meter) forested movement corridors may be sufficient to provide passage for some small mammal species (e.g., shrews). • Some small mammals may use corridor as their entire home ranges. 	Live-trapped small mammals in three regenerating stands following clear-cuts. Harvested stands were bisected by 100-m corridors.

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Croonquist and Brooks [82]	Bird species in central Pennsylvania riparian corridors, spring-summer	<ul style="list-style-type: none"> At least 164 feet (50 meters); wider to support sensitive species; 820 feet (250 meters) to support full complement of bird communities 13 feet (4 meters) woody vegetation for bird community in disturbed areas 	Undisturbed (reference) vs. disturbed (agricultural / residential) corridors – species richness, abundance generally decrease with distance from stream in disturbed, but not undisturbed, watersheds. Specialist neotropical migrants used disturbed corridors primarily for migration. Disturbance-sensitive species occurred only in undisturbed corridor 82 feet (25 meters) or greater.
Damschen et al. [86] Damschen et al. [85]	Experimental connectivity study at Savannah River site, South Carolina. Experimental forest setting. Patches and corridors were early successional habitat within a pine forest matrix. Two patch types: edgy and not edgy. Vascular plants, not season-specific.	<ul style="list-style-type: none"> 105-foot (32-meter) corridors 	<p>1 - Habitat patches connected by corridors retained more native plant species than do isolated patches, this difference increased over time, and the corridors did not promote invasion by exotic species.</p> <p>2 – Looking at plant dispersal, found that dispersal vectors (birds vs. wind dispersed) and habitat features (edge, corridors) affected species colonization. Bird-dispersed plant species showed positive connectivity effects increasing then stabilizing over time, but no edge effects. Wind-dispersed plant species richness showed steadily accumulating edge and connectivity effects.</p>
Darveau et al. (1995) [87]	Spring songbirds in riparian boreal forests in Canada. Studied corridors 66, 131, 197 feet (20, 40, 60 meters) and control (984 feet, or 300 meters) wide, effects over time due to logging.	<ul style="list-style-type: none"> 197-foot (60-meter) wide corridors 	To maintain forest breeding birds. Bird densities increased in buffer strips immediately after logging (“packing” effect), then decreased in all strip widths thereafter. By third year after clear-cutting, forest-dwelling species less abundant than generalists in 66-foot (20-meter) strips; Golden-crowned Kinglet and Swainson’s Thrush became essentially absent in 66-foot (20-meter) strips after 3 years. Moderate thinning had a more moderate, but similar, effect.
Dickson et al. [93]	Breeding birds in 3 riparian widths in eastern Texas	<ul style="list-style-type: none"> 49-82 feet (15-25 meters) (narrow – not recommended) 98-131 feet (30-40 meters) (medium – minimum recommended) 164-312 feet (50-95 meters) (wide, recommended) <p><i>Species-specific corridor width associations:</i></p> <ul style="list-style-type: none"> Cowbird, Common Yellowthroat, Mourning Dove: no association Yellow-breasted Chat: narrow Red-eyed Vireo, Yellow-billed Cuckoo: increased with width Downy woodpecker, American Crow: medium/wide 	Narrow width (49-82 feet, or 15-25 meters) contained many shrub and edge associates. Medium width (98-131 feet, or 30-40 meters) contained a mix of species associated with narrow and wide widths. Widest width (164-312 feet, or 50-95 meters) contained species primarily associated with mature pine-hardwood and bottomland hardwood.
Environment Canada 1998 [106]	Minimum to allow for interior habitat species movement Sufficient to allow for generalist species movement	<ul style="list-style-type: none"> 328 feet (100 meters) 164 feet (50 meters) 	Connectivity width will vary depending on the objectives of the project and the attributes of the nodes that will be connected. Corridors designed to facilitate species movement should be a minimum of 164-328 feet (50-100 meters) wide. Corridors designed to accommodate breeding habitat for specialist species need to be designed to meet habitat requirements of those target species.
Fahrig and Merriam (1985) (from 244)	White-footed mice (<i>Peromyscus leucopus</i>)	<ul style="list-style-type: none"> “a few meters” 	To reduce probability of extinction in woodlots
Fernandez-Juricic [113]	Urban birds in Madrid, Spain	<ul style="list-style-type: none"> Wooded streets increase habitat connectivity to parks 	Streets with trees that connected parks positively influenced the number of species in parks

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Fernandez-Juricic and Jokimaki [115]	Review two comprehensive urban bird studies in Spain and Finland parks	<ul style="list-style-type: none"> N/A - surrounding urban streets. 	Wooded streets increase habitat connectivity to parks
Haddad [149]	2 butterfly species in experimentally designed landscape, South Carolina. Patches and corridors were early successional habitat within a pine forest matrix.	<ul style="list-style-type: none"> 105 feet (32 meters) corridor 	Corridors increased inter-patch movement rates; movement rate was significantly, negatively related to inter-patch distance. Corridor effects were stronger for males than for females.
Haddad and Baum [151]	4 butterfly species in experimentally designed landscape, South Carolina. Patches and corridors were early successional habitat within a pine forest matrix.	<ul style="list-style-type: none"> 105 feet (32 meters) corridor 	Three out of four butterfly species reached higher densities in patches connected by corridors than in similar, isolated patches.
Haddad et al. [152]	Variety of invertebrate and vertebrate species (10 spp) in experimentally designed landscape, South Carolina. Patches and corridors were early successional habitat within a pine forest matrix.	<ul style="list-style-type: none"> 105 feet (32 meters) corridor 	This width was sufficient (and was the only width tested) to successfully direct movement of animals to the next patch. Interestingly, the same number of animals left a given patch with or without corridors, but corridors increased their arrival at the next patch by more than 68 percent for each of 10 species, acting as a sort of "drift fence."
Hagar 1999 [155]	Western Oregon study of logged and unlogged riparian areas. Study conducted May-July in Coast Range.	<p>These species' numbers increased with increasing buffer width (40-70m 1-sided buffers):</p> <ul style="list-style-type: none"> Pacific-slope Flycatcher, Brown Creeper, Chestnut-backed Chickadee, Winter Wren 1-sided, 70-m buffer may be too narrow for these species: Hammond's Flycatcher, Golden-crowned Kinglet, Varied Thrush, Hermit Warbler 	
Helferty 2002 [163]	Review of needs for amphibian upland corridors in Toronto area	<ul style="list-style-type: none"> Up to 0.62 mile (1 kilometer) traveled between wetland and terrestrial habitats. 	Maintenance of natural hydrology regimes is critical to maintaining amphibian biodiversity.
Hodges and Krementz 1996 [177]	Riparian forests in Georgia during breeding season. Minimum distance needed to support area-sensitive Neotropical migratory birds	<ul style="list-style-type: none"> 328 feet (100 meters) or more, 1-sided width Red-eyed Vireo probably needs more 	Sufficient to maintain the six most common species of breeding Neotropical migrant birds.

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Keller, Robbins & Hatfield 1993 [190]	Birds in riparian corridors (117) in agricultural setting in Maryland and Delaware, 25-800 m wide.	<ul style="list-style-type: none"> • Probability of area-sensitive Neotropical migrants increased most dramatically between 25-100m • Recommended minimum 100-m corridors Significant probability of detecting these species continued to increase to maximum width: <ul style="list-style-type: none"> • Red-eyed Vireo, Wood Thrush, Eastern Wood-peewee • Noted Red-eyed Vireo, Wood Thrush, Hairy Woodpecker as area-sensitive species with maximum probability of detection in minimum 100-ha patches. These species were significantly associated with narrow corridors: <ul style="list-style-type: none"> • Purple Martin, Mourning Dove, Red-winged Blackbird, European Starling, Turkey Vulture, House Sparrow, American Robin 	Brown-headed Cowbird came close to significance (P =0.07) for wider corridors. This makes sense in light of other studies showing correlation not necessarily with hard edges, but particularly with streamside edges.
Kilgo et al. 1998 [195]	Compared breeding bird abundance, species richness among S. Carolina bottomland hardwood stands ranging in width from <50 m to >1,000 m and enclosed by forested habitat. Also compared avian abundance and richness among stands enclosed by pine (Pinus spp.) forest and stands enclosed by field-scrub habitats.	<ul style="list-style-type: none"> • Neotrop and total species richness was positively associated with stand width. • Total abundances were generally greatest in width classes <50m and >1000m. • Probability of occurrence was + associated with stand width for 12 species, - for one. • Even narrow riparian zones can support diverse avifauna, but 500-m zones are needed to maintain complete avian community characteristics. 	Because these bottomland forests were embedded within other forest or vegetation types, relevance to the Metro region may not be high.
Kinley & Newhouse 1997 [197]	SE British Columbia breeding bird surveys examining riparian reserve zone width and bird density, diversity. Three zones: 70, 37 or 14 m wide.	These species seem to prefer the widest corridors (70 m or more): <ul style="list-style-type: none"> • Golden-crowned Kinglet, Gray Jay , Townsend's Warbler, Varied Thrush, Warbling Vireo (P<0.07), Winter Wren • Density of all species and all riparian-associated species > with increasing width. 	See pages 81-82 for species-habitat relationships.
Cross et al. 1985 [200]	Downy woodpecker	<ul style="list-style-type: none"> • 98 feet (30 meters) 	Minimum mean width supporting breeding populations of downy woodpeckers
Knutson and Naef 1997 [200]	Black-capped chickadee	<ul style="list-style-type: none"> • 98 feet (30 meters) 	Minimum mean width supporting breeding populations of black-capped chickadees
Mudd 1975 [264]	Mourning doves	<ul style="list-style-type: none"> • 98 feet (30 meters) 	Sufficient width for mourning doves
Stauffer and Best 1980 [347]	White-breasted nuthatch	<ul style="list-style-type: none"> • 112 feet (34 meters) 	Minimum mean width supporting breeding populations of white-breasted nuthatch

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Stauffer and Best 1980 [347]	Minimum needed to support Rufous-sided Towhee breeding populations	<ul style="list-style-type: none"> • 1,310 feet (400 meters) 	Rufous-sided Towhees were subsequently split between Spotted and Eastern towhees.
Mudd 1975 [264]	Pheasant, quail and deer	<ul style="list-style-type: none"> • 150 feet (46 meters) 	
Machtans et al. 1996 [224]	Bird movements through riparian (lakeside) buffer strips before and after harvest in Alberta, Canada May-August, 3 years	<ul style="list-style-type: none"> • At least 328 feet (100 meters) buffer along 1 edge of lake 	Resident juvenile birds (dispersal). Number of mist-net captures for all ages/species increased logarithmically closer to lake.
Margui 2007 [266]	Valencia, Spain street tree study over several seasons.	<ul style="list-style-type: none"> • Tree species richness, abundance, height were primary factors affecting bird metrics. • Siberian elm, box elder, white poplar were bird favorites. • Use varied by bird species and season. • Winter: 25% of all wintering bird species in the area used street trees; breeding = 19% 	Author concludes that street trees provide poor habitat, in sharp contrast to two other studies examining street trees as corridors in Madrid, Spain and Melbourne, Australia [113;384]. The Valencia study sites were purposely selected such that there were no natural areas nearby, unlike the other street tree studies, which were connected to natural areas. Madrid and Melbourne also had larger, more mature street trees. For more sensitive species, it seems likely that street trees may be quite valuable for connectivity but less valuable as habitat.
May 2000 [238]	General wildlife habitat	<ul style="list-style-type: none"> • 328 feet (100 meters) 	Wildlife needs summarized from May's literature review.
Merriam	Eastern chipmunk	<ul style="list-style-type: none"> • <i>Note this deals with length, not width.</i> • 66-1,509 feet (20-460 meters); most frequent usage in the 66-131-foot (20-40-meter) range 	Range of distances traveled between isolated upland forests; 90% via wooded linkages.
Peak and Thompson 2004 [295]	Nest success of songbirds in riparian forests of different widths (agricultural setting) in Missouri	<ul style="list-style-type: none"> • Wider than 1312-1739 feet (400-530 meters) for most area-sensitive species. • 180 feet (55 meters) may be sufficient for generalist species such as catbirds and cardinals. 	This study was for breeding habitat, not corridor movement; applies to birds attempting to nest within corridors.
Pennington et al. 2008 [299]	Neotropical migratory birds in Ohio – breeding and migration	<ul style="list-style-type: none"> • 1640 feet (500 meter) wide corridor or patch without buildings for breeding • 820 feet (250 meters) for migrating, buildings okay 	Hard to disentangle native vegetation from corridor width (true also here); both bird measures also positively related to native vegetation and mature trees. Recommend adding high native tree cover in urban areas for stopover habitat.
Rudolph and Dickson 1990 [322]	Full complement of herpetofauna and other vertebrate species	<ul style="list-style-type: none"> • > 197 feet (60 meters) 	Corridor should have mature trees.

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Semlitsch and Bodie 2003 [329]	Literature review relating to wetland / riparian buffer requirements for reptiles and amphibians, so this is not strictly a corridor reference.	<u>Group / range of recommended widths</u> <ul style="list-style-type: none"> Frogs / 673-1207 (205-368 meters) Salamanders / 384-715 feet (117-218 meters) Amphibians / 522-951 feet (159-290 meters) Snakes / 551-997 feet (168-304 meters) Turtles / 404-942 feet (123-287 meters) Reptiles / 417-948 feet (127-289 meters) Herpetofauna / 466-948 feet (142-289 meters) Overall recommendation to cover most species: 98-197 feet (30-60 meters) aquatic buffer, 466-1276 feet (142-389 meters) core habitat (from stream), additional 164 feet (50 meters) beyond core for terrestrial buffer. 	Mean minimum and maximum core terrestrial habitat for amphibians and reptiles. Values represent mean linear radii extending outward from the edge of aquatic habitats compiled from summary data in the authors' appendix (i.e., one-sided buffer). The review summarized terrestrial migration distances from aquatic sites for reptiles and amphibians, so the widths are more relevant to home range radii than corridors. However, provides information regarding both core habitat and corridor length requirements for a wide variety of species, including the following species occurring here: western toad, Pacific chorus frog (from 1956 OR study), bullfrog, OR spotted frog, rough-skinned newt (from 1960 OR study), snapping turtle, painted turtle, and northwestern pond turtle.
Silva and Prince 2008 [332]	Prince Edward Island, Canada Small mammals in agricultural landscape	<ul style="list-style-type: none"> Hedgerows provided substantial connectivity for small mammals Hedgerows narrow, but length and composition are important 	Abundance of small mammals except eastern chipmunk increased in hedgerows longer than 225–250 m, but was independent of length in shorter hedgerows. Most small mammals appeared to benefit from hedgerows with high shrub diversity, ground cover and few gaps.
Small 1982 [339]	Pileated woodpecker nesting	<ul style="list-style-type: none"> 328 feet (100 meters) 	
Small 1982 [339]	Travel corridor for red fox and marten	<ul style="list-style-type: none"> 328 feet (100 meters) 	
Soulé et al. 1988 [344]	4 chaparral bird species, including Spotted Towhee	<ul style="list-style-type: none"> 16 feet (5 meters) 	chaparral strips running between habitat patches to reduce local extinctions in isolated patches
Spackman and Hughes 1995 [345]	Birds and vascular plants in Vermont Spring; rural setting.	<ul style="list-style-type: none"> At least 492-1148 feet (150-350 meters) to retain 90% of bird species. Small mammals traveled primarily below or just above high water mark. 	Used "above high water mark" terminology to describe corridors, so assumed distances were 1-sided and doubled them. Corridors should be forested.
Thurmond et al. 1995 [359]	Forest interior and neotropical migrant birds in Georgia riparian areas	<ul style="list-style-type: none"> Wider than 165 feet (50 meters) 	Forest interior and neotropical migrants were essentially absent in widths less than this distance.
Todd 2000	General wildlife habitat	<ul style="list-style-type: none"> 100-325 feet (30-99 meters) 	From buffer width chart – wildlife needs

Reference	Location, species and context	Recommended or studied corridor width(s)	Notes
Tzilkowski, Wakely & Morris 1986 [361]	Relationships between street-tree characteristics, including habitat features, and use by urban birds were investigated from May-July in State College, PA. Bird presence or absence was sampled in 1278 individual street trees of 24 species.	<ul style="list-style-type: none"> • Analysis of tree species, height class and bird occurrence determined that pin oak, American elm and honey locust were used most frequently by birds. • There was a positive linear relationship between height class and bird occurrence. • Both native and non-native birds occurred more frequently in tall street trees where there was little other tree cover. • Natives were seen more often in residential areas with low vehicular traffic. • Non-natives were seen more often in business areas with high traffic volume. 	Street tree species and structure vary in their attractiveness to bird species. This study does not specifically address connectivity but ties to three other street tree studies cited here [113;266;384].
Prose 1985 [308]	Belted Kingfisher roosts; this was a Habitat Suitability Model from USFWS, and this reference was from Maritime Provinces.	<ul style="list-style-type: none"> • 100-200 feet (30-61 meters) from water (note 1-sided width) 	Kingfishers typically roosted among the leaves of deciduous trees and near the tips of small supple limbs, where they were safe from nocturnal predators.
White et al. 2005 [384]	Urban bird study in Melbourne, Australia.	<ul style="list-style-type: none"> • The transition from native to exotic streetscapes saw the progressive loss of insectivorous and nectivorous species reflecting a reliance by these species on structurally diverse and/or native vegetation for both shelter and food resources. More structurally diverse streetscapes provided habitat and movement corridors for more species. 	The implementation of effective strategies and incentives which encourage the planting of structurally diverse native vegetation in streetscapes and gardens should be paramount if avian biodiversity is to be retained and enhanced in urban environments.
Hannon et al. 2002 [157]	Studied changes in terrestrial vertebrate communities from pre- to post-harvest over 3 years in experimentally created buffer strips (20, 100, 200, and 800 m wide) in a boreal mixed wood forest in Alberta, Canada.	<ul style="list-style-type: none"> • 656-foot (200-meter) buffer needed to conserve pre-harvest passerine bird community, at least up to 3 years post-harvest. 	Forest-dependent bird species declined as buffer width narrowed from 200 to 100 m and narrower. Changes in small mammal or amphibian abundance were not detected for any treatment relative to controls; however, studied species are habitat generalists that used and even bred in clear cuts.

APPENDIX 2. LITERATURE RELATING TO SPECIES' HABITAT AREA REQUIREMENTS

Research suggesting minimum habitat patch size or noting area-sensitivity, for various species. Most species noted are present in the Metro region; others do not occur here but may have similar requirements to species occurring here (such as migratory thrushes).

Reference	Location and context	Recommended minimum habitat area	Notes
Askins, Philbrick & Segano 1987 [14]	Connecticut breeding bird study in forested landscape, testing importance of isolation and patch size.	<ul style="list-style-type: none"> • Hermit Thrush – 798 acres (323 hectares) • Brown Creeper – 124 acres (50 hectares) 	Forest area was the best predictor for forest-interior species richness and density for small forest patches, but in large patches, isolation was the best predictor.
Burke & Nol 1998 [58]	Study of Ovenbird (Neotropical migrant) patch size needs in southern Ontario.	<ul style="list-style-type: none"> • Density, pairing success higher in larger patches • Prey biomass was 10-36 times higher in large versus small woodlots • 49 acre (20 hectare) core area, 198 acre (80 hectare) total forest area 	<ul style="list-style-type: none"> • Distance to edge (623-984 feet, or 190-300 meters) most important predictor of pairing success
Dawson, Darr & Robbins 1993 [89]	Maryland birds studied May-July using point counts.	<ul style="list-style-type: none"> • Hairy Woodpecker: 178 acres (72 hectares) • Pileated Woodpecker: 1,147 acres (464 hectares) • White-breasted Nuthatch: 343 acres (139 hectares) • Red-eyed Vireo: 42 acres (17 hectares) 	This study estimated probability of occurrence within patches of various sizes based on field data. The recommended areas shown here represent the size at which a given species is substantially more likely to occur.
Galli, Leck & Forman 1976 [133]	New Jersey bird study conducted between June-August in mixed oak forested habitat. Patch sizes studied from <2.5 acres (1 hectare) to 74 acres (30 hectares)	<ul style="list-style-type: none"> • Red-eyed Vireo: most in 25-59 acre patches (10-24 hectares) • Downy Woodpecker: some in 2-10 acre patches (1-4 hectares), most in 25-59 acre patches (10-24 hectares) • Eastern Wood-peewee: 5 acres (2 hectares) or more; most in 25-59 acre patches (10-24 hectares) • White-breasted Nuthatch: some in 5-20 acre patches (2-8 hectares); more in 25-59 acre patches (10-24 hectares) • Ovenbird: started at 10 acres (4 hectares); most in 25-59 acre patches (10-24 hectares) • Hairy Woodpecker: some in 5-25 acre patches (2-10 hectares); most in 25-59 acre patches (10-24 hectares) • Black-capped Chickadee: some in 5-20 acre patches (2-8 hectares); most in 25-59 acre patches (10-24 hectares) • Yellow-breasted Chat: some in 10-59 acre patches (4-24 hectares); most in ≥ 59 acres (24 hectares) • Red-shouldered Hawk: 25-59 acre patches (10-24 hectares) 	<p>This study estimated probability of occurrence within patches of various sizes based on field data. The recommended areas shown here represent the size at which a given species is substantially more likely to occur.</p> <p>All of the species noted at left are insectivorous except Red-shouldered Hawk (carnivore).</p>
George & Brand 2002 [137]	Breeding bird study conducted in northern California redwood forests studying effects of fragmentation.	<ul style="list-style-type: none"> • These species appear to be area-sensitive: • Pileated woodpecker, Pacific-slope Flycatcher, Steller's Jay, Brown Creeper, Winter Wren, Varied Thrush 	These bird species are sensitive to fragmentation possibly due to changes in microclimate along forest edges or to increased nest predation and subsequent avoidance of forest edges

Reference	Location and context	Recommended minimum habitat area	Notes
Hawrot & Niemi 1996 [161]	Birds studied via transects over two years during June in northwest Wisconsin. Study examined potential impacts of different types of edge and patch shape on species.	<ul style="list-style-type: none"> Red-breasted Nuthatch, Hermit Thrush, Red-eyed Vireo and Ovenbird appear to be area-sensitive. No specific area recommendations. 	The types of (natural, not urban) edge matters and there may be differences in edge that appear subtle to the observer, yet make a big difference to bird species.
Hinsley et al. 1998 [176]	Review of European studies looking at woodland patch size, land cover, latitude and longitude in relation to breeding bird species in agricultural lands.	<ul style="list-style-type: none"> No specific area recommendations (patches were generally less than 49 acres, or 20 hectares). The number of species expected to breed decreased significantly with patch size decreases in several studies, revealing a linear relationship from 2-37 acres (1-15 hectares). 	Species richness declined with increasing latitude.
Kilgo, Miller & Smith 1999 [194]	Fall bird study conducted in South Carolina, examining forest practices. Study looked at created gaps within forests gap size 33-, 66-, and 131-foot (10-, 20-, and 40-meter) radius. Mist-netting study in bottomland hardwood forests.	<p>The following species were captured most often in the largest (131-foot radius, or about 5 acres; 40-meter radius, or about 2 hectares) gaps (in this case, gaps are patches):</p> <ul style="list-style-type: none"> Swainson's Thrush Yellow-breasted Chat Ruby-crowned Kinglet Hermit Thrush Eastern Towhee White-throated Sparrow 	Forest-dependent birds apparently shifted habitat preferences in fall to include forest gaps. (Lori's comment: newly emerging information suggests that migratory songbirds may have a life-history phase requirement for molting associated with migration, and that species' needs during this time may be entirely different from other life-history phases. Thus in this case, gap size represents "patch size.")
Mancke & Gavin 2000 [228]	This Pennsylvania study examined possible impacts of patch size and proximity to buildings on breeding bird communities in a forested area.	<ul style="list-style-type: none"> Forest interior species: Wood Thrush, Red-eyed Vireo Edge species: Common Yellowthroat, American Crow, American Robin, European Starling, Eastern Towhee, Song Sparrow, Red-winged Blackbird, Baltimore Oriole, House Finch, American Goldfinch, house Sparrow Species preferring few buildings or present only in moderately deep and deep woodlots when buildings are nearby: Downy Woodpecker, Rose-breasted Grosbeak, Song Sparrow Prefers no buildings nearby: Eastern Towhee 	Species-habitat relationships on page 606 of this article.
McIntyre 1995 [244]	Georgia study on the effects of landscape patchiness on the diversity of birds. Examined birds from January-April in small (<8 acre, or <3 hectare) vs (25-32 acre, or 10-13 hectare) forested patches set within a non-forested agricultural landscape. Compared these two patch size classes to control patches >32 acres (13 hectares).	<ul style="list-style-type: none"> Across seasons, of the two smaller size classes, the larger held an average of 52 species while the small held 39 species. Species associated with the 25-32 acre (10-13 hectare) patches and larger included Red-breasted Nuthatch, Brown Creeper, Hermit Thrush, Ruby-crowned Kinglet and Wood Thrush. Edge species include Cedar Waxwing, Dark-eyed Junco, Northern Rough-winged Swallow, Purple Martin and House Wren. 	The study revealed significant differences in diversity between large and small woodlots and between contiguous and fragmented landscapes, especially in terms of the numbers of edge and interior species and winter-resident, summer resident, and year-round birds observed.
Small & Hunter 1998 [340]	Artificial nest study during breeding season, forested habitats in Maine. Patch sizes ranged from 7-2,570 acres (3-1,040 hectares).	<ul style="list-style-type: none"> Predation rates were highest in small patches completely surrounded by land. Predation rates were lowest in large habitat areas with at least one side bordered by water. 	Results suggest an influx of predators from nearby habitats may be responsible for artificial nest predation in these fragments.
Weinberg & Roth 1998 [380]	Delaware Wood Thrush study on patch size. Mist-netting/banding study during May-August. "Control" patch was 37 acres (15 hectares).	<ul style="list-style-type: none"> Small patches with the same cumulative size produced many fewer young and fewer birds/ha. 	Helps address SLOSS (single large or several small patches) debate.

APPENDIX 3. LITERATURE RELATING TO SPECIES' GAP-CROSSING ABILITIES

Research suggesting gap distance (in feet and meters) that various wildlife species are willing to cross in wildlife movement corridors.

Reference	Species	Gap width (threshold distance), type	Notes
Desrochers and Hannon 2003 [92]	Quebec City, Canada Boreal forest and agricultural landscapes –	<ul style="list-style-type: none"> Birds were twice as likely to travel through 164 feet (50 meters) of woodland than through 164 feet (50 meters) of open habitat. Given choice of traveling through woodland or across a gap, most birds selected woodland routes, even when they were 3x longer than shortcuts in the open. However, species differed greatly in their response to gaps. 	Used chickadee mobbing calls to induce birds across forest gaps during post-fledging period.
Harris and Reed 2002 [159]	Red-breasted Nuthatch (<i>Sitta canadensis</i>)	<ul style="list-style-type: none"> 164 feet (50 meters) Clear cut, fields 	Summer-fall
Harris and Reed 2002 [159]	White-breasted Nuthatch (<i>Sitta carolinensis</i>)	<ul style="list-style-type: none"> 492 feet (150 meters) Clear cut, fields 	Fall-winter
Harris and Reed 2002 [159]	Downy Woodpecker (<i>Picoides pubescens</i>)	<ul style="list-style-type: none"> 525 feet (160 meters) Clear cut, fields 	Fall-winter
Harris and Reed 2002 [159]	Hairy Woodpecker (<i>Picoides villosus</i>)	<ul style="list-style-type: none"> 1312 feet (400 meters) Clear cut, fields 	Fall-winter
Harris and Reed 2002 [159]	Northern Flicker (<i>Colaptes auratus</i>)	<ul style="list-style-type: none"> 1969 feet (600 meters) Clear cut, fields 	Fall-winter
Harris and Reed 2002 [159]	Golden-crowned Kinglet (<i>Regulus satrapa</i>) (2 different studies)	<ul style="list-style-type: none"> 131 feet (40 meters) Trails, dirt roads, clearcuts 98 feet (30 meters) Fields, clearcuts 	Summer Summer-fall
Harris and Reed 2002 [159]	Swainson's Thrush (<i>Catharus ustulatus</i>)	<ul style="list-style-type: none"> 164 feet (50 meters) Trails, dirt roads, clearcuts 	Summer
Harris and Reed 2002 [159]	Yellow-rumped Warbler (<i>Dendroica coronate</i>)	<ul style="list-style-type: none"> 115-131 feet (35-40 meters) Trails, dirt roads, clearcuts 	Literature review
St. Claire et al. 1998 [346]	Black-capped chickadee (<i>Poecile atricapillus</i>) White-breasted Nuthatch (<i>Sitta carolinensis</i>) Hairy Woodpecker (<i>Picoides villosus</i>) Downy Woodpecker (<i>Picoides pubescens</i>)	<ul style="list-style-type: none"> 656 feet (200 meters) – all species unlikely to cross. Chickadees – 164 feet (50 meters), but if corridor more convoluted, more likely to cross (up to 656-foot, or 200-meter, gap). Nuthatch and woodpecker – much less likely to cross gaps or use narrow corridors; corridor width may be important to these species. 	Winter. Willingness to cross gaps of various distances when continuous forest along narrow corridors (fencerows) was present. Also looked at movement in forest patches.

APPENDIX 4. MODELS AND ASSESSMENT TECHNIQUES

Numerous models have been developed to identify core areas, landscape permeability and preferred movement corridors. Models often use variables such as forest canopy cover, edge, fragmentation metrics, land cover and land use, and road metrics. The U.S. Geological Survey offers descriptions of some GIS-based models and landscape analysis tools online at <http://rmgsc.cr.usgs.gov/latp/tools.shtml>. Beier and colleagues' corridor design web site offers downloadable corridor design tools for use with ArcCatalog software [28]. Some of the models seen in the literature, and their applied uses, are summarized in the table below.

Selected modeling methods used to identify core habitat areas, corridors and connectivity measures.

Reference	Model type / use	Setting	Model description
American Wildlands 2006 [8]	<ul style="list-style-type: none"> • HSI, cost surface, least cost paths 	Montana to Canada	Used habitat suitability, complexity, and weighted road density to develop cost surface layer. Selected core habitat areas and identified least cost paths between cores. Final connectivity model developed by connectivity surface and threshold modeling.
Austin, Viani and Hammond 2006 [17]	<ul style="list-style-type: none"> • GIS-based exercise augmented w/road-kill data • Focused on roads 	Vermont	Developed a centralized database of wildlife road mortality (bear, moose, deer, bobcat, amphibian, reptile), wildlife road crossing, and related habitat data for individual species for which data exists throughout the state of Vermont. Developed a relationship with VTran to gather the data. Developed a GIS-based Wildlife Linkage Habitat Analysis using landscape scale data to identify or predict the location of potentially significant Wildlife Linkage Habitats using (a) land use and land cover data; (b) development density data (E911 house sites); and (c) contiguous or "core" habitat data from the University of Vermont.
Beier et al. 2009 [28]	<ul style="list-style-type: none"> • Least cost path 	General	<p>The least cost path model is designed to identify the path between two points which has the lowest cost for wildlife to travel, where cost is a function of time, distance, or other user-defined factors. It is fairly widely used but has some drawbacks. Beier et al. see "no excuse for least cost paths instead of corridor swaths to define wildlife corridors," because such modeling exercises are raster-based, fail to consider matrix impacts, and are overly generalized and prone to classification errors. In addition, the "best" corridor identified through this method is not necessarily sufficient for focal species. They cite three useful tools to compare alternative linkage designs:</p> <ol style="list-style-type: none"> 1. Frequency distribution of habitat quality for each target species 2. A graph depicting intensity and length of bottlenecks 3. A list of the longest inter-patch distances that animals of each focal species would have to cross <p>Another researcher notes the same drawbacks regarding least cost modeling, but provides recommendations for "finding and filling the cracks" to enhance the methodology [320]. Cracks relate to thin but significant barriers, such as roads and railroad tracks, that aren't identified in raster-based analyses; these would be significant in any urban region. Another drawback she addresses is that least cost modeling can miss narrow but critical corridors, which are prevalent in the region.</p>
Brooker, Brooker and Cale 1999 [49]	<ul style="list-style-type: none"> • Dispersal simulation models 	Europe	Used a spatially explicit dispersal simulation to generate movement frequencies and distances for comparison with real dispersal frequencies collected in the field from two habitat-specific, sedentary bird species. The relationship between these two data sets allowed investigators to (1) test the hypothesis that the study species used corridor routes during dispersal; (2) measure the degree of reliance on corridor continuity; (3) estimate the rate of dispersal mortality with respect to distance traveled, and (4) give examples of how the model can be used to assess habitat connectivity with respect to similarly behaved species. Used two non-migratory bird species.

Reference	Model type / use	Setting	Model description
Clevenger et al. 2002 [73]	<ul style="list-style-type: none"> • Empirical habitat data • Best professional opinion • Literature-based 	Black bear movement corridors in Banff across Trans-Canada Highway	Compared three models developed using GIS to an independent data set, the latter which was used for validation. One model was based on empirical habitat data, one was professional opinion-based, and one was literature-based. The literature-based model performed best, while the opinion-based model least resembled the actual situation. Expert opinion seemed to over-rate importance of riparian corridors. There were some issues with season (pre-berry) that may have influenced results.
Csuti et al. 1997 [83]	<ul style="list-style-type: none"> • Comparison of reserve selection algorithms 	Oregon	Compared number of species represented and spatial pattern of reserve networks using five types of reserve selection algorithms on a set of vertebrate distribution data. Compared: richness-based heuristic algorithms (four variations), weighted rarity-based heuristic algorithms (two variations), progressive rarity-based heuristic algorithms (11 variations), simulated annealing, and a linear programming-based branch-and-bound algorithm. The latter method worked best.
Cushman, McKelvey and Schwartz 2008 [84]	<ul style="list-style-type: none"> • Landscape resistance mapping (empirical) • Least-cost path 	Yellowstone and Canadian border	Used a method that combines empirically derived landscape-resistance maps (from genetic studies) and least-cost path analysis between multiple source and destination locations. Identifying corridors and barriers for black bear movement between Yellowstone and Canadian border.
Dijak et al. 2007 [94]	<ul style="list-style-type: none"> • HSI software including habitat and spatial components 	General	Habitat suitability index (HSI) models are traditionally used to evaluate habitat quality for wildlife at a local scale. Rarely have such models incorporated spatial relationships of habitat components. We introduce Landscape HIS models, a new Microsoft Windows- (Microsoft, Redmond, WA)-based program that incorporates local habitat as well as landscape-scale attributes to evaluate habitats for 21 species of wildlife. Models for additional species can be constructed using the generic model option. At a landscape scale, attributes include edge effects, patch area, distance to resources, and habitat composition. A moving window approach is used to evaluate habitat composition and interspersions within areas typical of home ranges and territories or larger. The software and sample data are available free of charge from the United States Forest Service, Northern Research Station at http://www.nrs.fs.fed.us/hsi/ .
Forest Landscape Ecology Lab, UW-Madison 2009 [124]	<ul style="list-style-type: none"> • APACK • Calculates 25 landscape metrics, including connectivity • Runs on C++ 	General	APACK is an analysis package designed to meet these needs. It is a standalone program written in C++ that calculates landscape metrics on raster files. It runs on the Windows 95/98/NT/2000/XP platforms. Data formats supported include ERDAS GIS files and ASCII files. Output data consists of a text file and a spreadsheet readable file that can be further analyzed. APACK can calculate 25 metrics useful for determining landscape characteristics such as basic measures (e.g., area), information theoretic measures (e.g., diversity), shape measures (e.g., fractal dimension), textural measures (e.g., lacunarity), probabilistic measures (e.g., electivity), and structural measures (e.g., connectivity). In tests versus other commonly used analysis packages APACK was able to calculate upon larger maps and was significantly faster. This is in part due to APACK only calculating those metrics specified by the user. APACK fills the need for an analysis package that can easily and efficiently calculate landscape metrics from large raster maps.
Jantz and Goetz 2008 [184]	<ul style="list-style-type: none"> • Fragstats • ArcRstats • Least cost pathways 	Northeastern U.S.; multi-state.	Used geospatial data (roads, impervious surface, tree cover, protected areas, water features). Identified core areas by calculating road density in 250-m pixels, clustering similar pixels, setting a minimum core area size (2,000 ha). Calculated tree cover and removed anything <60%. Subsequently looked at ownership. Used Fragstats for core area metrics. Used ArcRstats, a graph theoretic approach (can identify more than one potential corridor), to identify least cost paths between habitat patches from which network connectivity metrics were calculated.
Majka et al. 2007 [226]	<ul style="list-style-type: none"> • HSI • ArcCatalog set of tools 	General	The CorridorDesigner toolbox aids the user in 1) creating habitat suitability models & identifying potential habitat patches, 2) creating corridor models, and 3) transforming a DEM into a topographic slope position raster. The CorridorDesigner toolbox currently only works within ArcCatalog, not ArcMap, and requires all data to be in the same meters (UTM) projection.

Reference	Model type / use	Setting	Model description
McRae and Beier 2007 [246]	<ul style="list-style-type: none"> • Circuit theory 	General	Circuit theory is a recent approach that borrows from electronic circuit theory to predict gene flow across complex landscapes. Incorporates potential effects of multiple pathways linking focal species' populations. "When applied to data from threatened mammal and tree species," state the authors, "the model consistently outperformed conventional gene flow models, revealing that barriers were less important in structuring populations than previously thought. Circuit theory now provides the best-justified method to bridge landscape and genetic data, and holds much promise in ecology, evolution, and conservation planning."
Miller et al. 2009 [254]	<ul style="list-style-type: none"> • Optimization modeling framework 	Chicago area	Used an optimization modeling framework to devise spatially explicit habitat acquisition and restoration strategies for 19 remnant-dependent focal species (butterflies). This is a modeling approach that seeks the "best" or optimum solution - the process of making something as good or as effective as possible with given resources and constraints. Considered minimum patch size to support population, suitable undeveloped properties contiguous to prospective sites, and parcels in surrounding landscape that could provide additional habitat if restored. Assumed conservation value increased when near protected sites. Made assumptions about gap distance.
Minnesota Department of Natural Resources 2003 [259]	<ul style="list-style-type: none"> • GIS models 	Minnesota	Four sets of models (forests, grasslands, wetlands/lakes, river corridors) were developed to map significant habitat. Literature reviews and expert opinion were used to select native animals that could serve as indicators of significant habitats. Describes general methodologies, including criteria and focal species, for each model.
Thorne et al. 2009 [358]	<ul style="list-style-type: none"> • MARXAN (reserve selection algorithm) 	California	Compared integration of regional conservation designs, termed greenprints, with early multi-project mitigation assessment for two areas in CA. Used reserve-selection algorithm MARXAN to identify greenprint for each site and seek mitigation solutions through parcel acquisition that would contribute to the greenprint and meet agency obligations.
U.S. Fish and Wildlife Service 1980 [363] Beier et al. 2009 [28]	<ul style="list-style-type: none"> • Habitat Suitability Indices (HSI) 	General	Identifying core habitat areas requires habitat assessment in relation to species of interest. Habitat suitability models are tools for predicting the suitability of habitat for a given species based on known affinities with environmental parameters. One such model is the Habitat Suitability Index (HSI), which involves identifying, weighting and scoring key environmental factors. Habitat suitability models are most commonly based on literature review and expert opinion [28;363], and this is the method preferred by Beier et al. [28]. Scientific literature-based models have drawbacks such as varying geographic areas, but they do not require collecting field data and they make use of the work of previous scientists. For these reasons they are inexpensive and efficient.
U.S. Geological Survey 2009 [366]	<ul style="list-style-type: none"> • Species distribution software 	Landscape Analysis Tools - USGS web site	DesktopGarp is a software package for biodiversity and ecologic research that allows the user to predict and analyze wild species distributions. Includes a GIS extension, "Boundary U-test Extension," that aids in analyses of boundaries and edges in ecology.
Walker and Craighead 1997 [376]	<ul style="list-style-type: none"> • ARC/GRID • Gap Analysis data • Least cost path 	Northern Rockies	Delineated landscape routes offering the best chance of success for wildlife moving among the three large core protected areas. Using ARC/GRID and Montana Gap Analysis data, derived habitat suitability models for three umbrella species, then combined with road density information to create kilometer-scale cost surfaces of movement. For each of the three species (grizzly bear, elk, cougar) performed a least.cost.path analysis to locate broad potential corridor routes. From this first approximation, identified probable movement routes and as well as critical barriers, bottlenecks, and filters where corridor routes intersected with high-risk habitat. This analysis is being used to identify priority areas for wildlife management to improve the connectivity between the core protected ecosystems in the Northern Rockies.
Williams and Snyder 2005 [387]	<ul style="list-style-type: none"> • Shortest-path optimization • Nearest-neighbor rules • Restoration prioritization 	General	Identifies where restoration should take place to efficiently reconnect habitat with a landscape-spanning corridor. Building upon findings in percolation theory, uses shortest-path optimization methodology for assessing the minimum amount of restoration needed to establish corridors. This methodology is applied to large numbers of simulated fragmented landscapes to generate mean and variance statistics for the amount of restoration needed. Provides information about the expected level of resources needed to realize different corridor configurations under different degrees of fragmentation and different characterizations of habitat connectivity ("neighbor rules").

Reference	Model type / use	Setting	Model description
Woess et al. 2002 [391]	<ul style="list-style-type: none"> • Landscape resistance model • Large mammals • Focuses on roads 	Austria	Modeling connectivity for large mammals and carnivores. Examines road network permeability. An interdisciplinary project in Austria, titled Wildlife corridors, examined the applicability of remote sensing methods and terrestrial surveys to identify corridor structures at different landscape scales. With the collected data and information from aerial / satellite images and terrestrial surveys a resistance model for the investigation area and the indicator species red deer and wild boar could be developed. The most probable migration route between the floodplains of the Danube and the floodplains of the Leitha was detected. Both projects reveal explicit measurements of resource management, which ensure genetic exchange on the long term.

APPENDIX 5. VERTEBRATE SPECIES KNOWN TO USE REGION HABITATS AT LEAST ONCE EVERY YEAR.

Purpose and limitations

The purpose of Metro's species list is threefold:

1. To identify fish and wildlife species that occur in the Metro region.
2. To identify the relative importance of various types of habitat to fish and wildlife species.
3. To provide a biologically meaningful way in which to describe the biodiversity of the Metro region.

THE LIST IS NOT A STATEMENT OF POLICY. In keeping with Metro's Streamside CPR Vision Statement, the focus of the list is on native fish and wildlife species whose historic ranges include the metropolitan area and whose habitats are or can be provided for in urban habitats. Urban habitats may never be conducive to significant populations of some species, such as black bear and cougar. Further analysis and Metro Council deliberation will help determine (to the extent possible) the type, amount, and location of fish and wildlife habitats that should be protected and/or restored. For example, landowner incentives will be developed for conservation purposes.

This list contains:

- All known native vertebrate species that currently exist within the Metro region (the final version will include a map of area involved) for at least a portion of the year and could be found in the region through diligent search by a knowledgeable person. Vagrant species (those that do not typically occur every year) are not included on this list.
- Extirpated (locally extinct) native vertebrate species known to have inhabited the region in the past.
- Nonnative vertebrate species with established breeding populations in the region.

The species list is based on the opinion of more than two dozen local wildlife experts. The Oregon Natural Heritage Program (ORNHP), Endangered Species Act (ESA), and Oregon Department of Fish and Wildlife (ODFW) status categories were obtained from ORNHP's February, 2001 *Rare, Threatened and Endangered Plants and Animals of Oregon* publication. Habitat associations were obtained from Johnson and O'Neil's new book, *Wildlife Habitats and Relationships in Oregon and Washington*. The taxonomic standards for common and scientific names for birds is based on the American Ornithological Union Check-list. We are also developing a separate aquatic and terrestrial invertebrate list, but this will not be as comprehensive in scope as the vertebrate species list.

Key to notations

- Indicates species that are **non-native** (also known as alien or introduced) to Metro region.
- () Indicates a species that was **historically present but was extirpated** from the Metro region within approximately the last century.

Code (type of animal)

- A = Amphibians
- B = Birds
- F = Fish
- M = Mammals
- R = Reptiles

Migratory Status (indicates trend for the majority of a given species in the Metro region):

- A** = Anadromous (fish; lives in the ocean, spawns in fresh water)
- C** = Catadromous (fish; lives in fresh water, spawns in the ocean)
- M** = Migrates through area without stopping for long time periods

N = Neotropical migratory species (birds; majority of individuals breeding in the Metro region migrate south of U.S./Mexico border for winter)
R = Permanent resident (lives in the area year-round)
S = Short-distance migrant (from elevational to regional migration, e.g., across several states)
W = Winters in the Metro region

Federal Status is based on current Endangered Species Act listings. **E** = Endangered, **T** = Threatened. Endangered taxa are those which are in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range. Threatened taxa are those likely to become endangered within the foreseeable future.

LE = Listed Endangered. Taxa listed by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) as Endangered under the Endangered Species Act (ESA), or by the Departments of Agriculture (ODA) and Fish and Wildlife (ODFW) of the state of Oregon under the Endangered Species Act of 1987 (OESA).

LT = Listed Threatened. Taxa listed by the USFWS, NMFS, ODA, or ODFW as Threatened.

PE = Proposed Endangered. Taxa proposed by the USFWS or NMFS to be listed as Endangered under the ESA or by ODFW or ODA under the OESA.

PT = Proposed Threatened. Taxa proposed by the USFWS or NMFS to be listed as Threatened under the ESA or by ODFW or ODA under the OESA.

C = Candidate taxa for which NMFS or USFWS have sufficient information to support a proposal to list under the ESA, or which is a candidate for listing by the ODA under the OESA.

SoC = Species of Concern. Former C2 candidates which need additional information in order to propose as Threatened or Endangered under the ESA. These are species which USFWS is reviewing for consideration as Candidates for listing under the ESA.

ODFW Status (state status) is based on current Oregon Department of Fish and Wildlife "Oregon Sensitive Species List," 2001. See Federal Status (above) for definitions of LT and LE.

SC (Critical) = Species for which listing as threatened or endangered is pending; or those for which listing as threatened or endangered may be appropriate if immediate conservation actions are not taken. Also considered critical are some peripheral species which are at risk throughout their range, and some disjunct populations.

SV (Vulnerable) = Species for which listing as threatened or endangered is not believed to be imminent and can be avoided through continued or expanded use of adequate protective measures and monitoring. In some cases the population is sustainable, and protective measures are being implemented; in others, the population may be declining and improved protective measures are needed to maintain sustainable populations over time.

SP (Peripheral or Naturally Rare) = Peripheral species refer to those whose Oregon populations are on the edge of their range. Naturally rare species are those which had low population numbers historically in Oregon because of naturally limiting factors. Maintaining the status quo for the habitats and populations of these species is a minimum requirement. Disjunct populations of several species which occur in Oregon should not be confused with peripheral.

SU (Undetermined Status): Animals in this category are species for which status is unclear. They may be susceptible to population decline of sufficient magnitude that they could qualify for endangered, threatened, critical or vulnerable status, but scientific study will be required before a judgment can be made.

ORNHP Rank (ABI – Natural Heritage Network Ranks): ORNHP participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is maintained by The Association for Biodiversity Information (ABI) in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, 4 Canadian provinces, and 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied and other biological factors. On Metro's Species List the first ranking (**rank/rank**) is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this ranking indicates the taxon has taxonomic questions. The second ranking (**rank/rank**) is the State Rank and begins with the letter "S". The ranks are summarized below.

- 1** = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences
- 2** = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences
- 3** = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences
- 4** = Not rare and apparently secure, but with cause for long-term concern, usually more than 100 occurrences
- 5** = Demonstrably widespread, abundant and secure
- H** = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered
- X** = Presumed extirpated or extinct
- U** = Unknown rank
- ?** = Not yet ranked, or assigned rank is uncertain

ORNHP List is based on Oregon Natural Heritage Program data.

List 1 contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range.

List 2 contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. They can be very significant when protecting the genetic diversity of a taxon. ORNHP regards extreme rarity as a significant threat and has included species which are very rare in Oregon on this list.

List 3 contains species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.

List 4 contains taxa which are of conservation concern but are not currently threatened or endangered. This includes taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat but are still too common to be proposed as threatened or endangered. While these taxa currently may not need the same active management attention as threatened or endangered taxa, they do require continued monitoring.

Riparian Association indicates use of any of the 4 water-based habitats. Single "X" in any habitat type (upland or water-associated) indicates general association; "XX" indicates close association, as per Johnson and O'Neil 2001.

Habitat Types based on Johnson and O'Neil (2001). These habitats are described more fully within the text of the upland and riparian chapters.

- WLCH** = Westside Lowlands Conifer-Hardwood Forest
- WODF** = Westside Oak and Dry Douglas-fir Forest and Woodlands
- WEGR** = Westside Grasslands
- AGPA** = Agriculture, Pasture and Mixed Environs
- URBN** = Urban and Mixed Environs
- WATR** = Open Water – Lakes, Rivers, Streams
- HWET** = Herbaceous Wetlands
- RWET** = Westside Riparian-Wetlands

Appendix 5. Species list and habitat associations for species normally occurring within the Metro region. Study area is the Metro jurisdictional boundary plus 1 mile buffer.

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
F	River Lamprey	<i>Lampetra ayresi</i>	A	SoC	None	G4/S4	4	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Western Brook Lamprey	<i>Lampetra richardsoni</i>	A	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Pacific Lamprey	<i>Lampetra tridentata</i>	A	SoC	SV	G5/S3	2	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	White Sturgeon	<i>Acipenser transmontanus</i>	A	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	American Shad*	<i>Alosa sapidissima</i>	A	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chiselmouth	<i>Acrocheilus alutaceus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Goldfish*	<i>Carassius auratus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Common Carp*	<i>Cyprinus carpio</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Peamouth Chub	<i>Mylocheilus caurinus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
(F)	(Oregon Chub - extirpated from Metro area)	<i>Oregonichthys crameri</i>	R	LE	SC	G2/S2	1	(XX)	(XX)	(XX)	N/A	N/A	N/A	N/A	N/A	N/A
F	Northern Pikeminnow (Squawfish)	<i>Ptychocheilus oregonensis</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Longnose Dace	<i>Rhynchichthys cataractae</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Leopard Dace	<i>Rhynchichthys falcatus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Speckled Dace	<i>Rhynchichthys osculus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Redside Shiner	<i>Richardsonius balteatus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Largescale Sucker	<i>Catostomus macrocheilus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Brown Bullhead*	<i>Ameiurus nebulosus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	N/A	N/A	N/A	N/A	N/A	N/A
F	Eulachon (Columbia River Smelt)	<i>Thaleichthys pacificus</i>	A	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Coastal Cutthroat Trout, SW WA/Col. R. ESU	<i>Oncorhynchus clarki clarki</i>	A	PT	SC	G4T2Q/S2	2	XX	XX	X	N/A	N/A	N/A	N/A	N/A	N/A
F	Coastal Cutthroat Trout, Upper Will. R. ESU	<i>Oncorhynchus clarki clarki</i>	A	SoC	None	G4T?Q/S3?	4	XX	XX	X	N/A	N/A	N/A	N/A	N/A	N/A
F	Chum Salmon, Columbia River ESU	<i>Oncorhynchus keta</i>	A	LT	SC	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Coho Salmon, Oregon Coast ESU	<i>Oncorhynchus kisutch</i>	A	LT	SC	G4T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Coho Salmon, Lower Columbia R./Southwest Washington ESU	<i>Oncorhynchus kisutch</i>	A	C	LE	G4T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Rainbow Trout (resident populations)	<i>Oncorhynchus mykiss</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead (anadromous Rainbow Trout), Oregon Coast ESU	<i>Oncorhynchus mykiss</i>	A	C	SV	G5T2T3Q/S2S3	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead, Lower Columbia River ESU	<i>Oncorhynchus mykiss</i>	A	LT	SC	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead, Upper Willamette River ESU, winter run	<i>Oncorhynchus mykiss</i>	A	LT	SC	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead, Middle Columbia River ESU	<i>Oncorhynchus mykiss</i>	A	LT	SC/SV	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead, Snake River Basin ESU	<i>Oncorhynchus mykiss</i>	A	LT	SV	G5T2T3Q/S2S3	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Steelhead, Upper Columbia River ESU	<i>Oncorhynchus mykiss</i>	A	LE	None	G5T2Q/SU	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Sockeye Salmon, Snake River ESU	<i>Oncorhynchus nerka</i>	A	LE	None	G5T1Q/SX	1 - ex	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chinook Salmon, Lower Columbia R. ESU	<i>Oncorhynchus tshawytscha</i>	A	LT	SC	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chinook Salmon, Upper Will. R spring run	<i>Oncorhynchus tshawytscha</i>	A	LT	None	G5T2Q/S2	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chinook Salmon, Snake River Fall-run ESU	<i>Oncorhynchus tshawytscha</i>	A	LT	LT	G5T1Q/S1	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chinook Salmon, Snake River Spr/Sum.run	<i>Oncorhynchus tshawytscha</i>	A	LT	LT	G5T1Q/S1	1	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Chinook Salmon, Upper Col. R. Spring-run	<i>Oncorhynchus tshawytscha</i>	A	LE	None	G5T1Q/SU	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Mountain Whitefish	<i>Prosopium williamsoni</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Sand Roller	<i>Percopsis transmontanus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Mosquitofish*	<i>Gambusia affinis</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	N/A	N/A	N/A	N/A	N/A	N/A
F	Three-spined Stickleback	<i>Gasterosteus aculeatus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
F	Prickly Sculpin	<i>Cottus asper</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Reticulate Sculpin	<i>Cottus perplexus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Green Sunfish*	<i>Lepomis cyanellus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Pumpkinseed Sunfish*	<i>Lepomis gibbosus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Warmouth*	<i>Lepomis gulosus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Bluegill*	<i>Lepomis macrochirus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Smallmouth Bass*	<i>Micropterus dolomieu</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Largemouth Bass*	<i>Micropterus salmoides</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	X	N/A	N/A	N/A	N/A	N/A	N/A
F*	White Crappie*	<i>Pomoxis annularis</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Black Crappie*	<i>Pomoxis nigromaculatus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F*	Yellow Perch*	<i>Perca flavescens</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	X	N/A	N/A	N/A	N/A	N/A	N/A
F*	Walleye*	<i>Stizostedion vitreum vitreum</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
F	Starry Flounder	<i>Platichthys stellatus</i>	R	None	None	None	None	XX	XX	?	N/A	N/A	N/A	N/A	N/A	N/A
A	Northwestern Salamander	<i>Ambystoma gracile</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
A	Long-toed Salamander	<i>Ambystoma macrodactylum</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
A	Pacific Giant Salamander	<i>Dicamptodon tenebrosus</i>	R	None	None	None	None	XX			XX	X	X	X		X
A	Cope's Giant Salamander	<i>Dicamptodon copei</i>	R	None	SU	G3/S2	2	XX	X		XX	X				
A	Columbia Torrent Salamander	<i>Rhyacotriton kezeri</i>	R	None	SC	G3/S3	2	XX			XX	X				
A	Cascade Torrent Salamander	<i>Rhyacotriton cascadae</i>	R	None	SV	G3/S3	2	XX			XX	X				
A	Rough-skinned Newt	<i>Taricha granulosa</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
A	Dunn's Salamander	<i>Plethodon dunni</i>	R	None	None	None	None	X			X	X	X			X
A	Western Red-backed Salamander	<i>Plethodon vehiculum</i>	R	None	None	None	None	X			X	X	X			X
A	Ensatina	<i>Ensatina eschscholtzii</i>	R	None	None	None	None	X			X	XX	X	X	X	X
A	Clouded Salamander	<i>Aneides ferreus</i>	R	None	SU	G3/S3	3					X	X		X	X
A	Oregon Slender Salamander	<i>Batrachoseps wrighti</i>	R	SoC	SU	G4/S3	1	X			X	X				
A	Western Toad	<i>Bufo boreas</i>	R	None	SV	G4/S4	4	XX	XX	XX	XX	X	X	X	X	X
A	Tailed Frog	<i>Ascaphus truei</i>	R	SoC	SV	G4/S3	2	XX			XX	X				
A	Pacific Chorus Frog (tree frog)	<i>Hyla regilla</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
A	Northern Red-legged Frog	<i>Rana aurora aurora</i>	R	SoC	SV/SU	G4T4/S3	2	XX	XX	XX	XX	XX	X	X	X	X
(A)	(Oregon Spotted Frog - extirpated)	<i>Rana pretiosa</i>	R	C	SC	G2G3/S2	1	(XX)	(XX)	(XX)	(XX)	(X)	(X)	(X)	(X)	
A*	Bullfrog*	<i>Rana catesbeiana</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	XX	X	X	X	X	X
R*	Common Snapping Turtle*	<i>Chelydra serpentina</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	X				X	X
R	Painted Turtle	<i>Chrysemys picta</i>	R	None	SC	G5/S2	2	XX	XX	XX	X		X		X	X
R	Northwestern Pond Turtle	<i>Clemmys marmorata marmorata</i>	R	SoC	SC	G3T3/S2	1	XX	XX	XX	XX	X	XX	X	X	X
R*	Red-eared Slider*	<i>Trachemys scripta elegans</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	X				X	X
R	Northern Alligator Lizard	<i>Elgaria coerulea</i>	R	None	None	None	None	X			X	X	X	X		X
R	Southern Alligator Lizard	<i>Elgaria multicarinata</i>	R	None	None	None	None	X			X	X	X	X	X	X
R	Western Fence Lizard	<i>Sceloporus occidentalis</i>	R	None	None	None	None					X	X	X	X	X
R	Western Skink	<i>Eumeces skiltonianus</i>	R	None	None	None	None					X	X	X	X	X
R	Rubber Boa	<i>Charina bottae</i>	R	None	None	None	None	X			X	X		X	X	X
R	Racer	<i>Coluber constrictor</i>	R	None	None	None	None						X	X	X	X
R	Sharptail Snake	<i>Contia tenuis</i>	R	None	SV	G5/S3	4	X			X	X	X	X	X	X
R	Ringneck Snake	<i>Diadophis punctatus</i>	R	None	None	None	None	X			X	X	X	X	X	X

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
R	Gopher Snake	<i>Pituophis catenifer</i>	R	None	None	None	None					X	X	X	X	
R	Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>	R	None	None	None	None	X		X	X		X	X	X	X
R	Northwestern Garter Snake	<i>Thamnophis ordinoides</i>	R	None	None	None	None	X			X	X	X	X	X	X
R	Common Garter Snake	<i>Thamnophis sirtalis</i>	R	None	None	None	None	XX		XX	XX	X	X	X	X	X
B	Red-throated Loon	<i>Gavia stellata</i>	W / M	None	None	None	None	XX			XX					
B	Pacific Loon	<i>Gavia pacifica</i>	W / M	None	None	None	None	XX			XX					
B	Common Loon	<i>Gavia immer</i>	W / M	None	None	None	None	XX	X	XX						
B	Pied-billed Grebe	<i>Podilymbus podiceps</i>	S / N	None	None	None	None	XX	X	XX	X					
B	Horned Grebe	<i>Podiceps auritus</i>	W / M	None	SP	G5/S2B, S5N	2	XX	XX	XX						
B	Eared Grebe	<i>Podiceps nigricollis</i>	W	None	None	None	None	XX	XX	XX						
B	Western Grebe	<i>Aechmophorus occidentalis</i>	W	None	None	None	None	XX	XX	XX						
B	Clark's Grebe	<i>Aechmophorus clarkii</i>	W / M	None	None	None	None	XX	XX	XX						
B	Doubled-crested Cormorant	<i>Phalacrocorax auritus</i>	R / S	None	None	None	None	XX	XX	X	X					X
B	American Bittern	<i>Botaurus lentiginosus</i>	S / N	None	None	None	None	XX		XX					X	
B	Great Blue Heron	<i>Ardea herodias</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	XX	X
B	Great Egret	<i>Ardea alba</i>	W / M	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
B	Green Heron	<i>Butorides virescens</i>	N / S	None	None	None	None	XX	X	XX	XX					
B	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	S	None	None	None	None	XX	XX	XX	X					
(B)	(California Condor - extirpated)	<i>(Gymnogyps californianus)</i>	R	LE	None	G1SX	1-ex	(X)			(X)			(X)		
B	Turkey Vulture	<i>Cathartes aura</i>	N	None	None	None	None	X		X	X	X	X	X	X	X
B	Greater White-fronted Goose	<i>Anser albifrons</i>	W / M	None	None	None	None	XX	XX	XX					XX	
B	Snow Goose	<i>Chen caerulescens</i>	W / M	None	None	None	None	XX	XX	XX					XX	
B	Ross's Goose	<i>Chen rossii</i>	W / M	None	None	None	None	XX	XX	XX					XX	
B	Canada Goose	<i>Branta canadensis</i>	VARIABLE	None	None	None	None	XX	XX	XX	X				XX	
B	Dusky Canada Goose	<i>Branta canadensis occidentalis</i>	W / M	None	None	G5T2T3/ S2N	4	XX	XX	XX	X				XX	
B	Aleutian Canada Goose (wintering)	<i>Branta canadensis leucopareia</i>	W / M	LT	LE	G5T3/S2N	1	XX	XX	XX	X				XX	
B	Trumpeter Swan	<i>Cygnus buccinator</i>	W / M	None	None	None	None	XX	XX	XX					XX	
B	Tundra Swan	<i>Cygnus columbianus</i>	W / M	None	None	None	None	XX	XX	XX					XX	
B	Wood Duck	<i>Aix sponsa</i>	S	None	None	None	None	XX	XX	X	XX	X			X	
B	Gadwall	<i>Anas strepera</i>	W / M	None	None	None	None	XX	XX	XX				X	X	
B	Mallard	<i>Anas platyrhynchos</i>	R	None	None	None	None	XX	X	XX	XX				X	X
B	Eurasian Wigeon	<i>Anas penelope</i>	W / M	None	None	None	None	XX	XX	X					X	
B	American Wigeon	<i>Anas americana</i>	W / M	None	None	None	None	XX	X	XX	X				XX	
B	Blue-winged Teal	<i>Anas discors</i>	W / M	None	None	None	None	XX	X	XX				X	XX	
B	Cinnamon Teal	<i>Anas cyanoptera</i>	N	None	None	None	None	XX	X	XX				X	XX	
B	Northern Shoveler	<i>Anas clypeata</i>	W / M	None	None	None	None	XX	XX	XX				X	X	
B	Northern Pintail	<i>Anas acuta</i>	W / M	None	None	None	None	XX	XX	XX					X	
B	Green-winged Teal	<i>Anas crecca</i>	S	None	None	None	None	XX	X	XX	X			X	X	
B	Canvasback	<i>Aythya valisineria</i>	W / M	None	None	None	None	XX	XX	XX						
B	Redhead	<i>Aythya americana</i>	W / M	None	None	None	None	XX	XX	XX						
B	Ring-necked Duck	<i>Aythya collaris</i>	W / M	None	None	None	None	XX	X	X	XX					
B	Greater Scaup	<i>Aythya marila</i>	W / M	None	None	None	None	XX	XX							
B	Lesser Scaup	<i>Aythya affinis</i>	W / M	None	None	None	None	XX	XX	XX						

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
B	Surf Scoter	<i>Melanitta perspicillata</i>	W / M	None	None	None	None	X	X							
B	Harlequin Duck	<i>Histrionicus histrionicus</i>	W / M	SoC	SU	G4/S2B, S3N	2	XX	XX		XX					
B	Bufflehead	<i>Bucephala albeola</i>	W / M	None	SU	G5/S2B,S5N	4	XX	XX	XX	X					
B	Common Goldeneye	<i>Bucephala clangula</i>	M	None	None	None	None	XX	XX	X						
B	Barrow's Goldeneye	<i>Bucephala islandica</i>	W / M	None	SU	G5/S3B,S3N	4	XX	XX	X						
B	Hooded Merganser	<i>Lophodytes cucullatus</i>	W / M	None	None	None	None	XX	XX	X	XX	XX				
B	Common Merganser	<i>Mergus merganser</i>	W / M	None	None	None	None	XX	XX		XX	XX				
B	Red-breasted Merganser	<i>Mergus serrator</i>	W / M	None	None	None	None	X	X							
B	Ruddy Duck	<i>Oxyura jamaicensis</i>	W / M	None	None	None	None	XX	XX	XX						
B	Osprey	<i>Pandion haliaetus</i>	N	None	None	None	None	XX	XX		X	X	X		X	X
B	White-tailed Kite (appears to be undergoing range expansion)	<i>Elanus leucurus</i>	W / M	None	None	G5/S1B, S3N	2	X			X	X		X	XX	
B	Bald Eagle ^a	<i>Haliaeetus leucocephalus</i>	S	LT ^a	LT	G4/S3B, S4N	2	XX	XX	X	X	X	X	X	X	X
B	Northern Harrier	<i>Circus cyaneus</i>	N	None	None	None	None	X		X	X			X	X	X
B	Sharp-shinned Hawk	<i>Accipiter striatus</i>	N	None	None	None	None	X		X		X	X	X	X	X
B	Cooper's Hawk	<i>Accipiter cooperii</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
B	Northern Goshawk	<i>Accipiter gentilis</i>	W / M	SoC	SC	G5/S3	2	X		X	X	X	X			
B	Red-shouldered Hawk (appears to be undergoing range expansion)	<i>Buteo lineatus</i>	?	None	None	None	None	X			X	X			X	
B	Red-tailed Hawk	<i>Buteo jamaicensis</i>	S / N	None	None	None	None	X		X	X	X	X	X	XX	X
B	Rough-legged Hawk	<i>Buteo lagopus</i>	W / M	None	None	None	None	X		X	X	X	X	X	X	X
B	American Kestrel	<i>Falco sparverius</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
B	Merlin	<i>Falco columbarius</i>	W / M	None	None	G5/S1B	2	X	X	X	X	X	X	X	X	X
B	American Peregrine Falcon	<i>Falco peregrinus anatum</i>	N	None	LE	G4T3/S1B	2	X	X	X	X	X	X	X	X	X
B*	Ring-necked Pheasant*	<i>Phasianus colchicus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	X		X	X	X	X	XX	XX	X
B	Ruffed Grouse	<i>Bonasa umbellus</i>	R	None	None	None	None	XX			XX	XX	X		X	
B	Blue Grouse	<i>Dendragapus obscurus</i>	R	None	None	None	None	X			X	XX	X			
B*	Wild Turkey*	<i>Meleagris gallopavo</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	X			X	X	X	X	X	X
(B)	(Mountain Quail - extirpated)	<i>Oreortyx pictus</i>	R / S	SoC	SU	G5/S4?	4	(X)			(X)	(X)	(X)		(X)	(X)
B	California Quail	<i>Callipepla californica</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
B	Virginia Rail	<i>Rallus limicola</i>	R / S	None	None	None	None	XX		XX					X	
B	Sora	<i>Porzana carolina</i>	S / N	None	None	None	None	XX		XX					X	
B	American Coot	<i>Fulica americana</i>	R / S	None	None	None	None	XX	XX	XX					X	X
B	Lesser Sandhill Crane	<i>Grus canadensis</i>	W / M	None	None	None	None	XX		XX					XX	
B	Black-bellied Plover	<i>Pluvialis squatarola</i>	M	None	None	None	None	X	X						XX	
B	American Golden-plover	<i>Pluvialis dominica</i>	W / M	None	None	None	None	X	X						XX	
B	Semipalmated Plover	<i>Charadrius semipalmatus</i>	M	None	None	None	None	XX	XX						X	
B	Killdeer	<i>Charadrius vociferus</i>	S / N	None	None	None	None	X		X	X	X	X	X	XX	X
B	Greater Yellowlegs	<i>Tringa melanoleuca</i>	W / M	None	None	None	None	XX	XX	XX	X			X	X	
B	Lesser Yellowlegs	<i>Tringa flavipes</i>	W / M	None	None	None	None	XX	XX	XX	X			X	X	
B	Solitary Sandpiper	<i>Tringa solitaria</i>	W / M	None	None	None	None	XX	XX	XX	XX			X	X	
B	Spotted Sandpiper	<i>Actitis macularia</i>	N	None	None	None	None	XX	X	X	XX				X	
B	Semipalmated Sandpiper	<i>Calidris pusilla</i>	W / M	None	None	None	None	XX	XX							

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									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN	
B	Western Sandpiper	<i>Calidris mauri</i>	W / M	None	None	None	None	XX	XX	XX					X		
B	Least Sandpiper	<i>Calidris minutilla</i>	W / M	None	None	None	None	XX	X	XX					X		
B	Baird's Sandpiper	<i>Calidris bairdii</i>	W / M	None	None	None	None	XX	X	XX					X		
B	Pectoral Sandpiper	<i>Calidris melanotos</i>	W / M	None	None	None	None	XX	X	XX					X		
B	Dunlin	<i>Calidris alpina</i>	W / M	None	None	None	None	XX	XX	XX					XX		
B	Short-billed Dowitcher	<i>Limnodromus griseus</i>	W / M	None	None	None	None	X		X					X		
B	Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	W / M	None	None	None	None	XX	X	XX					XX		
B	Common Snipe	<i>Gallinago gallinago</i>	S / N	None	None	None	None	XX		XX				X	XX		
B	Wilson's Phalarope	<i>Phalaropus tricolor</i>	W / M	None	None	None	None	XX	X	X							
B	Red-necked Phalarope	<i>Phalaropus lobatus</i>	W / M	None	None	None	None	X	X								
B	Bonaparte's Gull	<i>Larus philadelphia</i>	M / W	None	None	None	None	XX	X						X	X	
B	Mew Gull	<i>Larus canus</i>	W / M	None	None	None	None	XX	XX						X	X	
B	Ring-billed Gull	<i>Larus delawarensis</i>	W / M	None	None	None	None	XX	XX	X					X	X	
B	California Gull	<i>Larus californicus</i>	S	None	None	None	None	XX	XX	X					X	X	
B	Herring Gull	<i>Larus argentatus</i>	W / M	None	None	None	None	XX	XX	X					X	X	
B	Thayer's Gull	<i>Larus thayeri</i>	W / M	None	None	None	None	XX	XX	X					X	X	
B	Western Gull	<i>Larus occidentalis</i>	R / S	None	None	None	None	X	X							XX	
B	Glaucous Gull	<i>Larus hyperboreus</i>	W / M	None	None	None	None	XX	XX	X						X	
B	Glaucous-winged Gull	<i>Larus glaucescens</i>	W / M	None	None	None	None	XX	X							XX	
B	Caspian Tern	<i>Sterna caspia</i>	N	None	None	None	None	XX	XX	XX							
B	Forster's Tern	<i>Sterna forsteri</i>	M	None	None	None	None	XX	XX	XX							
B	Common Tern	<i>Sterna hirundo</i>	W / M	None	None	None	None	X	X								
B*	Rock Dove*	<i>Columba livia</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien								X	XX	XX
B	Band-tailed Pigeon	<i>Columba fasciata</i>	S	SoC	None	G5/S4	4	XX			XX	XX	XX		X	X	
B	Mourning Dove	<i>Zenaidura macroura</i>	S	None	None	None	None	XX			XX	X	X	X	XX	X	
B	Barn Owl	<i>Tyto alba</i>	R / S	None	None	None	None	X		X	X		X	X	XX	X	
B	Western Screech-Owl	<i>Otus kennicottii</i>	R	None	None	None	None	X		X	X	X	X		X	X	
B	Great Horned Owl	<i>Bubo virginianus</i>	R	None	None	None	None	X		X	X	X	X	X	X	X	
B	Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	R	None	SC	G5/S4?	4	X		X	X	XX	X		X	X	
(B)	(Northern Spotted Owl - extirpated from Metro region)	<i>(Strix occidentalis caurina)</i>	(S)	LT	LT	G3T3S3	1					(XX)	(X)				
B	Barred Owl	<i>Strix varia</i>	R	None	None	None	None	X			X	XX	X			X	
B	Long-eared Owl	<i>Asio otus</i>	W / M	None	None	None	None	X		X		X	X	X	X		
B	Short-eared Owl	<i>Asio flammeus</i>	W / M	None	None	None	None	XX		XX					X	XX	
B	Northern Saw-whet Owl	<i>Aegolius acadicus</i>	R / S	None	None	None	None	X			X	XX	XX		X	X	
B	Common Nighthawk (nearly extirpated)	<i>Chordeiles minor</i>	N	None	SC	G5/S5	4	X	X	X	X	X	X	X	X	X	
B	Vaux's Swift	<i>Chaetura vauxi</i>	N	None	None	None	None	XX	XX	X	X	X	X	X		X	
B	Anna's Hummingbird	<i>Calypte anna</i>	R	None	None	None	None	X			X	XX	X			X	
B	Rufous Hummingbird	<i>Selasphorus rufus</i>	N	None	None	None	None	X		X	X	X	X	X	X	X	
B	Belted Kingfisher	<i>Ceryle alcyon</i>	S	None	None	None	None	XX	XX		XX						
B	Lewis's Woodpecker (extirpated as breeding species)	<i>Melanerpes lewis</i>	W / M	SoC	SC	G5/S3B, S3N	4	X			X		XX	X	X	X	
B	Acorn Woodpecker	<i>Melanerpes formicivorus</i>	R	SoC	None	G5/S3?	4						XX	X		X	

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									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN	
B	Red-breasted Sapsucker	<i>Sphyrapicus ruber</i>	S	None	None	None	None	X			X	X	X	X	X	X	
B	Downy Woodpecker	<i>Picoides pubescens</i>	R	None	None	None	None	XX			XX	X	X		X	X	
B	Hairy Woodpecker	<i>Picoides villosus</i>	R	None	None	None	None	X			X	X	X	X	X	X	
B	Northern Flicker	<i>Colaptes auratus</i>	R	None	None	None	None	X			X	X	X	X	X	X	
B	Pileated Woodpecker	<i>Dryocopus pileatus</i>	R	None	SV	G5/S4?	4	X			X	X	X		X	X	
B*	Monk Parakeet*	<i>Myiopsitta monachus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX			XX		X		X	XX	
(B)	(Yellow-billed Cuckoo; extirpated)	<i>Coccyzus americanus</i>	N	SoC	SC	G5/S1B	2	(XX)			(XX)						
B	Olive-sided Flycatcher	<i>Contopus cooperi</i> (= <i>borealis</i>)	N	SoC	SV	G5/S4	4	X			X	XX					
B	Western Wood-Pewee	<i>Contopus sordidulus</i>	N	None	None	None	None	X			X	X	X		X	X	
B	Willow Flycatcher (western OR race)	<i>Empidonax traillii brewsteri</i>	N	None	SV	G5TU/S1B	4	XX			XX	X	X		X	X	
B	Hammond's Flycatcher	<i>Empidonax hammondii</i>	N	None	None	None	None					X	X				
B	Dusky Flycatcher	<i>Empidonax oberholseri</i>	M	None	None	None	None	X			X	X	X				
B	Pacific-slope Flycatcher	<i>Empidonax difcilus</i>	N	None	None	None	None	X			X	XX	X				
B	Say's Phoebe	<i>Sayornis saya</i>	N	None	None	None	None								X	X	X
B	Western Kingbird	<i>Tyrannus verticalis</i>	N	None	None	None	None						X	X	X	X	
B	Northern Shrike	<i>Lanius excubitor</i>	W / M	None	None	None	None	X		X					X	XX	
B	Cassin's Vireo	<i>Vireo cassinii</i>	N	None	None	None	None					X	XX				X
B	Hutton's Vireo	<i>Vireo huttoni</i>	R / S	None	None	None	None	X			X	X	XX		X	X	
B	Warbling Vireo	<i>Vireo gilvus</i>	N	None	None	None	None	XX			XX	XX	X		X	X	
B	Red-eyed Vireo	<i>Vireo olivaceus</i>	N	None	None	None	None	XX			XX	X					
B	Steller's Jay	<i>Cyanocitta stelleri</i>	R	None	None	None	None	X			X	X	X		X	X	
B	Western Scrub-Jay	<i>Aphelocoma californica</i>	R	None	None	None	None	X			X	X	XX	X	X	X	
B	Gray Jay	<i>Perisoreus canadensis</i>	R	None	None	None	None	X			X	X	X				X
B	American Crow	<i>Corvus brachyrhynchos</i>	R	None	None	None	None	X		X	X	X	X	X	XX	XX	
B	Common Raven	<i>Corvus corax</i>	R	None	None	None	None	X		X	X	X	X	X	X	X	
B	Streaked Horned Lark	<i>Eremophila alpestris strigata</i>	S	SoC	SC	G5T2/S2?	2								XX	X	X
B	Purple Martin	<i>Progne subis</i>	N	SoC	SC	G5/S3B	2	XX	XX	X	X	X	X	X	X		X
B	Tree Swallow	<i>Tachycineta bicolor</i>	N	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X	X
B	Violet-green Swallow	<i>Tachycineta thalassina</i>	N	None	None	None	None	X	X	X	X	X	X	X	X	X	X
B	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	N	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X	X
B	Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	N	None	None	None	None	XX	XX	X	XX	X	X	X	X	X	X
B	Barn Swallow	<i>Hirundo rustica</i>	N	None	None	None	None	XX	XX	XX	XX	X	X	X	XX	X	
B	Black-capped Chickadee	<i>Poecile atricapilla</i>	R	None	None	None	None	X		X	X	X	X	X	X	X	X
B	Mountain Chickadee	<i>Poecile gambeli</i>	W / M	None	None	None	None	X			X	X	X				X
B	Chestnut-backed Chickadee	<i>Poecile rufescens</i>	R	None	None	None	None	X			X	X	X		X	X	
B	Bushtit	<i>Psaltriparus minimus</i>	R	None	None	None	None	X			X	X	X		X	X	
B	Red-breasted Nuthatch	<i>Sitta canadensis</i>	R	None	None	None	None	X			X	X	X		X	X	
B	White-breasted Nuthatch	<i>Sitta carolinensis</i>	R	None	None	None	None	X			X		X	X	X	X	
B	Brown Creeper	<i>Certhia americana</i>	R	None	None	None	None	X			X	X	X	X	X	X	
B	Bewick's Wren	<i>Thryomanes bewickii</i>	R	None	None	None	None	X		X	X	X	X		X	X	
B	House Wren	<i>Troglodytes aedon</i>	N	None	None	None	None	X			X	X	X	X	X	X	
B	Winter Wren	<i>Troglodytes troglodytes</i>	R	None	None	None	None	X			X	X	X				X
B	Marsh Wren	<i>Cistothorus palustris</i>	N	None	None	None	None	XX		XX							

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									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
B	American Dipper	<i>Cinclus mexicanus</i>	R / S	None	None	None	None	XX	XX	X	XX					
B	Golden-crowned Kinglet	<i>Regulus satrapa</i>	R	None	None	None	None	X			X	XX	X			X
B	Ruby-crowned Kinglet	<i>Regulus calendula</i>	W / M	None	None	None	None	X		X	X	X	X	X	X	X
B	Western Bluebird	<i>Sialia mexicana</i>	S	None	SV	G5/S4B, S4N	4					XX	XX	X	X	X
B	Townsend's Solitaire	<i>Myadestes townsendi</i>	W / M	None	None	None	None	X			X	X	X		X	X
B	Swainson's Thrush	<i>Catharus ustulatus</i>	N	None	None	None	None	X			X	X	X		X	X
B	Hermit Thrush	<i>Catharus guttatus</i>	S	None	None	None	None	X			X	X	X		X	X
B	American Robin	<i>Turdus migratorius</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
B	Varied Thrush	<i>Ixoreus naevius</i>	W / M	None	None	None	None					XX	X		X	X
B*	European Starling*	<i>Sturnus vulgaris</i>	R / S	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX		X	XX	X	X	X	X	XX
B	American Pipit	<i>Anthus rubescens</i>	W / M	None	None	None	None	X		X				X	XX	
B	Cedar Waxwing	<i>Bombycilla cedrorum</i>	S	None	None	None	None	X		X	X	X	X		X	X
B	Orange-crowned Warbler	<i>Vermivora celata</i>	N	None	None	None	None	X			X	X	X	X	X	X
B	Nashville Warbler	<i>Vermivora ruficapilla</i>	N	None	None	None	None	X			X	X	X		X	
B	Yellow Warbler	<i>Dendroica petechia</i>	N	None	None	None	None	XX			XX					
B	Yellow-rumped Warbler	<i>Dendroica coronata</i>	S	None	None	None	None	X		X	X	X	X		X	X
B	Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	N	None	None	None	None	XX			XX	XX	XX		X	X
B	Townsend's Warbler	<i>Dendroica townsendi</i>	S / N	None	None	None	None	X			X	X	X		X	X
B	Hermit Warbler	<i>Dendroica occidentalis</i>	N	None	None	None	None	X			X	XX	X			
B	MacGillivray's Warbler	<i>Oporornis tolmiei</i>	N	None	None	None	None	X			X	X	X		X	
B	Common Yellowthroat	<i>Geothlypis trichas</i>	N	None	None	None	None	XX		XX	XX	X	X	X		X
B	Wilson's Warbler	<i>Wilsonia pusilla</i>	N	None	None	None	None	XX			XX	XX	X		X	X
B	Yellow-breasted Chat	<i>Icteria virens</i>	N	SoC	SC	G5/S4?	4	XX			XX	X	X		X	
B	Western Tanager	<i>Piranga ludoviciana</i>	N	None	None	None	None	X			X	XX	XX			X
B	Spotted Towhee	<i>Pipilo maculatus</i>	R	None	None	None	None	X			X	X	XX		X	X
B	Chipping Sparrow	<i>Spizella passerina</i>	N	None	None	None	None	X			X	X	X	X	X	X
B	Oregon Vesper Sparrow	<i>Pooecetes gramineus affinis</i>	S / N	SoC	SC	G5T3/S2B, S2N	2							XX	XX	
B	Savannah Sparrow	<i>Passerculus sandwichensis</i>	S / N	None	None	None	None	X		X	X			XX	XX	X
B	Fox Sparrow	<i>Passerella iliaca</i>	W / M	None	None	None	None	X			X	X	X		X	X
B	Song Sparrow	<i>Melospiza melodia</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
B	Lincoln's Sparrow	<i>Melospiza lincolni</i>	S / N	None	None	None	None	XX		XX	XX	X			X	
B	Swamp Sparrow	<i>Melospiza georgiana</i>	W / M	None	None	None	None	XX		XX	XX				X	
B	White-throated Sparrow	<i>Zonotrichia albicollis</i>	W / M	None	None	None	None								X	X
B	Harris's Sparrow	<i>Zonotrichia querula</i>	W / M	None	None	None	None								X	X
B	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
B	Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
B	Dark-eyed Junco	<i>Junco hyemalis</i>	S	None	None	None	None	X			X	X	X		X	X
B	Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	N	None	None	None	None	X			X	X	X		X	X
B	Lazuli Bunting	<i>Passerina amoena</i>	N	None	None	None	None	X			X	X	X	X	XX	X
B	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S	None	None	None	None	XX		XX	X			X	X	X
B	Tricolored Blackbird	<i>Agelaius tricolor</i>	S	SoC	SP	G3/S2B	2	XX		XX					X	

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
B	Western Meadowlark (extirpated as breeding species)	<i>Sturnella neglecta</i>	W / M	None	SC	G5/S5	4	X		X				XX	XX	
B	Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	N	None	None	None	None	XX		XX					X	
B	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	S	None	None	None	None	X		X	X		X	X	XX	X
B	Brown-headed Cowbird	<i>Molothrus ater</i>	S / N	None	None	None	None	X		X	X	X	X	X	XX	X
B	Bullock's Oriole	<i>Icterus bullockii</i>	N	None	None	None	None	XX			XX		XX		X	X
B	Purple Finch	<i>Carpodacus purpureus</i>	S	None	None	None	None	XX			XX	X	XX		X	X
B	House Finch	<i>Carpodacus mexicanus</i>	R	None	None	None	None	X		X	X	X	X	X	XX	XX
B	Red Crossbill	<i>Loxia curvirostra</i>	R / S	None	None	None	None	X			X	X	X			X
B	Pine Siskin	<i>Carduelis pinus</i>	S	None	None	None	None	X		X	X	X	X		X	X
B	Lesser Goldfinch	<i>Carduelis psaltria</i>	S	None	None	None	None	XX			XX	X	XX	X	X	X
B	American Goldfinch	<i>Carduelis tristis</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
B	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	W / M	None	None	None	None	X			X	X	X			X
B*	House Sparrow*	<i>Passer domesticus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien								XX	XX
M*	Virginia Opossum*	<i>Didelphis virginiana</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	X			X	X	X	X	XX	XX
M	Vagrant Shrew	<i>Sorex vagrans</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
M	Pacific Water Shrew	<i>Sorex bendirii</i>	R	None	None	None	None	XX		X	XX	X	X			
M	Water Shrew	<i>Sorex palustris</i>	R	None	None	None	None	XX			XX	X				
M	Trowbridge's Shrew	<i>Sorex trowbridgii</i>	R	None	None	None	None	X			X	XX	X		X	X
M	Shrew-mole	<i>Neurotrichus gibbsii</i>	R	None	None	None	None	X		X	X	XX	X		X	X
M	Townsend's Mole	<i>Scapanus townsendii</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
M	Coast Mole	<i>Scapanus orarius</i>	R	None	None	None	None	X			X	XX	X	X	X	X
M	Yuma Myotis	<i>Myotis yumanensis</i>	R / S	SoC	None	G5/S3	4	XX	XX	XX	XX	X	X	X	X	X
M	Little Brown Myotis	<i>Myotis lucifugus</i>	R / S	None	None	None	None	X	X	X	X	X	X	X	X	X
M	Long-legged Myotis	<i>Myotis volans</i>	R / S	SoC	SU	G5/S3	4	X	X	X	X	XX	X	X	X	X
M	Fringed Myotis	<i>Myotis thysanodes</i>	R / S	SoC	SV	G4G5/S2?	2	X	X	X	X	X	X		X	X
M	Long-eared Myotis	<i>Myotis evotis</i>	R / S	SoC	SU	G5/S3	4	X	X	X	X	X	X	X	X	X
M	Silver-haired Bat	<i>Lasiorycteris noctivagans</i>	L	SoC	SU	G5/S4?	4	X	X	X	X	XX	X	X	X	X
M	Big Brown Bat	<i>Eptesicus fuscus</i>	R / S	None	None	None	None	X	X	X	X	X	XX	X	XX	XX
M	Hoary Bat	<i>Lasiuris cinereus</i>	L	None	None	G5/S4?	4	X	X	X	X	X	X	X	X	X
M	Pacific Western Big-eared Bat	<i>Corynorhinus townsendii townsendii</i>	R / S	SoC	SC	G4T3T4/S2?	2	XX	XX	X	X	X	X	X	X	X
M	Brush Rabbit	<i>Sylvilagus bachmani</i>	R	None	None	None	None	X			X	X	X	X	X	X
M*	Eastern Cottontail*	<i>Sylvilagus floridanus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	X			X				X	X
M	Mountain Beaver	<i>Aplodontia rufa</i>	R	None	None	None	None	XX			XX	XX				
M	Townsend's Chipmunk	<i>Tamias townsendii</i>	R	None	None	None	None	X			X	XX	X			X
M	California Ground Squirrel	<i>Spermophilus beecheyi</i>	R	None	None	None	None					X	X	X	X	X
M*	Eastern Fox Squirrel*	<i>Sciurus niger</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien							XX	XX	XX
M*	Eastern Gray Squirrel*	<i>Sciurus carolinensis</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien						XX		X	XX
M	Western Gray Squirrel	<i>Sciurus griseus</i>	R	None	SU	G5/S4?	3					X	XX		X	X
M	Douglas' Squirrel	<i>Tamiasciurus douglasii</i>	R	None	None	None	None		XX	XX	X					
M	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	R	None	None	None	None	X			X	XX	XX			X
(M)	(Western pocket gopher)	<i>(Thomomys mazama)</i>	(R)	None	None	None	None					(XX)	(XX)	(X)	(X)	(X)
M	Camas Pocket Gopher	<i>Thomomys bulbivorus</i>	R	SoC	None	G3G4/S3 S4	3							XX	XX	X

Code ¹	Common Name	Genus/Species	Migratory Status ²	Federal Status ³	ODFW Status ⁴	ORNHP Rank ⁵	ORNHP List ⁶	Riparian Assn. ⁷	Habitat Type ⁸							
									WATR	HWET	RWET	WLCH	WODF	WEGR	AGPA	URBN
M	American Beaver	<i>Castor canadensis</i>	R	None	None	None	None	XX	XX	XX	XX	X	X		X	X
M	Deer Mouse	<i>Peromyscus maniculatus</i>	R	None	None	None	None	XX		XX	XX	XX	XX	XX	XX	XX
M	Bushy-tailed Woodrat	<i>Neotoma cinerea</i>	R	None	None	None	None	X			X	XX	XX		XX	X
M	Western Red-backed Vole	<i>Clethrionomys californicus</i>	R	None	None	None	None	X			X	X				
M	Heather Vole	<i>Phenacomys intermedius</i>	R	None	None	None	None	X			X		X			
M	White-footed Vole	<i>Arborimus (= Phenacomys) albipes</i>	R	SoC	SU	G3G4/S3	4	XX			XX	XX				
M	Red Tree Vole	<i>Arborimus (= Phenacomys) longicaudus</i>	R	SoC	None	G3G4/S3S4	3	X			X	XX	XX			
M	Gray-tailed Vole	<i>Microtus canicaudus</i>	R	None	None	None	None							XX	XX	
M	Townsend's Vole	<i>Microtus townsendii</i>	R	None	None	None	None	XX		XX	X	X	X	X	X	
M	Long-tailed Vole	<i>Microtus longicaudus</i>	R	None	None	None	None	XX		XX	XX	X	X	X	X	
M	Creeping Vole	<i>Microtus oregoni</i>	R	None	None	None	None	X			X	X	X	X	X	X
M	Water Vole	<i>Microtus richardsoni</i>	R	None	None	None	None	X			X	X				
M	Common Muskrat	<i>Ondatra zibethicus</i>	R	None	None	None	None	XX	XX	XX	XX				X	X
M*	Black Rat*	<i>Rattus rattus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien								X	XX
M*	Norway Rat*	<i>Rattus norvegicus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien								X	XX
M*	House Mouse*	<i>Mus musculus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien								XX	XX
M	Pacific Jumping Mouse	<i>Zapus trinotatus</i>	R	None	None	None	None	XX		X	XX	X	X		X	
M	Common Porcupine	<i>Erethizon dorsatum</i>	R	None	None	None	None	XX		X	XX	XX	XX		X	X
M*	Nutria*	<i>Myocastor coypus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	XX	XX	XX	XX				X	X
M	Coyote	<i>Canis latrans</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
M	Red Fox	<i>Vulpes vulpes</i>	R	None	None	None	None	X			X	X	X	XX	X	X
M	Gray Fox	<i>Urocyon cinereoargenteus</i>	R	None	None	None	None	X			X	XX	X	X	X	
(M)	(Gray Wolf - extirpated)	(<i>Canis lupus</i>)	S	None	None	None	None	(X)			(X)	(X)	(X)	(X)		
M	Black Bear	<i>Ursus americanus</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
(M)	(Grizzly Bear)	(<i>Ursus arctos</i>)	(R)	LT	None	G4/SX	2-ex	(X)			(X)	(X)		(X)		
M	Common Raccoon	<i>Procyon lotor</i>	R	None	None	None	None	XX	X	XX	XX	X	X	X	XX	XX
M	Ermine	<i>Mustela erminea</i>	R	None	None	None	None	X			X	X	X	X	X	
M	Long-tailed Weasel	<i>Mustela frenata</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
M	Mink	<i>Mustela vison</i>	R	None	None	None	None	XX	XX	XX	XX	X	X	X	X	X
M	Striped Skunk	<i>Mephitis mephitis</i>	R	None	None	None	None	X		X	X	X	X	X	X	X
M	Western Spotted Skunk	<i>Spilogale gracilis</i>	R	None	None	None	None	X			X	X	X	X	X	X
M	Northern River Otter	<i>Lontra canadensis</i>	R	None	None	None	None	XX	XX	XX	XX					X
M	Mountain Lion (Cougar)	<i>Puma concolor</i>	S	None	None	None	None	X		X	X	X	X		X	X
M	Bobcat	<i>Lynx rufus</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
M*	Domestic Cat (feral)*	<i>Felis domesticus</i>	R	N/A - alien	N/A - alien	N/A - alien	N/A - alien	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
M	California Sea Lion	<i>Zalophus californianus</i>	S	None	None	None	None	XX	XX							
M	Roosevelt Elk	<i>Cervus elaphus roosevelti</i>	S	None	None	None	None	X		X	X	X	X	X	X	X
(M)	(Columbian White-tailed Deer)	(<i>Odocoileus virginiana leucurus</i>)	(R)	LE	SV	G5T2QS2	1	(X)		(X)	(X)	(X)	(XX)	(X)	(X)	(X)
M	Mule Deer	<i>Odocoileus hemionus</i>	R	None	None	None	None	X		X	X	X	X	X	X	X

^a Bald eagle is currently proposed for de-listing at the federal level.

APPENDIX 6. LITERATURE CITED

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Emma Brown

From: jloyen@usfamily.net
Sent: Thursday, April 13, 2023 11:08 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Letter of Support

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning,

I would like to express my support for the proposed amendments to the Saint Paul Zoning Code coming out of Phase 2 of the 1-4 Unit Housing Study.

I would support a combined H1 and H2 district using the proposed H2 standards. I believe this will help to reverse some of the housing patterns that were created through racial covenants in the Como Neighborhood. I also think it will reverse the changes of zoning that were implemented in the 1970's.

I currently live in a neighborhood that is mixed with duplexes single family and small apartment buildings that were all in place prior to the 1970 changes. The current zoning limited design options for us when we put an addition on our home. We could have easily designed a separate apartment to be added to the home to assist us with future age in place opportunities, but were prevented from doing this based on the zoning at the time. We would like to see flexibility for our current neighbors as they look to create living spaces that accommodate extended families and other community members within the neighborhood.

I would strongly encourage penalties for tearing down viable housing. I would support moving viable buildings vs tear down and propose possible incentives for that type of rehab.

I believe the building codes should also be aligned as the zoning code changes. I would be interested in seeing permit fee's tiered to promote density and reuse. For example if you incentivize density (density bonus 80% AMI), part of the incentive could be a reduced building permit cost.

I would also suggest a revision to vacant single family home building fees to increase over time. For example, years 1-3 standard fee then double the fee every year after. With over 400 vacant buildings in St. Paul it seems we have an instant housing supply if vacant single family homes were turned over more quickly.

Thank you for your work on this important project.

Best regards,
Laura Oyen
1432 Almond Ave
St. Paul, MN 55108
651-442-8672
jloyen@usfamily.net

Emma Brown

From: Leah Long <jlong1@macalester.edu>
Sent: Thursday, April 13, 2023 2:38 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Housing Study Comments

Hi,

Thanks for the invitation to comment on the proposed zoning amendments stemming from the City's 1-4 Unit Housing Study. My name is Leah Long and I am a sophomore at Macalester College. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Leah Long
1600 Grand Avenue
Saint Paul, MN 55105

Emma Brown

From: Lisa Haller <lisahaller28@gmail.com>
Sent: Tuesday, March 14, 2023 8:59 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Public comments for housing study

Hello,

Generally I think the change in zoning is a good idea and creative way to increase housing density, in line with urban development principles. I especially like that you are thinking about ways to preserve and include green space.

My concerns are probably outside the scope of zoning changes, however I believe how the city handles these will affect the success of this project.

1. **Corporate landlords** – In the past two years a real problem has developed where large corporations buy up all of the housing stock in a neighborhood, shutting out homeowners and establishing poorly managed, overpriced rental property. I would like to see some assurance that one company, usually located out of state, is not able to buy up massive quantities of properties.
2. **Landlord regulation, generally** – Landlords have a poor reputation and this is due in large part to the number of people calling themselves landlords who are incapable of treating renters like human beings. In my opinion, the quality of property and rental business management, including how renters are treated is key to ensuring increasing the number of rental properties has a positive overall effect on the community. There is no point in increasing the number of rental properties if they are run by people who don't maintain them, allow health hazards to fester and take advantage of renters' financial circumstances. Many people attempt to become landlords without understanding the enormity of the responsibility (including financial) required to do so successfully. We are talking about providing a fundamental right to human beings, not creating stables for animals. And even that has plenty of guidance and expectations around ensuring the animals are not abused. We should be doing the same at the very least for human beings.

Thank you for inviting commentary on this change.

Lisa

Emma Brown

From: Lisa Haller <lisahaller28@gmail.com>
Sent: Tuesday, March 14, 2023 9:10 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: Automatic reply: Public comments for housing study

Follow Up Flag: Follow up
Flag Status: Flagged

Lisa Haller
730 6th St E
St Paul, MN 55106

On Tue, Mar 14, 2023 at 8:59 AM *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:

Thank you for submitting your comments for the 1-4 Unit Housing Study Phase 2 amendments.

In order for your comments to be included in the public record, you must make sure that you have included your full name and address of residence. Testimony without this information will not be provided to the Planning Commission and will not be included in the record.

Please note: The deadline to receive written testimony is at noon on Thursday, April 13, 2023. You may also testify at the public hearing at the [Planning Commission meeting](#) on Friday, April 14 at 8:30 a.m. at City Hall, room 40.

From: [Lori Brostrom](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Cc: [Rebecca Noecker](#)
Subject: 1 to 4 Housing Study Recommendations--Feedback
Date: Saturday, April 8, 2023 5:49:54 PM

I have several concerns about the proposed zoning changes:

- The reality is that over the past few years, St. Paul and Ramsey County have seen losses in population, likely due to increases in property taxes while city services decline, an aging population combined with lower birthrates, increased crime/lower enforcement leading to reduced quality of life, and the desire for more space including both size of residence but also amount of green space and privacy. Remote work and an ever-declining employer base are certainly contributing factors. The changes driving this are likely permanent.
 - There is a documented need for more affordable housing, as the study notes. However, nowhere in these recommendations is there a case made that these changes would lead to increased affordability, especially for lower-income households.
- Overall, it would significantly increase the density in all areas of the city and also make significant alterations to the character of neighborhoods, reducing desirability:
 - The combination of smaller required lot sizes, reductions in setbacks, the opportunity to add height in some areas, and what appears to be large increases in allowed lot coverage by buildings on a property would create a much more claustrophobic feel to neighborhoods, reducing privacy, increasing noise, reducing green space, and apparently decreasing off-street parking. There is nothing here that would actually improve quality of life
 - There is absolutely no guarantee that these changes would benefit anyone other than developers and rental property owners; in fact, they would likely drive up prices/costs instead of improving affordability, driving more people at higher incomes out of the city.
- Despite the concerns by current residents outlined in the online survey, these recommendations ignore or gloss over many of them:
 - Single unit and/or duplexes were the 4 most-wanted housing types. Jamming more units--or worse yet, multiple duplexes--onto these smaller proposed lots are explicitly not what residents want.
 - Off-street parking is high on the list of concerns, and yet these proposals, by reducing lot sizes and increasing lot coverage, would de facto eliminate, not increase, off-street parking.
 - Private outdoor space was also high on the list. As with above, it would significantly decline, if not be eliminated entirely.

The number of bedrooms and bathrooms were also among the highest expressed needs. Again, shoe-horning more units onto existing lots will not support those desires, unless the sizes of those rooms are decreased. When people are moving to the suburbs, this is what they're looking to avoid.

- Also not mentioned anywhere that I could see was the impact this increased density would have on existing infrastructure--water, sewer, sidewalks and streets. These are already challenged in the current scenario, and they're finite and not well-maintained as it is. I suspect what is driving much of this desire for increased density is a larger property tax base, but it's unlikely that the increase in affordable units needed would generate the incremental property tax revenue that would make up for the incremental stress on infrastructure.

I'm also not sure why this is being promoted city-wide. There are parts of the city that could be designated as opportunity zones for these kinds of changes which would a) benefit from increased investment, b) can absorb more density, and c) would provide more affordable options vis a vis lower land/property acquisition costs and infrastructure and thus, be more likely sites for the kind of housing that is actually needed. Was that ever looked at or considered?

Lori Brostrom
710 Summit Ave Apt. 1
St. Paul 55105



Virus-free www.avast.com

Emma Brown

From: Lukas Lock-Scamp <llocksca@macalester.edu>
Sent: Thursday, April 13, 2023 10:45 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Policy Proposal

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Lukas Lock-Scamp
he/him/his
Macalester College 25'
1600 Grand Ave St. Paul

Emma Brown

From: lyn rhodes <lmroads@gmail.com>
Sent: Monday, March 13, 2023 9:15 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: Omg

Follow Up Flag: Follow up
Flag Status: Flagged

Lynda Rhodes

Aka Lynda Birawer as owner since 1996 of property, 374 Wheeler st. N. Saint Paul mn 55104.

2011 purchased in current legal name Lynda Rhodes

Owner occupied since 1998, when we received occupancy, after buying condemned building. My address is:

374 Wheeler st. N apt 1, st paul mn 55104... This is with exception of short period in 2009 due to domestic violence, which was resolved by my subsequent divorce.

Is this adequate for my comments to be included?

Thank you!

Lynda Rhodes

On Mon, Mar 13, 2023, 8:18 AM *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:

Thank you for submitting your comments for the 1-4 Unit Housing Study Phase 2 amendments.

In order for your comments to be included in the public record, you must make sure that you have included your full name and address of residence. Testimony without this information will not be provided to the Planning Commission and will not be included in the record.

Please note: The deadline to receive written testimony is at noon on Thursday, April 13, 2023. You may also testify at the public hearing at the [Planning Commission meeting](#) on Friday, April 14 at 8:30 a.m. at City Hall, room 40.

From: lyn rhodes <lmroads@gmail.com>
Sent: Monday, March 6, 2023 7:09 PM
To: *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us>
Cc: #CI-StPaul_Ward4 <Ward4@ci.stpaul.mn.us>
Subject: Omg

This is ridiculous. I am the owner of a 4 plex in st paul. I still own it despite the city trying to rid us all. * corner 4 plex.

What is the issue? Greed- by the city.

Think about the entire block of homes destroyed to make 3 empty parking lots by the old midway hospital- those were houses. These choice pints have made this mess. What's the vacancy rate at the high end apts that were built across from the stadium, down the street from the stadium...etc. ?

Look at your policies, they can't be, just let duplex 4 plex owners cover the cost. These are no longer largely owned by city employees who got the first dibs on flipping. Its really expensive to operate a 4 plex in st paul. And I can't raise rents even when taxes, heat, water, (some you guys control) maybe a Tax Break for small units like mine that are offering affordable housing....make ilus feel valued or welcomed? Maybe not charge me for 3 empty upside down trashbins. It's ok, the city could take a hit, it doesn't actually have to destroy the nice things (me buying a condemned building, despite the tear down date, despite the city stating one bedroom units are not needed, and i have a 0% vacancy for 27 years) then wonder where they went...

On my 3 blocks, one 4plex went single family, one 4plex quietly quit renting, one duplex went quiet during the trash years....

4 plex units have more classifications by the city of Saint Paul than slum lords have excuses. I can't imagine the fact you let all other units actually charge what it costs has helped either. And fyi. Dont say the citizens voted for it, they didnt the trash, we had the votes, the city doesnt care about the people who live here...you sued us.

This isn't a partnership...its a choice as to when to leave ...make it a hard one.

Lynda Rhodes

Emma Brown

From: Marty Stoner <mstoner2@macalester.edu>
Sent: Thursday, April 13, 2023 10:24 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Support Zoning Amendments!

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

- 1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.*
- 2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).*
- 3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).*

Thank you for your consideration.

*Marty Stoner
1600 Grand Avenue, St. Paul, MN 55105*

Emma Brown

From: Mary Voight <mcavoight@gmail.com>
Sent: Thursday, April 13, 2023 7:31 PM
To: *CI-StPaul_1to4HousingStudy
Subject: 1-4 Unit Housing Phase 2 COMMENT

Follow Up Flag: Follow up
Flag Status: Flagged

A "range of housing" can include single family homes as well as the variety you list on your website.

Why eliminate single family housing? Why not expand the range of choices?

Mary C. Voight
951 South McKnight Road
St. Paul

Emma Brown

From: Matthew McCord <mccordm@outlook.com>
Sent: Thursday, April 13, 2023 9:03 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Comment in support of 1-4 plan as proposed, with possibilities for further addition

Follow Up Flag: Follow up
Flag Status: Flagged

To whom it may concern:

I write in general support of the proposed 1-4 Unit Housing Study Phase 2 Amendments as proposed. The proposed changes centered around setback, height, and homes per lot will help legalize the development of "missing middle" housing that is so desperately needed in our region and in particular our urban cores.

I would go further in a few respects:

1. Consolidate H1 and H2 into H2 to simplify the code further in the direction of housing option legalization. This would further promote more efficient development of infill housing in areas currently proposed as H1 and make our zoning and permitting process less expensive for smaller developers and property owners.
2. Increase the H3 district radii (from Nodes, LRT, and BRT) to at least 1/4 mile (instead of just 1/8) - investments in transit and nodes will support densification more than just a block away from nodes and transit, and indeed would be the most effective places to concentrate it.
3. Clarify how the requirements will impact proposals for rowhomes and other structures sharing walls - from what i was able to glean from current proposals, the side setback requirements will remain and will require variances to make connected structures like rowhomes. Given the efficiency of developing connected structures (e.g., two fewer walls to insulate) and the attractiveness of these in denser areas, if my read is correct, this is an oversight.

Thank you to all in the city who have worked on this project. I had the privilege of joining in one of the community sessions about a year ago and was impressed with the thought put into creating and engaging on this plan. I hope the measure succeeds.

Yours sincerely,

--

Matthew McCord
JD (Minn.-licensed attorney), CIPP/US
1360 Hartford Avenue Saint Paul, Minnesota 55116
+1 (248) 697-1305

Emma Brown

From: Mayumi Morgan <mmorgan9@macalester.edu>
Sent: Thursday, April 13, 2023 9:51 AM
To: *CI-StPaul_1to4HousingStudy
Subject: 1-4 Unit Housing Study

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Mayumi Morgan
1600 Grand Ave.
St. Paul, MN
55105

--

Mayumi Morgan
she/her/hers
Macalester College '25
International Studies | Political Science | Critical Theory
651-788-6182

Emma Brown

From: Ray Camper <rcamper@mccdmn.org>
Sent: Thursday, April 13, 2023 11:00 AM
To: *CI-StPaul_1to4HousingStudy
Subject: MCCD 1-4 Housing Study feedback
Attachments: 2023 MCCD St. Paul Housing Study recommendations.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Hello, please find MCCD's recommendations and feedback regarding the 1-4 Housing Study.

Thank you,
Ray

Ray Camper
Policy and Field Building Advisor

Metropolitan Consortium of Community Developers
3137 Chicago Avenue S.
Minneapolis, MN 55407
Direct: 612-814-0758
MCCD: 612-789-7337
www.mccdmn.org
Pronouns: He/Him



City of St. Paul Planning Commission
Attention: Luis Rangel Morales
City Hall Conference Center
Room 40
15 Kellogg Boulevard West

Re: St. Paul Phase 2 1-4 Housing Study

The Metropolitan Consortium of Community Developers (MCCD) is an association of 50 nonprofit organizations committed to expanding the wealth and resources of communities through housing opportunities and economic development initiatives. MCCD's mission to build strong and stable communities can only be achieved by addressing the inequities that have shaped housing and economic development policies at every level of government and that has prevented Black, Indigenous and People of Color (BIPOC) and other communities from achieving housing stability, accessing capital and wealth building opportunities.

MCCD and our members are appreciative of the partnership that we have shared with the City of St. Paul to provide safe and affordable housing throughout the City. We also appreciate the outreach and engagement that city staff have completed and for the recommendations that were made during phase 1 that were adapted for the 2nd phase of this study.

While MCCD supports the improvements and adjustments made within phase 2 of this study, there is still the concern of cost and accessibility; particularly for those who would benefit the most from ADU on their properties and those who need to add more livable space for multigenerational family housing, for example. According to the staff memo, 71% of Saint Paul renters are cost-burdened, and most of Saint Paul's populations of color rent their homes. (Staff Memo, pg. 40).

With the need for more affordable housing, it is imperative that St. Paul ensure that this opportunity is accessible to as many residents as possible; and this can be accomplished through waiving fees, and by providing subsidy or grant funding to relieve some of the costs, especially for those who fall under the 80% AMI range.

Thank you for your consideration, and we look forward to working with you to better serve community development work. MCCD and its members would like to make ourselves available for continued input and conversation this year and in the future. Please reach out to Ray Camper (rcamper@mccdmn.org) should you need any further information.

Sincerely,

Elena Gaarder

Elena Gaarder

Chief Executive Officer

Emma Brown

From: Meg Arnosti <arnosti.meg@gmail.com>
Sent: Thursday, March 23, 2023 2:39 PM
To: *CI-StPaul_1to4HousingStudy
Subject: 1-4 Housing Study Comments

Follow Up Flag: Follow up
Flag Status: Flagged

Regarding the proposed 1-4 Housing study, I have four main concerns.

1. If there can be an increased number of units on a property, there should also be a requirement that one of the units be occupied by the property owner. The danger is that all units on a property will become rental, and that those units will not have adequate supervision, which could lead to disruptive activities. This has already happened with AirBnB rentals around St. Paul. If the owner lives on the property, the rental units will be more closely monitored and follow-up will be easier in case of disruptive behavior.
2. Trees are vital to the health of our neighborhood. There should be a tree protection clause so that trees cannot be removed without a variance.
3. Infiltration can be an issue on lots without enough land for infiltration. A drainage plan, reviewed by a professional, must be approved before the lot can have additional construction.
4. In keeping with the goal of neighborhood aesthetics, I fear that existing homes will be torn down and multiple units built on the lot. There should be a provision to maintain existing homes and to ensure that new construction fits in aesthetically with surrounding homes. These concerns were behind the District 14 and 15 Residential Design Standards. Those design standards should remain in place and be expanded to include the whole city as a part of this study.

Clauses to address these issues should be part of the 1-4 Housing Study.

Sincerely,

Margaret Malde-Arnosti
Landscape Architect
1722 Princeton Avenue
St. Paul, MN 55105

Emma Brown

From: Meghan Howard <meghan@vibemn.com>
Sent: Thursday, April 13, 2023 11:50 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Comments for Phase Two of 1-4 Unit Housing Study

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thank you very much for the opportunity to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study.

I was/am so excited to see the proposal and would like to recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you so much for your consideration of these changes.
I hope you enjoy the beautiful day ~

Meghan Howard
1323 Watson Avenue St. Paul, MN 55116



Meghan Howard (SHE/HER)

REALTOR® | VIBE REALTY

📞 612.803.2213

📍 400 SELBY AVE, STE C, ST PAUL, MN

🌐 VIBEMN.COM

From: [Melissa Wenzel](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Support for 1-4 Housing Study, requesting changes
Date: Tuesday, April 11, 2023 8:02:49 PM

Dear Planning Commissioners,

I am submitting my support and suggested changes connected to the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.

2. Apply the proposed H3 zone to more areas: for example, a quarter-mile (or more) radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#). Living on the East Side, we need higher density and more housing options to not only house more residents in our growing wards, but also to provide an increased tax base to provide us with the amenities we deserve.

3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels), or encourage houses to be built solar-panel ready, so that current or future residents can install solar panels.

Thank you all for the great work you're doing to ensure that residents have more homeownership choices in Saint Paul, and thank you for considering these requested changes!

Sincerely,

Melissa Wenzel
613 Burlington Road
Saint Paul, MN 55119

Emma Brown

From: Alexa Golemo <alexa@macgrove.org>
Sent: Thursday, April 13, 2023 12:03 PM
To: *CI-StPaul_1to4HousingStudy
Cc: Emma Brown; #CI-StPaul_Ward4; #CI-StPaul_Ward3
Subject: MGCC Recommendation re: Phase 2 of the 1-4 Housing Study
Attachments: MGCC recommendation re Phase 2 of the 1-4 Housing Study.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon,

Please see the attached recommendation from the Macalester-Groveland Community Council regarding Phase 2 of the 1-4 Housing Study.

Thanks,

Alexa

--

Alexa Golemo
Executive Director
Macalester-Groveland Community Council
320 S Griggs St | St. Paul, MN 55105
[651 695-4000](tel:6516954000) | macgrove.org
Sign-up to receive meeting agendas and Zoom info at <https://macgrove.org/participate/>.

The MGCC Candidate Application Period is open. Visit www.macgrove.org/boardelections to learn more!





320 South Griggs Street
St. Paul, MN 55105
www.macgrove.org

651-695-4000
mgcc@macgrove.org

April 13, 2023

Saint Paul Planning Commission
City of Saint Paul
VIA EMAIL

To Whom It May Concern:

On Wednesday, March 29th, 2023 the Housing and Land Use Committee (“HLU”) of the Macalester Groveland Community Council (“MGCC”) held a special public eMeeting via Zoom, at which it considered the recommendations from city staff as part of Phase 2 of the 1-4 Housing Study.

After speaking with city planners, considering neighborhood feedback, consulting the Macalester Groveland Long Range plan, and assessing the recommendations, the Housing and Land Use Committee passed the following resolution by a final vote of 9-8:

***** The Housing and Land Use Committee of the Macalester-Groveland Community Council supports Phase 2 of the 1-4 Housing Study with the following additions: 1. Encourage only homesteaders be eligible, and 2. Encourage new additions fit in with the character of the neighborhood. *****

These additions are meant to incentivize homeowners to provide more neighborhood-scale housing in Saint Paul over commercial developers and maintain the visual character of neighborhoods in Saint Paul.

If you have questions or concerns, please do not hesitate to contact me.

Alexa Golemo
Executive Director
Macalester-Groveland Community Council

cc (via email): Ward 3, City of Saint Paul
Ward 4, City of Saint Paul
Emma Brown, City Planner, City of Saint Paul

From: [Ned Keyse](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Date: Wednesday, April 12, 2023 9:05:22 PM

Dear Planning Commissioners,

Thank you for granting me the opportunity to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. Include the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings. Please also consider offering density bonuses to incentivize other beneficial practices, such as cooperative homeownership models or agreements not to install gas lines to new buildings and instead opt for electrical heating.

Thank you for your consideration.

Ned Keyse
1607 Grand Avenue
Saint Paul, MN 55105

From: [Noah Velick](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Amendments to Saint Paul Housing Study
Date: Wednesday, April 12, 2023 9:16:30 AM

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Noah Velick
1536 Osceola Ave, Saint Paul, MN, 55105

From: [Pam Tollefson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Fwd: Concerns
Date: Tuesday, April 11, 2023 1:57:07 PM

----- Forwarded message -----

From: **Pam Tollefson** <ptollefsonward5@gmail.com>
Date: Tue, Apr 11, 2023 at 1:54 PM
Subject: Concerns
To: <1to4housingstudy@ci.stpaulmn.us>

Hi,

I attended the meeting at the Freedom Library. I am concerned that because so many people won't be able to afford to make their houses into multi houses, they will sell to developers who will then change them into multi housing.

Is this something that is encouraged? Because, I don't see people on the east side and other lower income neighborhoods being able to afford this.

Thank you,
Pam Tollefson

From: [Pam Tollefson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Re: Automatic reply: Concerns
Date: Tuesday, April 11, 2023 2:10:54 PM

Oops!

Pam tollefson
515 brainerd avenue
St Paul, MN 55130

On Tue, Apr 11, 2023 at 1:57 PM *CI-StPaul_1to4HousingStudy
<1to4HousingStudy@ci.stpaul.mn.us> wrote:

Thank you for submitting your comments for the 1-4 Unit Housing Study Phase 2 amendments.

In order for your comments to be included in the public record, you must make sure that you have included your full name and address of residence. Testimony without this information will not be provided to the Planning Commission and will not be included in the record.

Please note: The deadline to receive written testimony is at noon on Thursday, April 13, 2023. You may also testify at the public hearing at the [Planning Commission meeting](#) on Friday, April 14 at 8:30 a.m. at City Hall, room 40.

From: [Pat Thompson](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Support for Phase 2 study findings
Date: Tuesday, April 11, 2023 11:17:31 AM

Dear Planning Commissioners,

I'm writing to strongly support the proposed zoning amendments in the Phase Two of the City's 1-4 Unit Housing Study in general, and recommend some changes:

- Combine the new zoning districts H1 and H2 under the provisions of H2. I currently live in an area that would be more restricted under the proposal, and I don't see a reason for this slight differentiation. I think it would be simpler and fairer to have just one.
- Apply the proposed H3 zone to more areas, particularly: increase to a quarter-mile radius around Light Rail, and include *all* planned Bus Rapid Transit routes (including the planned H Line that will follow much of the current 3 bus route, <https://www.metrotransit.org/h-line-project>), as well as the neighborhood business nodes identified in the 2040 Comprehensive Plan.
- Consider expanding the density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).
- Reconsider the percent of lot size coverage allowed; it seems too minimal to me, when considering historical building patterns in walkable cities Saint Paul should want to emulate.

Thank you for your consideration.

—
Pat Thompson
1496 Raymond Avenue, Saint Paul 55108

From: [Patricia James](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Public Comment on study
Date: Monday, April 17, 2023 1:56:01 PM
Attachments: [1to4HousingStudy.wpd](#)

Please include the attached letter in the public hearing record.

Thank you.
Patricia James

April 17, 2023

Luis Rangel Morales, Chair
Saint Paul Planning Commission
1400 City Hall Annex
25 W. Fourth Street
Saint Paul, MN 55102

RE: 1 to 4-Unit Housing Study

Chair Rangel Morales and Members of the Planning Commission:

Please enter these comments into the public hearing record for the 1 to 4 Unit Housing Study. My comments fall into two categories: overall process and specific issues with the study itself. Adoption of the code and map amendments that have resulted from the research and analysis included in this study will dramatically change the zoning rules for residential development in Saint Paul, and I therefore believe that it is vitally important for residents of the city to be aware of these changes and the impact they could have on their neighborhoods.

Thus, my first observation is that the study distributed for public review is a very technical document that seems written for those who are already familiar with the housing and real estate development field. I believe members of the general public without this familiarity would have a very difficult time digesting the study and really understanding what it would mean for their block or neighborhood. I was surprised that there was no executive summary or similar introduction that would be more accessible to a general audience. In this same vein, I can recall no news coverage of this study except for an article in the Pioneer Press regarding the public hearing held on Friday.

From what I can gather from the study document, there was more community outreach at the beginning of the study than there was after the study was finished and the public hearing date was set. I tried contacting my district council to see if they were reviewing the study and would be having a community meeting, but never heard back. Perhaps my experience is unusual, but, if not, this lack of follow-up is concerning.

I am therefore asking the Planning Commission to delay referring this study to the City Council until considerably more publicity about the planned changes can be arranged. My fear is that if these recommendations are adopted with little general understanding of what they include, developments begun under the new regulations will generate a lot of opposition and mistrust from the surrounding residents, even if the development complies with the requirements.

My other general concern, related somewhat to the first, is that I am not at all sure how the new regulations will ensure that the spirit of the regulations will also be enforced. My impression of the study is that it assumes small developers and “do-it-yourselfers” (as well as perhaps some larger real estate developers) will carefully design this infill housing to ensure that the new developments fit with the character of the surrounding area. It isn’t as clear how this will be enforced. Are the case studies to be adopted as the only design options available? Has anyone looked at these major changes with an eye to how they could NOT enhance the surrounding neighborhood? This problem could arise particularly in cases where financing is a tight. The T and PD districts have design guidelines that help in those districts. Is something similar needed for these new residential districts?

My more specific concerns/questions are random, but also point to the difficulty the general public may have in understanding how these changes will affect their homes and neighborhoods.

1. There are occasional typos or missing words in the text. A final proofread would find and correct these.
2. It was frustrating to see terms I wasn't familiar with that were not explained. This was an issue in the case study section, which I think is important but seemed to be written only for the housing developer audience. The terms "market-sized" and "family-sized" came up, but were not explained until the section on H3 examples. There was also a mention of "funding gap per door" that concerned financing. This was never defined.
3. Some of the map decisions were puzzling. Why is the northwest side of West Seventh Street where there are steep bluffs zoned H3? Does the city hope to develop this land? Are there transit stops planned along this stretch? The H3 zoning for the entire Highland Golf course and Town and Country Club are two more examples. The far ends of these properties are not near transit. If they are redeveloped, there would likely need to be some master planning for subdivision and future use. Wouldn't that be a better time to determine appropriate zoning? Was it requested by property owners to maintain or increase the properties' value? Or...? I haven't looked at all the maps in detail, but these areas caught my attention. I would ask that the maps not be adopted until there has been more consultation with the area district councils and property owners.

In conclusion, I think that these changes are too important to rush through the approval process. I am sure that there are many citizens who are not even aware that this study is being considered, yet it's adoption would clearly impact them. I would ask that more time be given to assuring broad community awareness and education.

Thank you.

Sincerely,

Patricia James

1414 Hythe Street

Saint Paul, MN 55108

Emma Brown

From: Emma Brown
Sent: Thursday, April 13, 2023 8:10 AM
To: *CI-StPaul_1to4HousingStudy
Subject: FW: Comments

Follow Up Flag: Follow up
Flag Status: Flagged

From: Rosalyn Goldberg <blueskater3@gmail.com>
Sent: Wednesday, April 12, 2023 8:56 PM
To: Emma Brown <Emma.Brown@ci.stpaul.mn.us>
Subject: Fwd: Comments

Think Before You Click: This email originated **outside** our organization.

----- Forwarded message -----

From: Rosalyn Goldberg <blueskater3@gmail.com>
Date: Wed, Apr 12, 2023 at 4:58 PM
Subject: Comments
To: <1-4HousingStudy@ci.stpaul.mn.us>

Please consider the scale of buildings, building materials, green space, yards, buildings not too close to other buildings, height, not overdoing it, focus

*on downtown, owner occupied,
set backs, "fit" existing
character...*

*Sorry, lost my notes, time
crunch.*

*No LEGO LAND buildings like
the ugly, inappropriate building
across from Dunn Brothers on
Grand at Snelling. As a renter,
I can see into the neighboring
building very clearly. As such, I
have not pulled up my shades on*

the east side of my building for 42 years. Do not overload one neighborhood. The materials and *SIZE* must match the *ORIGINAL* buildings in the neighborhood. No variances !!! *GREENSPACE*. Even a journalist knows to have white space. Don't pack 'em in. Do not demolish the ones already here (duplexes...) *KEEP* single family homes. Not everyone wants to live in a "dorm". People want yards, privacy. Be

respectful. Make them affordable, with quality materials and design. BTW: "Affordable" means something that a person with a "regular" job, service industry, blue collar can "afford", not what people usually think of, subsidized, "very low" income. Be respectful in your decisions, not money grubbing and density focused. We are not NY nor do we want to be !!!

Thank you.

*Rosalyn Goldberg
1023 Grand Ave., #6
St. Paul, MN 55105
c 651-206-1742*

*Lifelong St. Paulite (68yrs, 42
years on Grand Ave...)*

Emma Brown

From: Scout Holding Eagle-Bushaw <sholding@macalester.edu>
Sent: Wednesday, April 12, 2023 8:24 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: Support for Zoning Amendments

Follow Up Flag: Follow up
Flag Status: Completed

My mistake- my address is 1594 Summit Avenue, not Grand! I was typing a bit too fast.

On Wed, Apr 12, 2023 at 8:17 PM Scout Holding Eagle-Bushaw <sholding@macalester.edu> wrote:
Hello Planning Commissioners,

I'm writing to express my firm support for the proposals emerging from Phase Two of the 1-4 Housing Study. As a current student who would like to stay in the city and one day raise a family here, these proposals make that dream look much more like a reality. However, I would also like to recommend the following changes.

1. Eliminate the proposed zoning district H1, and instead consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. That would be more fair and equal between R1-R3 and R4-RT2 as well as less confusing for future homeowners and home builders.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. Support and expand the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings. Please consider expanding this to offer density bonuses to incentivize other good things, such as cooperative homeownership models or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Scout Holding Eagle-Bushaw
1594 Grand Ave, Saint Paul, 55105

Emma Brown

From: Brandon Griffin <bgriffin@thesannehfoundation.org>
Sent: Thursday, April 13, 2023 12:05 PM
To: *CI-StPaul_1to4HousingStudy
Subject: SECO D1 Land Use Feedback - Unit Housing Study Phase 2
Attachments: SECO D1 Land Use Feedback Phase 2 Unit Housing 4-13-2023.pdf; SECO Community Member Feedback Phase 2 Unit Housing 4-13-2023.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon,

Please see attachments regarding 1-4 Unit Housing Study Phase 2. Note that one is an official statement from SECO (D1) Land Use, while the other is a community member voice that does not reflect the views nor endorsement of the district council.

Please let me know if you have any questions.

Brandon

--



SANNEH



Brandon Griffin
Senior VP of Operations
(he/him/his)

Cell: 501.672.3280
Office: 651.690.4855 ext. 3
Email: bgriffin@thesannehfoundation.org

www.thesannehfoundation.org
2090 Conway Street, St. Paul, MN 55119



Southeast Community Organization

2105 ½ Old Hudson Road, Saint Paul, MN 55119
www.district1council.org district1council.org/blog

Community Council Office

(651) 578-7600 (phone)
(651) 578-7404 (fax)
district1council@gmail.com

Youth Programming

(651) 578-7400 (phone)
(651) 578-7404 (fax)
district1chia@gmail.com

April 12, 2023

City of St. Paul
Att: Planning and Economic Development
City Hall Annex
25 West 4th Street, Suite 1300
Saint Paul, MN 55102

Subj: SECO (District 1) Land Use Response to Unit Housing Study Phase 2

Honorable Councilmembers and Planning Commissioners,

The Southeast Community Organization (SECO) District 1 Land Use Committee has had the opportunity to discuss the Phase 2 Unit Housing Study provided by the City of Saint Paul on Monday, April 3rd 2023. We want to thank you for providing comprehensive explanations and definitions within the online slide presentation, as well as the background and objectives behind the study. We certainly understand the impact of these zoning code amendments and proposals, as well as their impact on homeowners in our city. Overall, we support the conclusions provided within the study with some comments and feedback on particular components.

Introduction

While it comprises only a small area within the district's boundaries, SECO represents the only portion of the city with the RL zoning designation. This zoning district was created to acknowledge the important, and in many cases fragile, natural features of the Highwood neighborhood while also providing for residents to safely operate private septic systems as many do not have access to City sanitary sewer services, currently. The proposed text changes for the RL district in the study strike a good balance of allowing additional housing in Highwood while also continuing to protect natural features and acknowledging the unique septic system situation the neighborhood has.

Specific to the changes to the intent statement, the proposed changes leave in place the core reason behind why this district was created in the first place. By changing "reduce" to "minimize" in relation to erosion and runoff the changes strengthen the protection of the natural features. This is incredibly important as a changing climate will bring more precipitation, particularly in large individual rain events which could greatly impact the neighborhood's steep slopes. The change with regard to septic systems and wells also acknowledges both the change that has happened in Highwood since the RL district was created three decades ago (i.e. more access to public sanitary sewer services and fewer private septic systems) as well as Comprehensive Plan Policy LU-43 that SECO had requested during the plan's drafting.

With regard to the proposed RL dimensional standards, we appreciate that thought is still given to ensuring that septic systems and private wells will be able to be kept far enough apart to protect drinking water safety. The minimum lot width of 60' is likely the narrowest that lots could be while still maintaining this separation. Additionally, the 9,000sqft minimum lot size allows for additional housing while also allowing for the necessary space for leach fields (which can exceed 1,000sqft per home) and the protection of natural features.

We finally wish to call attention to our belief that cluster developments may be the best way to increase housing in Highwood in a way that best protects natural features. By allowing an increase in development on flatter, more open areas of lots, land that is covered in trees, wetlands, steep slopes and other features can be protected as part of the land needed per unit. Simply making changes to the dimensional standards without the proposed robust language on cluster developments, would encourage development in sensitive areas that should not be impacted.

Land Use Feedback

In reviewing the Phase 2 Unit Housing Study presentation, the committee reviewed the pre-drafted community questions on slides 44 – 46 as a guide to itemize and obtain comments from both committee members and attending community members. Please note that general feedback is outlined from the committee below, as well as includes consolidated reactions to the specific community questions offered and some community feedback. Reactions below:

General Comments: In September 2017, SECO formally requested that a zoning study be conducted to examine the applicability of the citywide accessory structure regulations to large lots. SECO has formally recommitted to this request at least once since that initial letter. We have seen a history of zoning variances requested in Highwood and Battle Creek for reasonable additions to residential properties, such as gazebos and pottery/art studios, because their addition would exceed the aggregate accessory structure footprint limit. The impact of 1,200sqft of accessory structures on a standard urban lot seen throughout most of the city is far greater than the impact of that same 1,200sqft on a lot of a half-acre, or even multiple acres. Minutes from the Board of Zoning Appeals considering these variance requests show surprise from BZA members that there is not a standard that scales to lot size, and these variance requests have all been approved within the last decade.

The complications of this one-size-fits-all regulation is borne out when examining the proposed cluster development language. Many cluster developments will likely have both a garage and a community building on site (e.g. for shared laundry, an event room, and/or other community uses). It is also quite possible that a small maintenance or utility building would also be present. This would exhaust the three non-living unit accessory structures allowed, and would almost certainly exceed the 1,200sqft footprint standard, particularly for cluster developments with four or more units.

Because the proposed changes update the lot coverage regulations to 40-50% of lot coverage for combined principal and accessory structures, the accessory structure limits that are retained are rendered redundant. We support a percentage standard as that allows coverage to scale with property size. However, the logical outcome of these new standards without a repeal of the accessory structure standards will be to physically attach most or all of the accessory functions to one of the structures containing a dwelling unit to evade the limitation and be subject only to the broader 40-50% coverage requirements. This may not be the best way to lay out a development site and may also result in more massing in portions of the lot that would be undesirable for neighboring properties.

In consideration of all of these factors, we ask that the revised lot coverage standards be adopted, but the restrictions recodified as 63.501(e)(1) should be removed. On a similar note, we do also want to express support for the updated height requirements of accessory structures which will provide greater flexibility without allowing these structures to be too tall.

“Questions for the Community” Comments:

Question 1: We think it is a "zoning approach" that removes restrictions that have a history of discrimination and provides some flexibility to build housing to support those named groups. However, it may take some strategic funding to support an equitable impact on all of the community, including low income families.

Question 2: Several committee members felt the two zones should remain separate (H1 and H2) in addition to the preservation of RL, while other were in support of combining H1 and H2 together into one district (with RL and H3 being the other districts). Our committee suggested that none of this approach regulates building size and so we are only talking about the number of people that could live on the property, not how large the building is. The committee did not reach consensus in this area.

Question 3: Some felt the proposal did not do much to “manage the pace of change to minimize potential displacement pressures on existing neighborhoods and residents”. There seems to be some uncertainty around the potential for future changes and development.

Question 4: Transit and neighborhood nodes are the highest priority. We discussed some questions around the density bonuses (leaving aside any skepticism about whether they will actually produce affordable housing), many believe they should apply to H3 properties. We need affordable housing near transit and near commercial destinations. We vehemently emphasize that 80% AMI is too high to be considered affordable and that AMI number needs to be decreased.

Question 5: Suggestions surrounding density bonus' for buildings that are ultra-energy-efficient, such as LEEDS certifications or other.

Committee Questions:


Page 7: Slide mentions "to encourage the development of family-sized and Workforce housing through zoning bonuses" Q: What is Work Force Housing?

Page 24 – Slide mentions RL - "reduced min rear yard setbacks" Q: What if this is a stability problem?

Page 27 – Slide mentions max impervious surface is 75% - Q: Does this seem higher than usual?

Thank you very much for your time and attention to our comments, questions, and concerns. As previously stated, the SECO District 1 Land Use Council is unanimously in favor of the proposed study presented by the City of Saint Paul. We look forward to further information and feedback.

Sincerely,

A handwritten signature in black ink that reads "Brandon Griffin". The signature is written in a cursive, slightly slanted style.

Brandon Griffin, Chair
SECO (District 1) Land Use Committee
On Behalf of the Board of Directors



Southeast Community Organization

2105 ½ Old Hudson Road, Saint Paul, MN 55119
www.district1council.org district1council.org/blog

Community Council Office

(651) 578-7600 (phone)
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district1council@gmail.com

Youth Programming

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(651) 578-7404 (fax)
district1chia@gmail.com

April 12, 2023

City of St. Paul
Att: Planning and Economic Development
City Hall Annex
25 West 4th Street, Suite 1300
Saint Paul, MN 55102

Subj: Community Response to Unit Housing Study Phase 2

Honorable Councilmembers and Planning Commissioners,

While comments from the public are welcome and encouraged, it is important to note that the following feedback from the community does not reflect the views or endorsement of the SECO organization nor the District 1 Land Use council:

A community member in attendance (Tom Dimond, D1 Resident) of the committee meeting expressed that saving single-family residential neighborhoods is essential for Saint Paul. Single-family residential neighborhoods would be prohibited in Saint Paul. It was shared that some believed that single family neighborhoods are the economic backbone of the city and that the proposed ban reduces neighborhood housing choices. A ban on single family residential neighborhoods eliminates the most popular residential neighborhood choice and that Saint Paul can ill afford to ban the public's preferred choice. Additionally, that very few in Saint Paul even knew that this ban is proposed.

Some shared that existing zoning allows home owners a choice of the zoning they want. The proposed ban prohibits homeowner choice in single family neighborhood zoning. It was also shared that history allowed the subdividing of single-family homes and incompatible infill. Inner city neighborhoods became blighted and impoverished. An emphasis on protecting home values were suggested as high priorities while prohibiting single family neighborhoods will increase neighborhood overcrowding and increase conflicts like not having a place to park your car.

It was suggested that the State, Saint Paul, and homeowners have invested much work and millions of dollars into restoration of homes and neighborhoods. Questions arose concerning environmental or historic impacts, including the exponential increases of impervious surfaces means runoff has to go somewhere. The proposal increases runoff, erosion, loss of trees and wildlife habitat in the State Critical Area. Property owners were not consulted and have not approved any zoning change to their property. It is important to note that the current St. Paul Zoning Code notes that the district is designed to protect, maintain and enhance wooded areas, wildlife and plant resources, fragile bluff areas, topography and large expanses of natural vegetative cover; to reduce erosion and excessive storm water runoff associated with higher-density development; and to facilitate installation of private wells and individual sewage treatment systems for one-family detached dwellings.

Emma Brown

From: Rick Varco <Rick.Varco@seiuhcmnia.org>
Sent: Wednesday, April 12, 2023 11:40 PM
To: *CI-StPaul_1to4HousingStudy
Cc: Jon Grebner
Subject: Phase Two 1-4 Unit Housing Study Comments
Attachments: Housing Density Resolution 20180426.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Members of the St. Paul Planning Commission:

SEIU Healthcare Minnesota & Iowa encourages you to adopt the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. In fact, we urge you to go further and authorize more housing.

SEIU Healthcare Minnesota & Iowa represents over 50,000 members in hospitals, clinics, nursing homes, and self-directed home care. This number includes over 3,000 St. Paul residents. Despite good union jobs, fewer and fewer can afford to live in St. Paul. Many of our members want to live in St. Paul and be near their jobs at places like United Hospital. But high rents have forced too many of them to move to distant suburbs. While they saved on housing, they added car expenses and long commutes away from their family. This is bad for workers, bad for families, and catastrophic for the planet.

Building more housing in St. Paul is a pro-labor position. I want to draw your attention to a 2018 resolution passed by all four local of the SEIU Minnesota State Council, including our local, SEIU Local 26, SEIU Local 284, and Workers United. There are many ways to address affordable housing, but we believe relaxing zoning rules to allow more construction is the most cost-effective because it costs the city nothing. But it is also a necessary step. Without changing the rules to allow sufficient dwelling places for all of those seeking to live in St. Paul, housing subsidies and other programs will simply elevate a few local winners while depriving the large mass of workers of the housing they need.

The proposed zoning amendments from the Study are a good start, but we encourage you to go further. We recommend the following changes to allow more workers to afford homes in St. Paul:

1. Consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2 and eliminate the proposed zoning district H1. If you allow the areas of Saint Paul currently zoned R1-R3 to have as many homes per lot than the areas currently zoned R4-RT2, you will increase the supply of housing at no cost and without harming any legitimate interest. In addition, applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in the 2040 Comprehensive Plan. When we invest in public transit, we owe it to taxpayers to allow as many people as possible to live within the service area of such an expensive public investment.
3. We support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings. Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Workers need affordable places to live that are near the good healthcare jobs in St. Paul. Unless we legalize more housing in St. Paul, rents will continue to soar. Low-income residents will be priced out and forced to move. The City should not cater to the nostalgia of the well-off, but, instead, provide abundant housing opportunities for the many.

Rick Varco
Political Director

Residential Address
2265 Youngman Ave. #208
St. Paul, MN 55116

SEIU MN State Council Resolution in Support of Increased Housing Density
Adopted April 26, 2018

Whereas, SEIU members face increasing costs for housing, especially in Minneapolis and St. Paul; and

Whereas, local governments, especially Minneapolis and St. Paul, use their zoning authority to limit housing density and the number of new housing units that can be built, thus increasing the cost of housing; and

Whereas, dense urban areas generate fewer greenhouse gasses per person and promote union construction jobs;

Be it resolved, that the SEIU Minnesota State Council generally opposes zoning limits on density and supports changes to the 2040 comprehensive plans in Minneapolis, St. Paul, and other cities to allow greater density; and

Be it further resolved, that the SEIU Minnesota State Council specifically supports the proposal in Minneapolis to legalize 4-plex dwellings citywide.

From: [Maggie Wenger](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Cc: [Simon Taghioff](#); director@summithillassociation.org; [#CI-StPaul_Ward2](#)
Subject: Summit Hill Association Comments on the 1-4 Unit Housing Study Phase 2 Amendments
Date: Wednesday, April 12, 2023 7:05:41 AM
Attachments: [Letter 1-4 Unit Phase 2 03-2023.pdf](#)

Hello,
Please find attached comments from SHA on the 1-4 Unit Housing study.

Sincerely,
Maggie Wenger
ZLU Chair
Summit Hill Association



860 St Clair Ave
St Paul MN 55105

651.222.1222
SummitHillAssociation.org

April 12, 2022

To: Saint Paul Planning Commission
Luis Perreira

CC: Rebecca Noecker

Re: Residential 1-4 Unit Housing Study, Phase 2 Amendments

Dear Members of the St Paul Planning Commission:

We appreciated Planning Staff attending our March 21 Zoning & Land Use Committee meeting to introduce the Phase 2 amendments.

Missing middle housing was a common theme and priority throughout the District 16 Neighborhood Plan engagement. Summit Hill contains many examples of missing middle housing and we support the city's efforts to make construction of new, small-scale multifamily housing as simple as possible. This type of development could be a viable way to add housing in established neighborhoods like Summit Hill.

We have comments on several aspects of proposed amendments and on items the city should consider when it moves into implementation:

Victoria and Grand Neighborhood Node

The proposed amendments identify the residential parcels between Summit, Goodrich, Milton, and Avon as R3 in the proposed zoning, as they are within $\frac{1}{8}$ of a mile of the neighborhood node identified in the 2040 Plan. In reality, Grand Avenue is a *linear* mixed use corridor. We would like the City to consider changes to better match R3 to the existing RT1 zoning that extends along Lincoln Avenue west to Ayd Mill Road, and also consider the intersections of major arterials served by transit routes such as at Grand and Lexington.

Traditional Neighborhood Design Standards for Multi-Family H District Developments

With the amended districts, the kind of residential building that can now be built in an H district now closely resembles what is permitted in the RM and T districts, e.g. multi-family buildings with up to 6 units on a standard city lot in H3, or more on oversized lots. In an infill context, multi-unit buildings will now coexist

alongside existing lower density buildings. How new developments relate to what's already there is important to our neighborhood.

We suggest the City ensure that the existing Traditional Neighborhood District design standards¹ are applied to multi-family developments within the new districts, regardless of configuration. This would ensure multi-family developments within the new H districts are regulated consistently with multi-family developments in other zoning districts.

We would also suggest a review of the design standards themselves to assess whether there are opportunities to update them given the new building types and lot configurations proposed in the Phase 2 amendments.

City-Approved Plan Sets

Based on the economic analysis performed for this study, it is clear that these developments are not expected to be very profitable for owners or developers, with margins of 6-10% suggested as typical. This is doubly true in our neighborhood, where housing and land prices are relatively high, and reconfiguring older properties is expensive.

One suggestion to improve the viability of these changes is for the City to provide pre-approved plan sets for some of the common lot and unit types. This would save property owners time and money. Many other cities have provided this option as part of their ADU programs.² If possible, extending this to duplex or duplex+ADU plans might encourage more missing middle implementation. These plans could be developed specifically to reflect and respond to St. Paul's historic neighborhoods in design and scale.

We appreciate your ongoing work to create new avenues to add housing of many types to our city and neighborhoods. Thank you again for attending our committee meeting and providing webinars and other tools for public review and comment.

Sincerely,

Monica Haas
Executive Director

Simon Taghioff
President

Maggie Wenger
ZLU Chair

¹ Sec. 66.343

https://library.municode.com/mn/st._paul/codes/code_of_ordinances?nodeId=PTIILECO_TITVIIIIZOCO_CH66ZOCOONDIUSDEDIST_ARTIII66.300.TRNEDI_DIV466.340.RECO_S66.343TRNEDIDEST

² City of Eugene, OR ADU Library <https://www.eugene-or.gov/4708/Homeowner-ADU-Info>

Emma Brown

From: Sherry Johnson <facilitator.sher@gmail.com>
Sent: Thursday, March 16, 2023 10:02 AM
To: *CI-StPaul_1to4HousingStudy
Subject: LOVE the report

Hi, there. I'm incredibly happy that Saint Paul planning staff have produced the work just released on the 1 to 4-Unit Housing Study. So much here to enable more ample and affordable development at neighborhood scale. The density bonus is a HUGE plus, as well.

Thank you for your work, and please pass my comment on to the Planning Commission and officials who will be voting on this important set of zoning reforms.

Sherry Johnson
820 Osceola Ave
Saint Paul

Emma Brown

From: Sherry Johnson <facilitator.sher@gmail.com>
Sent: Thursday, March 16, 2023 10:14 AM
To: *CI-StPaul_1to4HousingStudy
Subject: Re: Automatic reply: LOVE the report

Follow Up Flag: Follow up
Flag Status: Flagged

Just checking... I didn't add my zip code to my address. Is that needed?

If so, it's:

Sherry Johnson
820 Osceola Ave
Saint Paul, MN 55105

On Thu, Mar 16, 2023 at 10:02 AM *CI-StPaul_1to4HousingStudy <1to4HousingStudy@ci.stpaul.mn.us> wrote:
Thank you for submitting your comments for the 1-4 Unit Housing Study Phase 2 amendments.

In order for your comments to be included in the public record, you must make sure that you have included your full name and address of residence. Testimony without this information will not be provided to the Planning Commission and will not be included in the record.

Please note: The deadline to receive written testimony is at noon on Thursday, April 13, 2023. You may also testify at the public hearing at the [Planning Commission meeting](#) on Friday, April 14 at 8:30 a.m. at City Hall, room 40.



SIERRA CLUB

NORTH STAR CHAPTER

2300 Myrtle Avenue, Suite 260
Saint Paul, MN 55114
612-659-9124
sierraclub.org/minnesota

April 12, 2023

1 to 4 Unit Housing Study
25 West 4th Street, Suite 1400,
Saint Paul, MN 55102
(Sent by email: 1to4HousingStudy@ci.stpaul.mn.us)

Dear Saint Paul Planning Commission:

The Sierra Club North Star Chapter is in strong support of the proposed changes to Saint Paul's zoning code.

As the Planning Commission and city staff have discussed in their excellent presentations, there are many reasons to support increased residential density in the city. Letters by others, including Sustain Saint Paul, describe in detail the benefits of the proposed residential zoning changes.

Another letter of support by Barb Thoman raises questions and concerns for further study and evaluation, such as what type of spaces we should be looking at for housing development, impervious surfaces, setbacks, tree canopy, and architectural salvage.

We refer you to those letters for further elaboration.

Briefly, the benefits of the proposed zoning include:

- Encourage construction of new affordable housing and remodeling of existing larger single-family homes into multi-family units,
- Increase the city's tax base and better utilize existing city infrastructure,
- Support local neighborhood shops and services (through increased population),
- Promote transit frequency and use (through increased population and density along major transit corridors),
- Provide strategies to address climate change by reducing vehicle use and bringing people closer to destinations, and
- Simplify the zoning code and make it fairer.

The Sierra Club does have concerns about the amount of possible impervious coverage allowed on a lot, up to 80% if you include cement walks and patios. Is 20% non-impervious greenspace enough to manage all the runoff from impervious surfaces on a fully developed site? Runoff from roads, buildings and parking lots already carries pollutants to our wetlands, lakes and rivers. Flooding is also a possibility when water can't percolate into the soil, not a small problem in this era of extreme weather events. Basements of neighboring houses and businesses can be affected by runoff as well. Since up to 20% of a lot could be in impervious parking and driveways (garages are additional), we suggest that the current code for allowable paving materials be updated to include gravel, which can be permeable under certain conditions, but not currently listed under "paving" (sec.63.316).

We are pleased to see that the proposed changes to the code include bonuses for nearness to transit, which provides an incentive for residents to own fewer vehicles and commits less space to parking.

We hope that additional incentives will be explored to encourage fewer vehicles parked on a lot and on nearby streets, along with incentives for other runoff mitigations such as rain gardens and other stormwater Best Management Practices (BMPs). Beyond runoff from parking pads, cars and trucks are a huge source of climate and air pollutants as well, and ways of incentivizing people to reduce car ownership should be explored.

Thank you for your work on these proposed zoning changes.

Sincerely,

Mathews Hollinshead
Conservation Chair
Sierra Club North Star Chapter

###

The Sierra Club North Star Chapter is the Minnesota branch of the national Sierra Club. We are 50,000 Minnesotans empowered to protect our communities' well-being through environmental protection.

From: [S Mason](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Cc: [kristinemariongrill@gmail.com](#); [hackney.troy@gmail.com](#); [holst046@gmail.com](#); [nmhood@gmail.com](#); [midwaygg@msn.com](#); [libbykantner28@gmail.com](#); [i.j.khadar@gmail.com](#); [brian.c.martinson@gmail.com](#); [gmcourtrey07@gmail.com](#); Stephen Moore; [mauricio.j.ochao@gmail.com](#); [lortega753@gmail.com](#); [nieeta@yahoo.com](#); [luiserangelmorales@gmail.com](#); James Guenter; Kari; [Eeva Savolainen](#); [Jeff.risberg@gmail.com](#); [libby.starling@comcast.net](#); [usstmc@gmail.com](#); [stthomas@abcrealtytwincities.com](#); [Karoline Finlay](#); [jake.reilly76@gmail.com](#); [Simon Taghioff](#)
Subject: COMMENTS ON PHASE 2 HOUSING STUDY
Date: Monday, April 17, 2023 4:18:28 PM
Attachments: [PUBLIC COMMENT on proposed new residential, Updated April 17 v5.pdf](#)

Commissioners

Please accept the following as public comments on the 1-4 Housing Study.

As background, I have a Master in Architecture from the University of Minnesota, and now focus on residential design, mostly in St Paul. Personally and professionally, I am big supporter of Missing Middle development. On a personal level, I grew up in St Paul's historic ~~Missing~~ Middle housing: in a 1913 home that looked like a single family home but in fact was two homes. I now am raising my children in ~~Missing~~ Middle housing, in a 7-unit condominium. On a professional level, I have had many clients come to me with Missing Middle projects. Example: client on West Side who would like to convert a duplex into a triplex; clients in Merriam Park and Dayton's Bluff who want to build a small townhouse developments, clients in W. Seventh interested in building a new construction duplex with an ADU on a small infill lot. None of these projects is allowed under current zoning by right. Recognizing that zoning is not the only difficulty to middle-scale projects — costs, banks and lending, and conflicting building code requirements add to the complexity of these small projects—the zoning changes proposed stand to make these types of projects more possible.

However, I am writing with a mixed review. The proposed changes hold much promise, but also fail to hit the mark. The Planning Commission asks the question:

Does the draft ordinance strike the right balance of encouraging more neighborhood-scale housing to be developed over the long term on lots throughout the city, while also managing the pace of change to minimize potential displacement pressures on existing neighborhoods and residents? Why or why not?

As proposed, the answer is no, the changes do **not** (yet) strike the right balance.

There's a lot to like in the proposed Phase 2 changes: the top two are (1) allowing more housing units at neighborhood scale, and (2) the desire to reduce complexity of the code. Related to the first goal of increasing the number of households and housing opportunities, re-legalizing duplexes nearly everywhere, combined with the ability on larger lots to increase the number of units beyond duplexes to townhouses, 3- and 4-plexes is the most important component for accomplishing this key goal. Related to the second goal, the best areas of Phase 2 are where it makes zoning guidelines easier to read and understand, making the code more accessible and user-friendly.

The two greatest concerns I have center on the same two issues: **scale and complexity**. Several of the specific changes related to heights and dimensional limits in particular **go far beyond "neighborhood scale"** and allow development that would eliminate far too much open space, light, and air—the exact qualities that make a section of the city feel like

“neighborhood” and not an urban center. Maintaining neighborhood scale is important for many reasons, but often overlooked are the environmental benefits of yards, especially the tree canopy in yards for lessening urban heat island, clean air, storm water management, and both slowing as well as mitigating the ill effects of climate change. Changes that would increase impervious surface and reduce space for trees needs to be thoughtful and gentle. Similarly, the reductions in complexity need to be thoughtful to avoid diminishing the rich diversity present in the neighborhoods of St Paul. The zoning code can help shape and honor the unique characteristics and development patterns of St Paul, and avoid making the city more homogenous and less architecturally distinct and diverse.

In closing, I just listened to the meeting from Friday 3/14/23. I wish I had been able to attend. There were far fewer members of the public in attendance to comment than I would have expected given the magnitude of the changes proposed. Comments made about this being a zoning change to individual properties made with insufficient notice gave me pause. While I personally support Missing Middle throughout the city, I hope that outreach to a wider populace in St Paul is conducted. The comments made toward the end by architect Guyus Nelson (spelling?) also struck a chord with me. He expressed concern for unintended consequences of these changes, both of losing existing housing to of "maxed out" single family houses. I appreciated his comments in favor of District 13 and 14's zoning code text amendment—relatively recent, as zoning changes go — also resonated with me. I hope that sufficient time will be taken so the details can be worked out to strike the right balance.

I have attached a document I hope you will take the time to look over in whatever of level of detail you are able. I wish I had a little more time to edit it, and even address more of the changes in the footnotes. Please admit the document to the public record.

Kind Regards
Sonja Mason
Sonja Mason home Design LLC
21 St Albans St

PUBLIC COMMENT ON PROPOSED NEW RESIDENTIAL ZONING

PHASE 2 CHANGES TO LOW-DENSITY RL-RT2 ZONING DISTRICTS

DATE: DRAFT 4/17/23

BY: SONJA MASON, M. ARCH, PRINCIPAL OF SONJA MASON HOME DESIGN LLC

Summary

The following is my professional assessment of the Phase 2 of the 1-4 Unit Housing Study. As background, I am an intense supporter of *Missing Middle* development.

This document is focused on two areas: (1) presenting an analysis, including a more detailed section, and recommendations, in the form of a qualitative assessment of the proposed changes toward the state goals (2) The second part is a factual summary, to help make the changes more digestible.

Following is an overview summary of the changes, presented in sections:

- I. ANALYSIS & RECOMMENDATIONS
 - a. One Page Summary 2
 - b. Rationale for Establishing Appropriate Limits
 - i. "Neighborhood scale" 3
 - ii. Solar access , trees, run off mitigation 4
 - c. Overview of Recommendations 6
 - i. Specific Recommendations 7-12
- II. ANNOTATED ZONING MAPS (FULL CITY) 13
 - a. Annotated Neighborhoods:
 - i. Summit Hill & Ramsey Hill 14
 - ii. Highland Park and Daytons Bluff 15
 - iii. Merriam Park and North End/Como Park 16
 - iv. West Side and Payne-Phalen 17
 - b. Text Description of Proposed Changes 18-21
 - c. Visual Examples of Proposed Changes 22
- III. FOOTNOTES AND DEEPER DETAIL (incomplete) 23

I.a One Page Overview Summary

The **three best things**: the best part of the proposed changes are allowing more units throughout the city.

1. Duplexes would be allowed, subject to lot size limitations, throughout the city.
2. Number of units is linked to lot size alone, such that more units (townhouses, triplexes and quadplexes) can be allowed within house-size structures on larger lots.
3. Setbacks, height limits, and other dimensional standards are no longer linked to the number of units. In other words, within the same zoning district, a single-family home or a duplex would now have the same size rules: same setbacks, same height limit, etc.

The **six changes most needed**: to make it simpler and more equitable, as well the strike the balance between preserving open space and adding more housing. The changes should allow “house size” buildings only in R1 (H1-H2) and only slightly larger in R2 (H3).

1. Consistency has value. Instead of introducing new H names (e.g. H1, H2, H3) **retain the known and common R names** (R1, R2, etc.)
2. Instead of three new districts (H1-H3), create just **two new districts**: R1 and R2. In other words, combine the proposed H1 and H2 to a single R1 district. This would be more equitable with the vast majority of the city having the same R1 district, subject to newly defined standards.
3. The **more intense (H3 or better named R2 district) should only be located within walking distance of high-speed transit corridors**. This just makes sense: the new place higher intensity developments will likely not provide off-street parking. We should place them where people have the best opportunity to live car-free.
4. The **height limit should remain the same**: 30 feet for R1 (current height limit for all single family home districts) and 40 feet for R2 (current limit for town houses “RT2”)
5. **Front setbacks should remain at the current 25 feet** or at most be reduced slightly, perhaps to 20 feet. The proposed reduction to front setbacks of only 10 feet as inappropriate and would eliminate too much open space. Within set back rules, the “match existing” provision should be kept in strengthened, instead of weakened. In the areas of the city, where there are predominantly, smaller setbacks, those would be retained, and it would prevent people from building houses in front of their houses on Mississippi River Boulevard, which would be a travesty.
6. Side yards & **Sidewall Height Limit**. A 5 foot side yard set back is proposed uniformly. This is only acceptable if it is paired with a side wall height limit, to preserve solar access (There is currently a sidewall height limit for Ward 3. The changes proposed to eliminated, but it should be added to the whole city.

I.b DEEPER DETAIL: ANALYSIS & CONCERNS

Recent Construction Examples: What Might New In-fill buildings look like?

Below are internet images plus an existing townhouse development on Marshall Avenue showing multifamily varieties that “fit in” with the scale of neighborhood streets in St Paul. On the bottom right is a Grand Avenue 4-plex is on a typical narrow 40 foot lot. This 4-story tall & skinny is **not neighborhood scale**, and is not suitable for neighborhood streets. The building has a front set back of around ten feet and a side setback of around 5 feet. The 4-story height is around 38-40 feet. As proposed, this size and shape of structure would be allowed in proposed H3 districts, as well as in H2 district with a CUP. The Grand Avenue apartment is beyond a “gentle” increase in scale and **should not be allowed by dimensional standards**

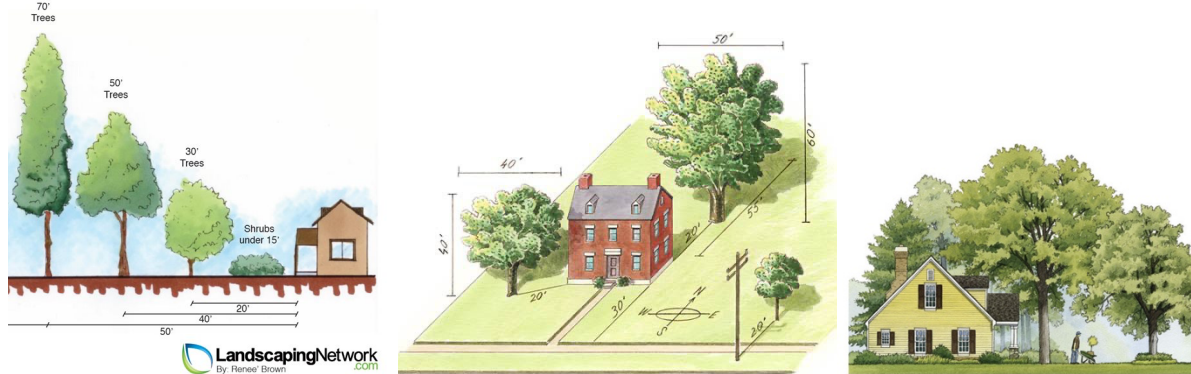


... a very important aspect of the concept of Missing Middle Housing, as we define it, is **thoughtful form and scale (livability), or what we often call “house scale.”** This concept is not about simply creating more density. These “house scale” types of multiple-unit buildings have historically delivered attainability and are also in high demand from a growing number of households that do not want to live in single family homes.¹ - Daniel Parolek

¹ Daniel Parolek <https://opticosdesign.com/blog/top-five-missing-middle-mistakes/>

Why does Scale Matter? Tree Canopy & Density

According to WRI, to mitigate and slow climate changes, urban forests should aim for 43.3% tree coverage². St Paul currently has a tree canopy of 32.5%³, and in St Paul, “residential, single-family parcels offer the greatest area for increased canopy cover².” We need to ensure that we add density in a manner that not only does not have a negative impact, but allows the tree canopy to grow. Maintaining sufficient space for trees via setbacks, combined with lot coverage and height limits will support growing the tree canopy in the city.



Why does open space matter? Flooding and Run off

Similarly, preserving lot coverage limits is important to provide sufficient pervious surface to absorb rainwater.

How wall height (vertical setbacks) can support trees (& prevent the need to relocate utilities in the alley)

A study of urban trees in Science Direct showed that building height is the main predictor of tree failure⁴. In our neighborhoods, the existing height and front setback limits, in particular, create the open space for trees to grow and flourish. Trees can't be too close to sidewalks, houses, and taller trees need more yard space for their roots to grow, and air space for their canopies to spread out. Too small yards will limit trees heights.

Sidewall height limits currently existing in the zoning code for Ward 3 only. The proposed changes propose to eliminate the sidewall height limit. Instead, the sidewall limit should be extended to all R districts.

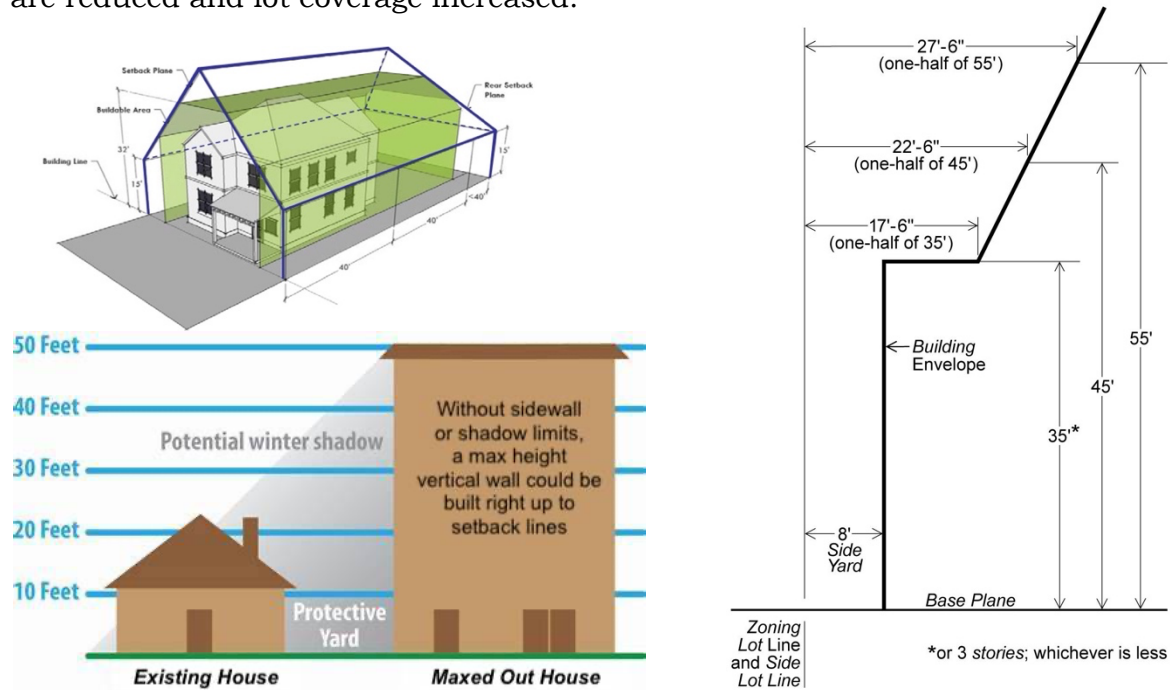
² World Resources Institute: “Conserving forests and avoiding forest degradation is renowned as one of the most cost-effective strategies to lower emissions. Many communities are pledging to achieve carbon neutrality by mid-century, and forests and trees can help achieve the last mile of emission reductions needed to achieve these ambitious climate goals. At the global scale, ending forest conversion, preserving existing forest carbon sinks and restoring degraded forests has the potential to avoid more than one-third of emissions” <https://www.wri.org/insights/urban-trees-city-climate-action>

³ <https://www.stpaul.gov/departments/parks-and-recreation/natural-resources/forestry/urban-tree-canopy-assessment>

⁴ “The proportion of tree failure is 37% lower than the city’s average in relatively newer districts with low building height” <https://www.sciencedirect.com/science/article/abs/pii/S1618866722002084>

How to Control Scale Effectively? The Importance of Height and Setbacks

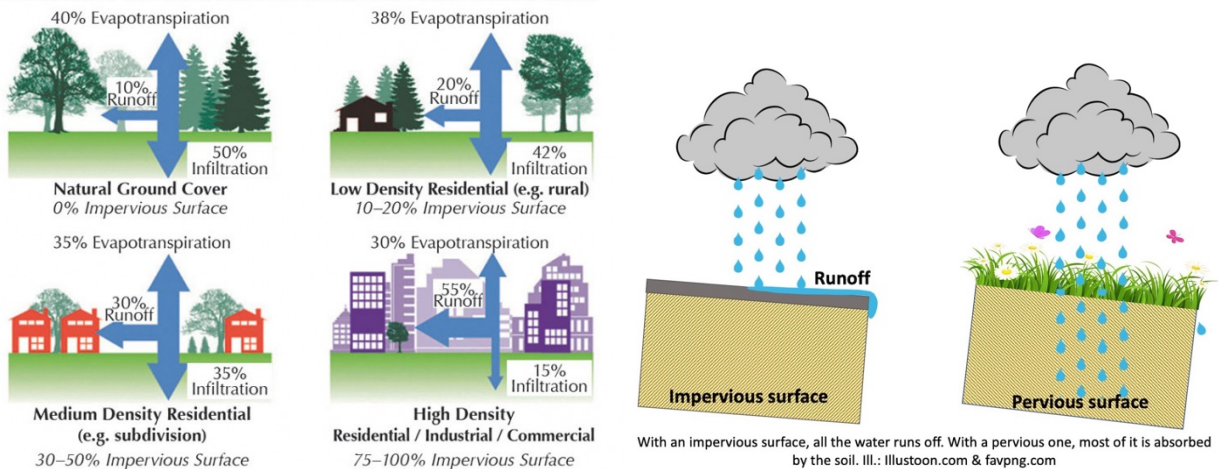
Open space for trees can be controlled by yard requirements (“setbacks”) combined with height limits. Sidewall height limits and step back requirements can be used to ensure that space for light, air, and trees is preserved even when dimensional limits are reduced and lot coverage increased.



How to Control Run off and Prevent Run off? Maintain lot coverage limits.

Too small yards will limit the ground’s ability to absorb run off and rain water. Too dense of buildings will increase run off and flooding. The zoning code needs to preserve. Increases in lot coverage should balance the needs of absorbing rainwater

EFFECTS OF IMPERVIOUSNESS ON RUNOFF AND INFILTRATION



I.c Overview of Recommendations

A letter from the Planning Commission asks the question:

Does the draft ordinance strike the right balance of encouraging more neighborhood-scale housing to be developed over the long term on lots throughout the city, while also managing the pace of change to minimize potential displacement pressures on existing neighborhoods and residents? Why or why not?

There's a lot to like in the proposed Phase 2 changes: the top two are (1) allowing more housing units at neighborhood scale, and (2) the desire to reduce complexity of the code. Related to the first goal of increasing the number of households and housing opportunities, re-legalizing duplexes nearly everywhere, combined with the ability on larger lots to increase the number of units beyond duplexes to townhouses, 3- and 4-plexes is the most important component for accomplishing this key goal. Related to the second goal, the best areas of Phase 2 are where it makes zoning guidelines easier to read and understand, making the code more accessible and user-friendly.

As proposed, however, the answer is no, the changes do **not** (yet) strike the right balance. The two greatest concerns I have center on the same two issues: **scale and complexity**. Several of the specific changes related to heights and dimensional limits in particular **go far beyond “neighborhood scale”** and allow development that would eliminate far too much open space, light, and air—the exact qualities that make a section of the city feel like “neighborhood” and not an urban center. Maintaining neighborhood scale is important for many reasons, but often overlooked are the environmental benefits of yards, especially the tree canopy in yards for lessening urban heat island, clean air, storm water management, and both slowing as well as mitigating the ill effects of climate change. Changes that would increase impervious surface and reduce space for trees needs to be thoughtful and gentle. Similarly, the reductions in complexity need to be thoughtful to avoid diminishing the rich diversity present in the neighborhoods of St Paul. The zoning code can help shape and honor the unique characteristics and development patterns of St Paul, and avoid making the city more homogenous and less architecturally distinct and diverse.

The good news is that with some tweaks, the proposed changes could easily strike the balance. Please consider these constructive critiques:

MEMO
PAGE
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ARE IN THE
MARGINS

I.d Specific Recommendations

Further Simplify Residential Districts (“New” Zoning Districts) (66.211-63.212)

This is an area where greater reduction in complexity is warranted. Instead of creating the three new “H districts,” simply consolidating the six common low density R districts (R1-RT2) into **two districts: R1 and R2** would have several advantages.

- **R1 Low-Density District:** uniform low density residential district in neighborhoods, re-zones all R1-RT2 districts located more than 1/8 mile from high frequency transit
- **R2 Low-Density District:** uniform high frequency transit low density residential district, re-zones all R1-RT2 districts located within 1/8 mile of high frequency transit

PAGE
2

There are four benefits: (1) naming consistency has value; (2) better supports transit; (3) easier to understand; (4) more geographically equitable.

Benefit #1: Consistency. Keeping the “R” naming standard provides consistency and simplicity. Calling Residential property R zones is not just the known standard in St Paul, but it is also the standard in other communities. Predictability and consistency have tangible benefits. Changing the naming standard from R to H will require text changes throughout the entire zoning code. Keeping the “R” naming pattern can prevent errors of omission.⁵

Benefit #2: Support Transit. The revised R2 District (replaces H3) should be reserved **only for housing in walking distance of transit corridors**, and not for neighborhood nodes. Some neighborhood nodes are well served by high frequency transit (HFT), but others are not. Adding more intense density to nodes where residents do not have HFT is not equitable, and goes against LU-1, which prescribes that the majority of growth be directed to “areas with the highest existing or planned transit capacity”:

Policy LU-1: Encourage transit-supportive density and direct the majority of growth to areas with the highest existing or planned transit capacity

It’s also adaptable: as the high frequency transit network grows, R1 residential districts adjacent to the new or improved routes would be up-zoned to R2.

Benefit #3: Comprehension. Simplification of residential districts bears many fruits. Having just two districts is **easier to understand**, and having just one defining difference is easier to understand. Many of the proposed standards between H1, H2, and H3 are the same. (For example, the six districts R1-RT2 have differing standards for front and especially side setbacks. The proposal for H1-H3 largely unifies all setbacks.) Further by using proximity to transit as the distinction between R1 and R2 not only supports LU-1, but it is much easier to understand. Nearly any adult resident

PAGE
2

⁵ There are at least two references to R-districts are not updated to H-districts within the sections currently proposed for text amendments. An example to avoid: Minneapolis zoning changes made its residential zoning exceptionally difficult to navigate zoning code. Some sections still reference deleted districts and provisions, and all properties have navigate requirements from both the main zoning district and an entire new overlay categories that distinct from overlay districts. We can do better, St Paul. ;)

can name where the closest bus route or LRT route is, and can do so without consulting a table or complicated zoning map. The same can not be said for identifying the neighborhood nodes defined in the 2040 plan.

Benefit #4: Equity. The distinction between the defined H1 and H2 continued the arbitrary differences of the R1-RT2 zoning districts, and resulted in uneven distribution of H1 and H2 between St Paul’s seven wards. Consistent R1 district is **more equitable**, allowing growth more evenly between wards and neighborhoods. Further, it has the potential added bonus of making the tireless job of street maintenance easier. Many proposed H1 districts are concentrated in **areas where there is more capacity** for additional on-street parking (example, less dense neighborhoods like Highland Park and Battle Creek). Conversely, H2 is more common in areas where density and on-street parking congestion are already high (example: W Seventh and Summit Hill). This winter has heightened everyone’s awareness of the trade-offs in plowing and other street services in neighborhoods where on-street parking demand is high.⁶

In the key areas where neighborhood unique distinctions are valuable components in creating rich diversity of our urban neighborhoods, footnotes are available. An example of a “rich diversity” complexity is the “match existing” front setback provisions (632.21(f)), which will be covered more in depth in due course.

Finally, the “intent” statements (66.212 R1 and 66.231 R2) would need to be re-worded somewhat to reflect their new distinctions: R1: “It is intended for use in neighborhoods that do not yet have fixed rail and bus rapid transit corridors within 1/8 mile.” R2: “It is intended for use near transit routes along fixed rail and bus rapid transit corridors”

Low Density & Medium Density Districts:

A new defining term for RL-R2 districts is needed to replace “one-family districts,” I would propose the benign “**Low-Density Residential**” because it is common and expected terminology. RM1-RM3 could then be re-named “**Medium Density Residential.**” (High-density residential is for downtown, allowed in B4 and B5). Medium Density fits the step up in intensity from R1-R1 to RM1-RM3, and conveniently can represent the “M” in “RM.”

Changes to Land Use Standards (66.221)

The land use changes in Table 66.221 to expand the type of dwellings permitted in all low density districts is the single most important feature of Phase 2. Adding duplex and multifamily dwellings as permitted uses to single family dwellings in low density residential districts is the largest step toward accomplishing neighborhood-scale “Missing Middle” (MM) housing:

⁶ “Saint Paul has a parking problem, not a plowing problem, according to [Public Works’ public information manager Lisa] Hiebert. She cited the lack of off-street parking at many apartment buildings and the low level of compliance with the city’s snow emergency rules.” *MyVillager* “City officials explain special challenges of plowing in winter of 2022-23” Feb 10, 2023.

The form and scale limits (66.231 and 63.232) work in concert with the important defining change in 66.221 to ensure that low density districts can grow while retaining compatible scale and form.

Changes to Lot, Density & Dimensional Standards (66.231) (63.232)

Modifying the related elements of form—namely lot, density and dimensional standards—is the trickier component. And this is where the proposed changes do not (yet) strike the right balance.

The goal of MM is to ensure that infill housing thoughtfully blends and maintains the features that make our St Paul neighborhoods desirable to current and future residents.

Building form is a function of both the physical size of structures, placement on the lot, and the amount of the lot that can be covered and that must be left open (as yard or sky).

Gentler Increases to Size & Form Needed:

In general, the changes proposed to the dimensional standards should be more **gentle**,⁷ with lower height limits and setbacks a smaller step up from the existing standards. In particular, the reductions front yard setback and the increase in allowed heights⁸ are much too great of a change for many (but not all) neighborhoods. And, for those neighborhoods where taller and larger scale houses are already common, “match existing” footnotes can support neighborhood norms and variety. For the same reasons, the height bonus should be eliminated, as those goals can be better accomplished with density bonus.

PAGE
7

Missing Middle Mistake 4 – Not effectively regulating form and scale to ensure “house scale”⁹

Given the relationship being lot and building, and in the interests to ease of use, I would propose a restructure of 66.231 and 66.232, to combine lot size, density, coverage in one table, and

This will accomplish a more gentle increase in size of buildings, while the land use changes in Table 66.221 (more than just single family) and density changes in (Table 66.231) will do the heavier lifting to increase density by allowing an increase in the number of units behind the doors.

Organizational Changes: Lot Size Minimum Standards & Lot Number of Unit Maximums

For ease of use, I would also propose two organizational shifts.

⁷ APA, “Practice Gentle Density” “Bulk and dimensional standards can play a significant role in blending missing-middle housing types into new and existing neighborhoods.” <https://www.planning.org/publications/document/9263625/>

⁸ Increases in height are not in Table 66.231 (, they are in footnotes and conditional use options

⁹ Daniel Parolek <https://opticosdesign.com/blog/top-five-missing-middle-mistakes/>

(1) Separate Low-Density (RL-R2) and High-Density residential tables (RM1-RM3), and divide the footnotes to be directly below their respective table. Currently, there are very few footnotes that apply to both, and they could simply be duplicated under each table. This will increase readability by locating applicable footnotes closer to the Dimensional Standards that they modify.

- Table 66.231a Low-Density Residential (RL-R2)
- Table 66.231b Medium-Density Residential (RM1-RM2)

(2) Some lot use standards (minimum size, new number of principal units) are in Table 66.231 and one (lot coverage) is separated alone in 66.232, and not in table format. Adding lot coverage to the Table 66.231 would place all the important dimensional standards in one place, aiding comprehension

, whether that’s families with young children, senior citizens, eholds, Parolek specifically cautions against “pencil houses”

Density: Lot Size Minimum Standards & Lot Number of Unit Maximums

Below is a proposed revision of select elements of Table 66.231

R1 District standards for lot area would keep the 2,000 square feet per unit standard (proposed for H1) for R1, with the proposed density bonus to encourage affordable housing (66.231(x)) . It would bring current lower density residential lots up to the current townhouse standard (District RT2). The new R2 would keep the 1,000 square feet per unit standard (proposed for H3). Both is these are sizeable increases in the allowed density compared to the current ranges.

Zoning District	Lot Area Minimum (per principal unit)		Lot Width Minimum (feet)	Maximum Number of Principal Units Per Lot	
	(square feet)				
RL	9,000	(a)	60	2	
R1 (H1 and H2)	2,000	(a)	30	3 / 4 on corners	(b)
R2 (H3)	1,000	(a)	25	4	(b)

Dimensional Standards: Building Height and Setbacks

St Paul’s tree canopy is central to both fighting and mitigating climate change, and according to the WRI, urban forest should aim for 43.3% tree coverage¹⁰. St Paul currently has a tree canopy of 32.5%¹¹, and in St Paul, “residential, single-family parcels offer the greatest area for increased canopy cover².” A gentler reduction in yard setbacks will strike a better balance *encouraging more neighborhood-scale housing, while also managing the pace of change*. Making sure we have room for trees benefits yields compounded benefits: better health through better air quality, storm water management, shade and lower cooling costs, and the less tangible but no less real benefit of higher quality of life.

The current 30 foot limit generally keeps roofs below tree canopies, and **should be maintained for R1**. Since the height bonus increases the allowed by five feet, there should be no increase

Zoning District	Height Maximum	
	(feet)	
RL	30	(c)
R1 (H1 and H2)	30	(c)
R2 (H3)	35	(c)

Page 9 states that the reduction in yard setbacks proposed were inspired by T districts, a mixed-use design standard intended for commercial and mixed use corridors outside of downtown. With respect, we disagree that a commercial mixed-use typology is the right model to emulate for residential neighborhoods. One of the repeated¹² main goals is to support “neighborhood-scale” housing. The height of buildings, as well the space between buildings are central components to what makes a residential neighborhood distinct from commercial district, a mixed use corridor, and medium density residential centers, like Upper Landing, along University Avenue, or Highland Bridge.

Zoning District	Minimum Yard Setbacks (feet)				
	Front		Side		Rear
RL	30	(d)	10	(f)	25
R1 (H1 and H2)	20	(d)	5	(f)	25

¹⁰ World Resources Institute: “Conserving forests and avoiding forest degradation is renowned as one of the most cost-effective strategies to lower emissions. Many communities are pledging to achieve carbon neutrality by mid-century, and forests and trees can help achieve the last mile of emission reductions needed to achieve these ambitious climate goals. At the global scale, ending forest conversion, preserving existing forest carbon sinks and restoring degraded forests has the potential to avoid more than one-third of emissions” <https://www.wri.org/insights/urban-trees-city-climate-action>

¹¹ <https://www.stpaul.gov/departments/parks-and-recreation/natural-resources/forestry/urban-tree-canopy-assessment>

¹² “Neighborhood-scale housing” occurs 9 times in the City Memo

R2 (H3)	15	(d)	5	(f)	10
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Foot note (f)

Height Bonus

Rear yards allow ADUs, so the reduction in rear setbacks will serve to promote larger buildings rather than more housing per se, for this reason a larger rear setback should be maintained and the separate standard for detached building remains.

See discussion on footnotes to Table 66.231

Add Lot Coverage to Table 66.231

Lot coverage is currently addressed in a different section of the zoning code (66.232) than other dimensional standards. For better accessibility, it should be added to Table 66.231.

Zoning District	Maximum Lot Coverage (Total)	
	(all structures)	
RL	35%	(a)
R1 (H1 and H2)	40%	(a)
R2 (H3)	45%	(a)

A foot note for cluster homes should be added (a) except for cluster developments under the provisions in section 65.130.

66.231 “Density Bonus” : Eliminate the density bonus for large units: (b) One additional dwelling unit is permitted for each principal dwelling unit on the zoning lot containing three (3) or more bedrooms.

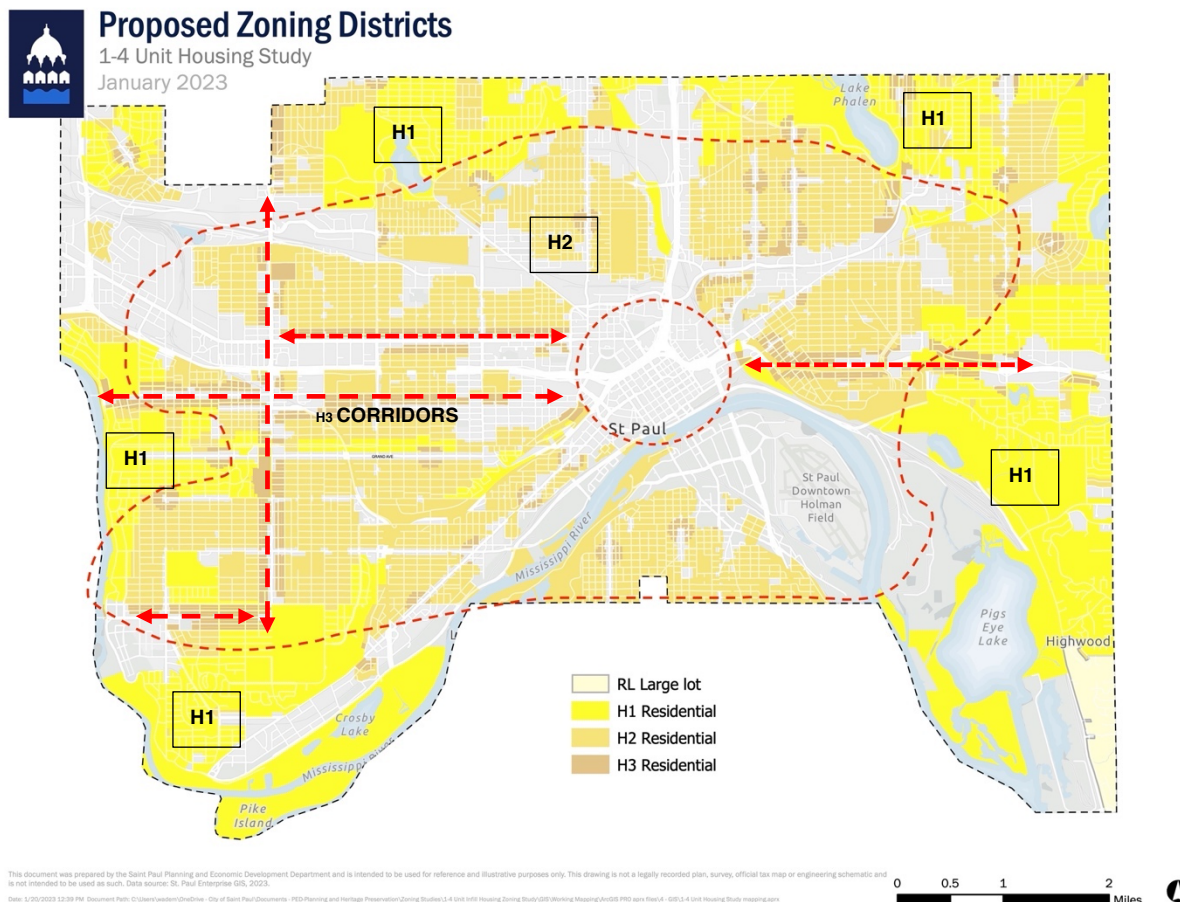
II.a : OVERVIEW SUMMARY New Zoning Districts:

Description of proposed changes: the proposed Phase 2 changes would simplify current low-density residential zoning by consolidating seven districts into four districts:

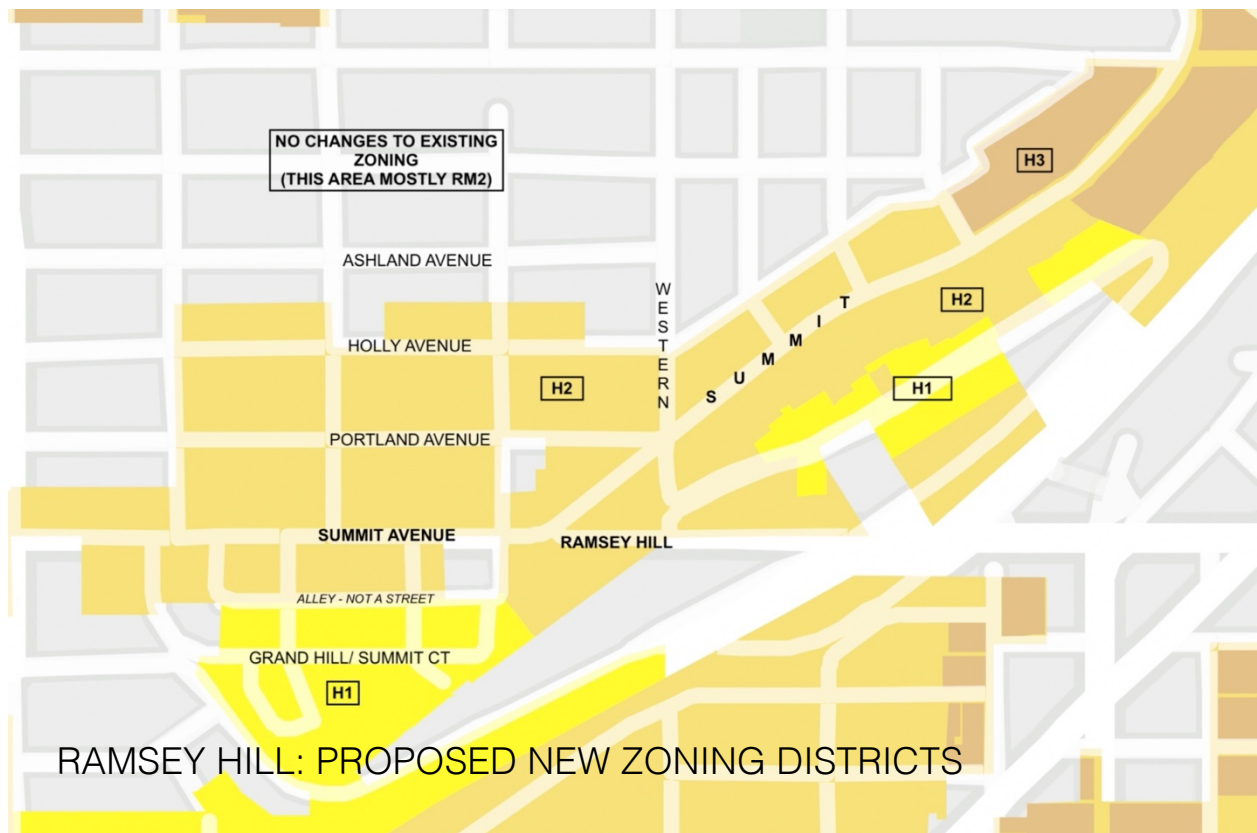
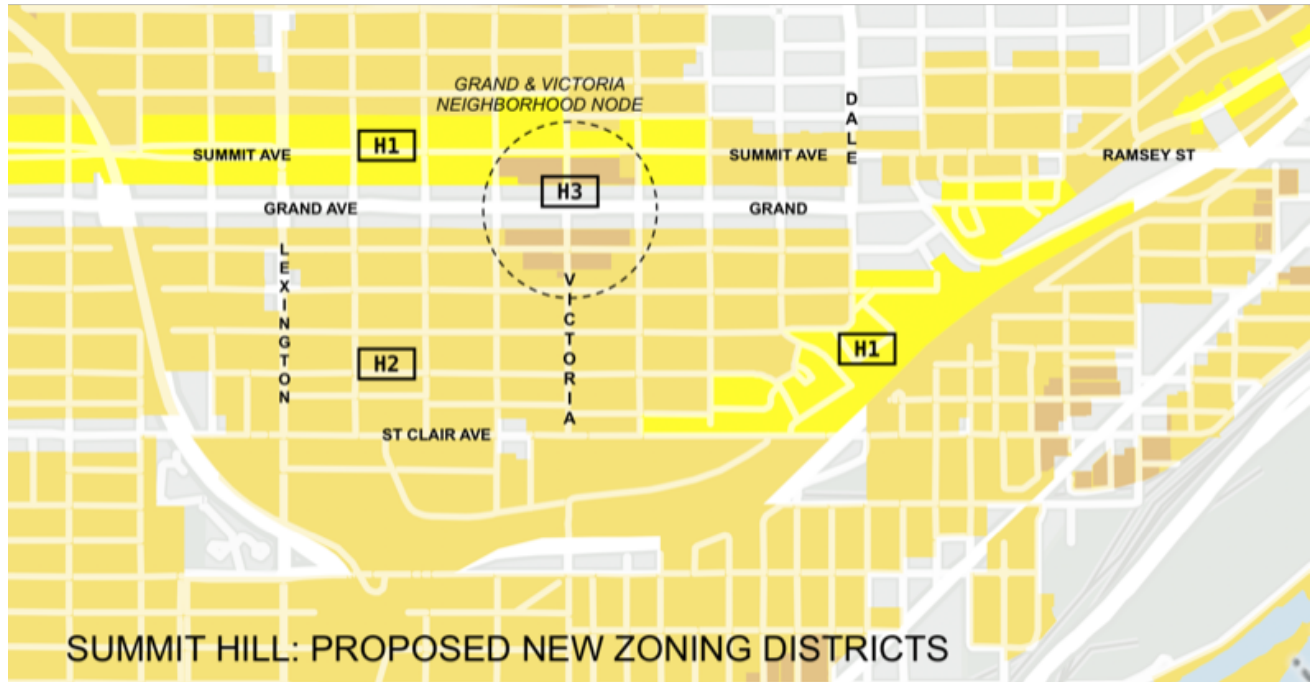
- **RL district:** maintain the current RL one-family large lot district
- **new H1 district:** *most* current R1, R2, and R3 one-family districts
- **new H2 district:** *most* R4 one-family, RT1 two-family, and RT2 townhouse districts
- **new H3 district:** *any* current R1-RT2 parcels within 1/8 of a mile of either Neighborhood Node intersections or fixed rail and bus rapid transit corridors

New Zoning Districts: Distribution in Neighborhoods

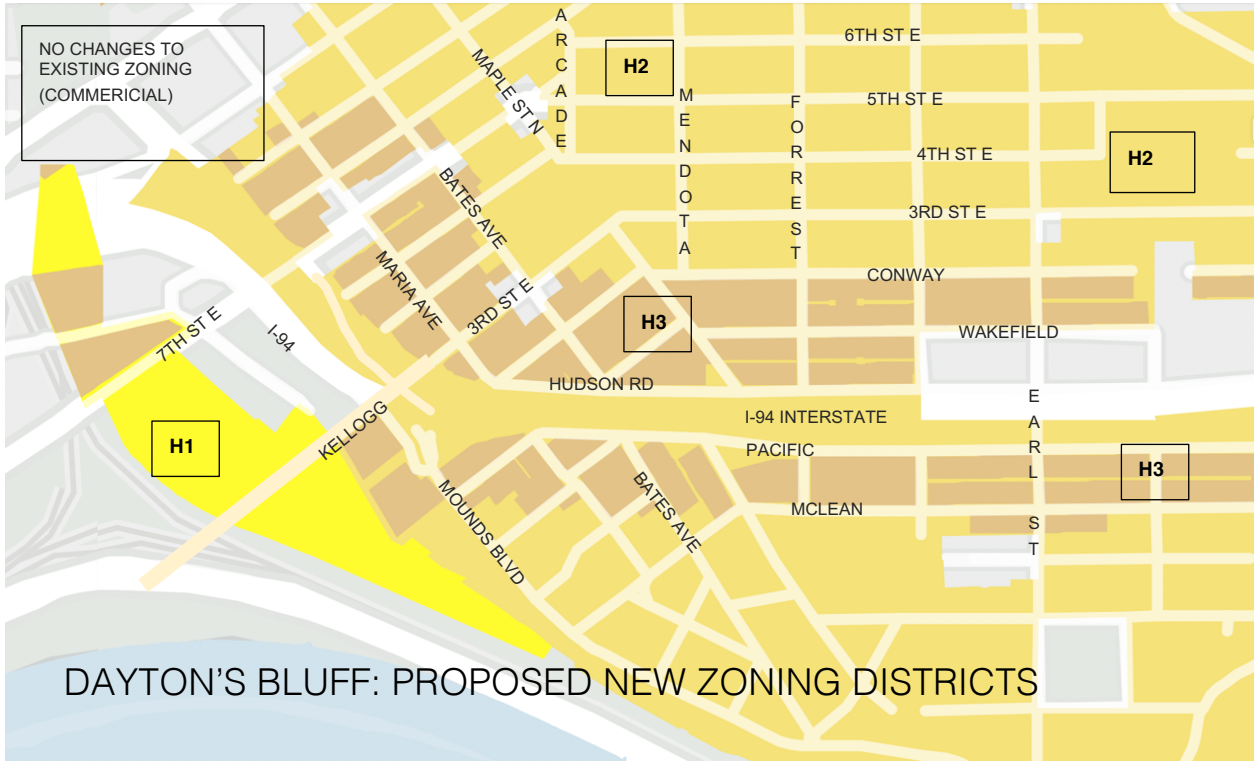
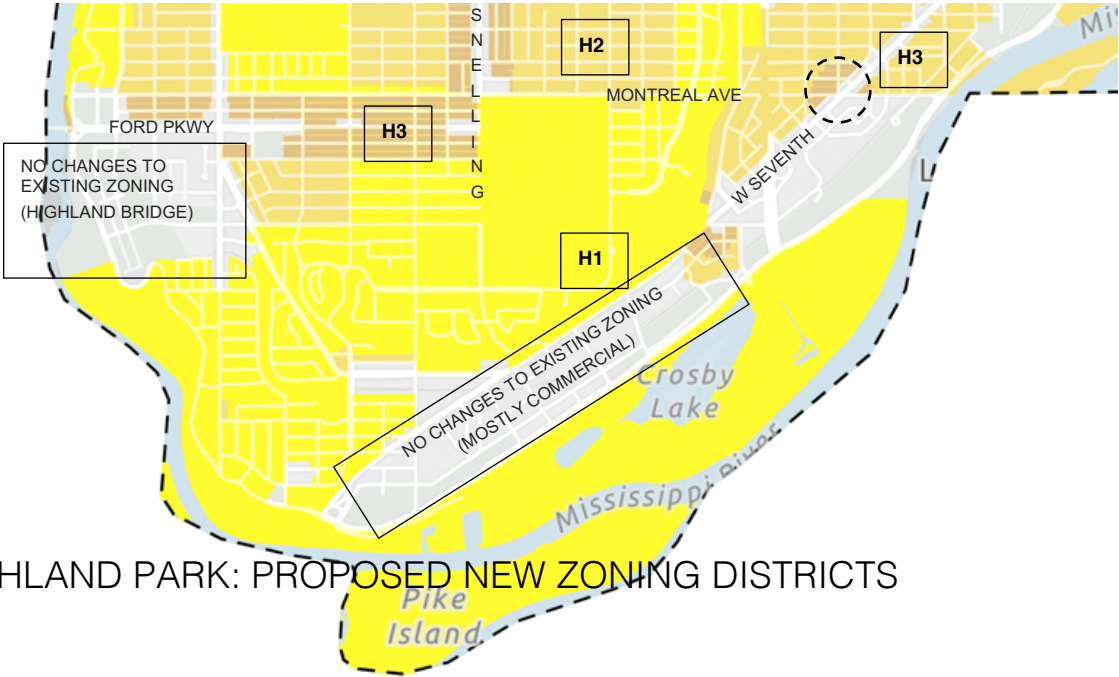
The map below is an excerpt from the full city map of the proposed low-density residential districts, with annotations added. Generally, outlying neighborhoods are more likely to be H1. These include areas platted after WW2, like Highland Park and Battle Creek, as well as older areas that are farther from downtown, like Como Park, St Anthony Park, and Greater Eastside. Closer and generally older neighborhoods would mostly be zoned H2. Transit corridors (Snelling, Ford Parkway, Marshall/Selby, Mounds Blvd, University) and neighborhood nodes would have the most intense H3 zoning. Higher concentrations of H3 zoning occur mostly in the areas west of downtown.



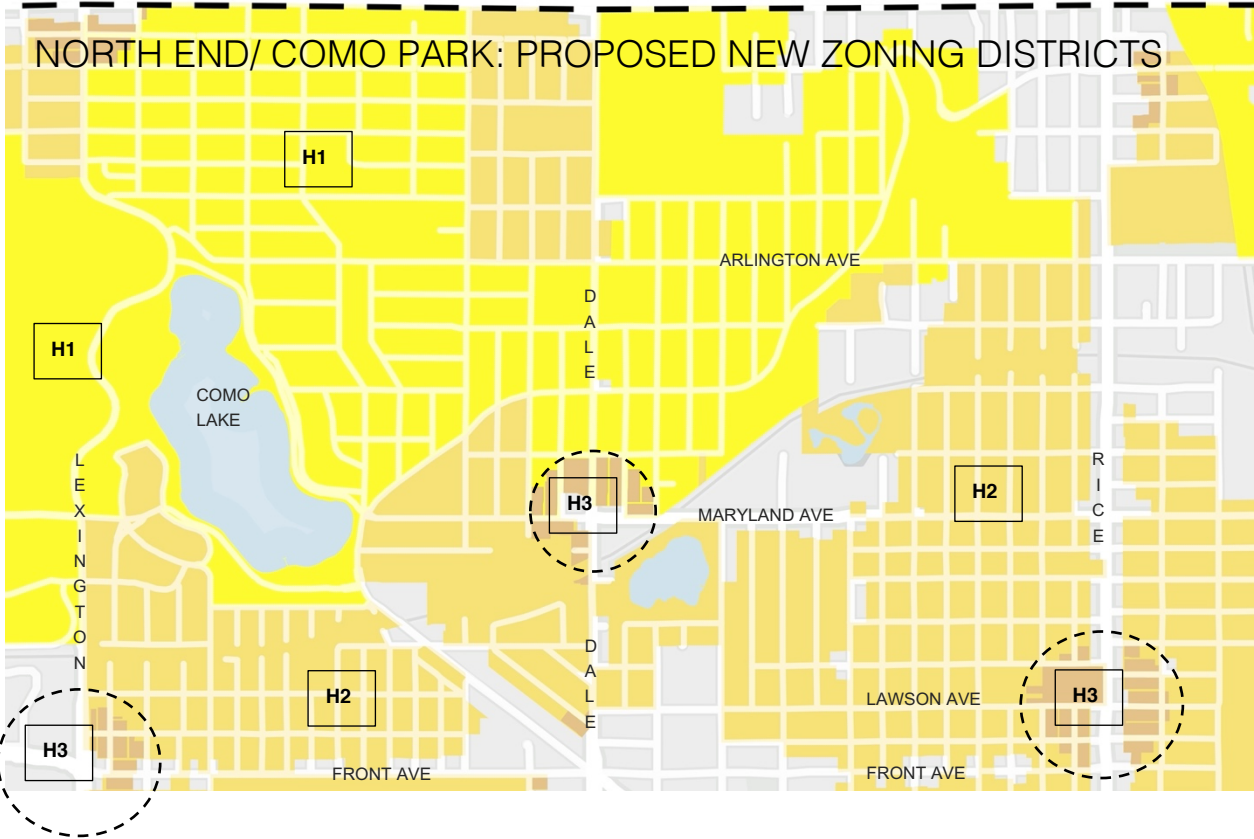
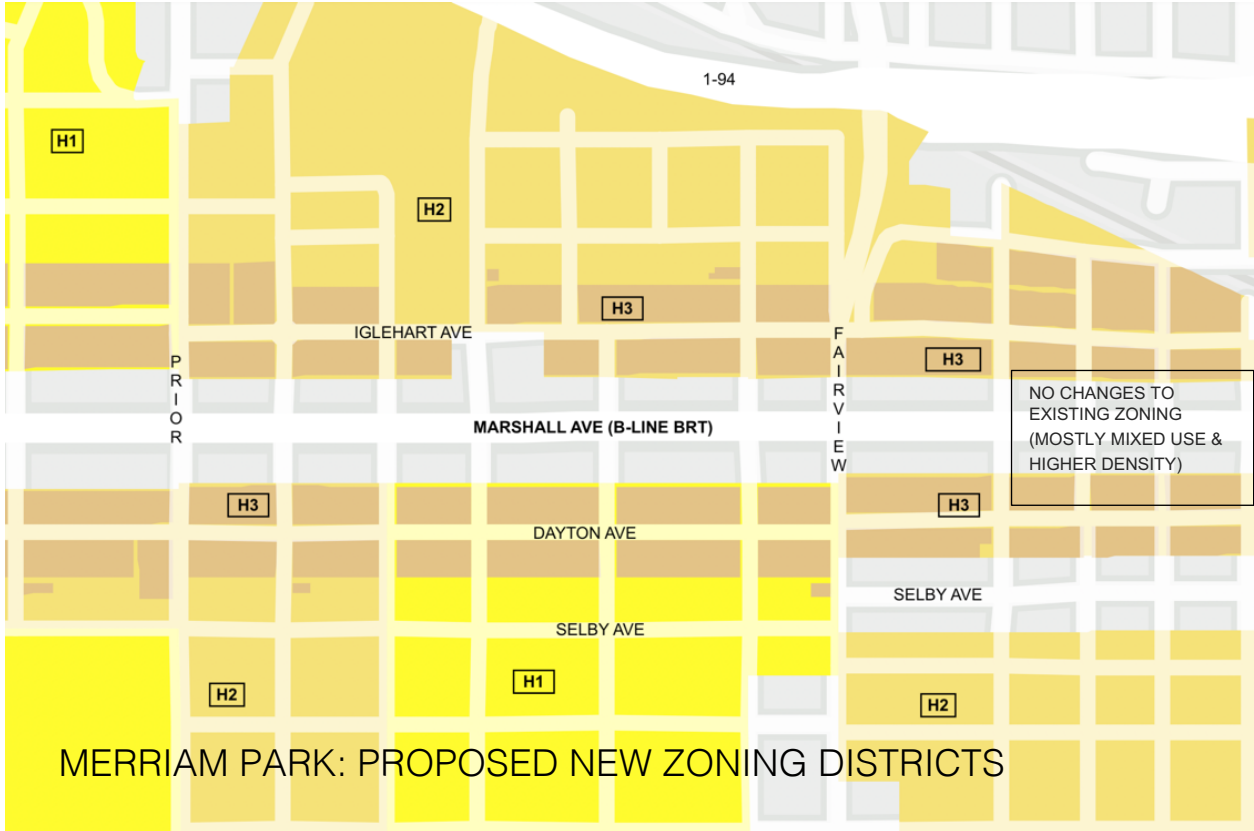
The following pages include a few neighborhoods with street names and annotations added. On this page, Summit Hill and Ramsey Hill would be mostly H2, with some H1 along parts of Summit and along the bluff (Linwood, Crocus Place, Grand Hill, etc.) Near the Grand-Victoria “node” there would be a pocket of H3. (Gray indicates other types of zoning districts: commercial, mixed use, or medium/high density residential zoning, etc.)



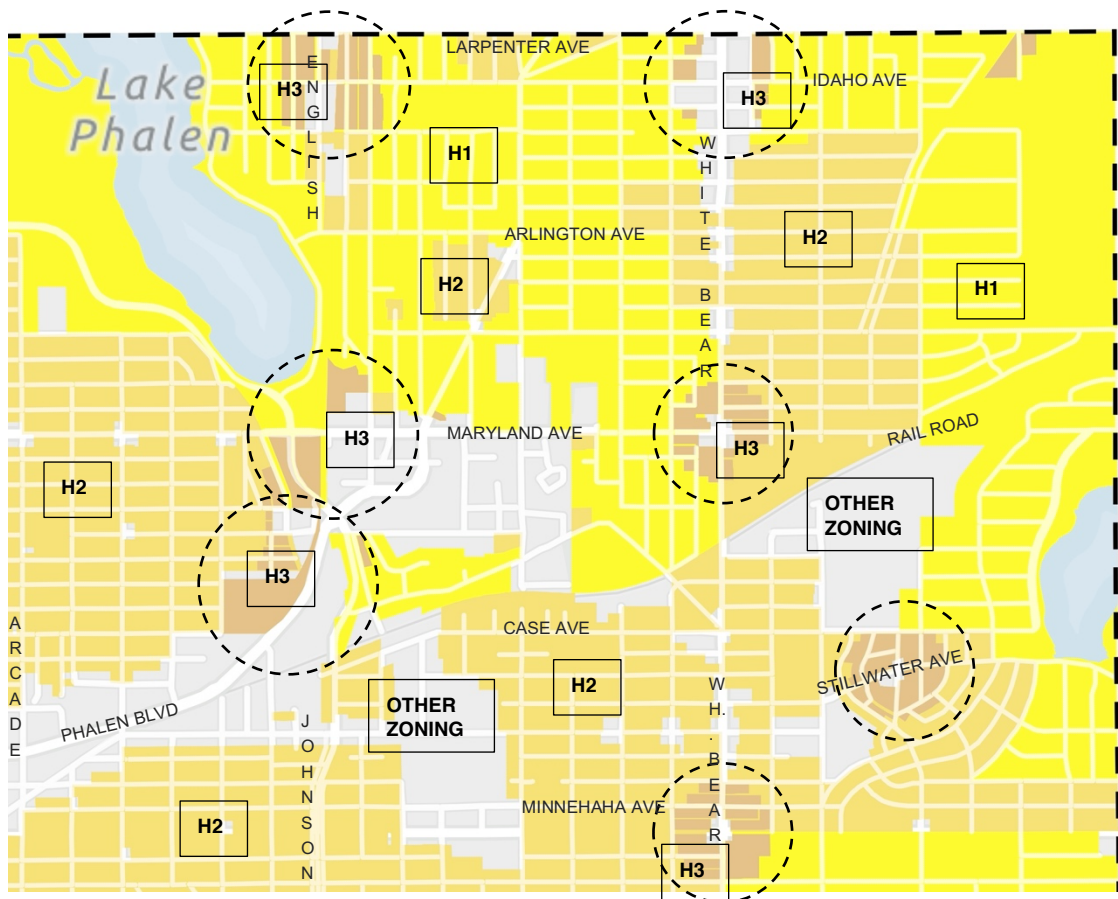
Following are annotated maps from neighborhoods: Dayton's Bluff and Highland Park. Properties close to transit corridors (Ford, Snelling & Mounds/Hudson) receive H3 zoning, as well as the *neighborhood node* at W 7th and Montreal.



Following are annotated maps from Merriam Park and North End/Como Park.



Following are annotated maps from West Side and West Seventh/Ft Road.



II.b: DESCRIPTION OF PROPOSED LARGE SCALE CHANGES

Updated “Land Use” Standards:

Changes would permit duplexes and triplexes by right in almost all residential districts. The vast majority of residential lots would become H1-H3. (RL is specialty district for large lots with septic systems. It is exclusively located in the Highwood neighborhood, near the southeastern border.) H1-H3 will allow “single family” “two-family” and “multi-family” land use, which will be regulated by a new standard: a maximum number of principal units per lot. In addition to triplexes, the changes would also permit up to 4-plexes on any corner lot in H1 and any lot in H2 or H3. H3 would also allow up to 6-plexes. The size of the lot is the key determining factor for the number of allowed principal units.

- **RL:** Up to 2 principal units per lot
- **H1:** Up to 3 principal units per interior lot; 4 units corner lots
- **H2:** Up to 4 principal units per lot
- **H3:** Up to 6 principal units per lot

Updated Dimensional Standards:

RL and H1-H3 lots would be subject to updated dimensional standards to allow denser development. Updates are proposed to increase building height maximums and allowed lot coverage, as well as to reduce minimums for yard setbacks, lot width, and the per unit lot area. The changes aim to “allow for more building and site plan flexibility, while still allowing light, air, and movement around a property.” Notable changes for H1-H3 include reducing front yard and rear setback to 10 feet from 25 or 30 feet.

3. Residential District Density and Dimensional Standards Table Updates

Sec. 66.231. - Density and dimensional standards table.

Table 66.231. Residential District Dimensional Standards

Zoning District	Lot Size Minimum (per-unit)		Building Height Maximum		Yard Setbacks Minimum (feet)		
	Area (sq.-feet)	Width (feet)	Stories	Feet	Front	Side	Rear
RL one-family large lot	21,780 (b)	80	3	30	30 (f)	10	25
R1 one-family	9,600 (c)	80	3	30 (f)	30 (f)	10	25
R2 one-family	7,200	60	3	30 (f)	25 (f)	8 (g)	25
R3 one-family	6,000	50	3	30 (f)	25 (f)	6 (g)	25
R4 one-family	5,000	40	3	30 (f)	25 (f)	4 (g)	25
RT1 two-family (a)	3,000 (d)	25	3	40	25 (f)	9	25
RT2 townhouse (a)	2,000 (d)	20	3	40	25 (f)	9 (h)	25

Zoning District	Lot Area Minimum (per principal unit)	Lot Width Minimum	Maximum Number of Principal Units Per Lot	Building Height Maximum	Yard Setbacks Minimum (feet)		
	(sq. feet)	(feet)		(feet)	Front	Side	Rear
RL large lot	9,000 (a)	60	2	30	30 (d)	10 (f)	10
H1 residential	2,000 (a)	30	3 / 4 on corners (b)	30 (c)	10 (d)	5 (f)	10
H2 residential	1,500 (a)	25	4 (b)	35 (c)	10 (d)	5 (f)	10
H3 residential	1,000 (a)	25	6	40	10 (d)	5 (f)	10

The decrease in lot width combined with the new “per unit” lot area minimum together would allow houses on smaller plots of land. To construct a single family home in the proposed H2 district would require a minimum lot size of 25 x 60 feet (1,500 SF); this is less than a third in land area than the current R4 minimum of 40 x 125 (5,000 SF). See tables above for changes.

More ADUs and Cluster Developments:

The changes aim to facilitate alternative housing patterns, including *ADUs* (accessory dwelling units) and *Cluster developments*—more than one house or structure on a lot. Currently zoning allows one ADU per lot, proposed changes would allow up to two ADUs per lot. *Cluster developments* would be permitted by right in most districts. Additionally, *cluster developments* will have the option of utilizing the conditional use process (CUP) to changed required zoning standard.

Minimum Density Requirements

The proposed changes allow for increased density, but generally do not require it, with the exception of the H3 district. For H3, an amendment adds a maximum floor area of 2,500 sq. ft. for new one-family dwellings.

Increased Lot Coverage.

The changes aim to allow increased lot coverage in all districts. Currently, low-density residential districts are generally limited to 35% lot coverage by principal structures, and detached accessory buildings are limited to 1,200 SF. The proposed changes would increase allowed lot coverage by district: 40% in H1, 45% in H2, and 50% in H3.

ANALYSIS: Proposed changes go far beyond established norms. They have the potential to reduce open space beyond “neighborhood scale”; gravely limit the growing zone for the urban tree canopy as well as natural surfaces that absorb run off.

Below is an illustration from Phase 1 showing existing lot coverage



b) Permit multiple principal residential buildings on a zoning lot in RL-RT1

District	Minimum lot size per unit	Yard setback minimum	Lot size required to build 2 principal residential buildings
RL	Area: 21,780 SF Width: 80'	30' front / 10' side / 25' rear	Area: 43,560 SF Width: 160'
R1	Area: 9,600 SF Width: 80'	30' front / 10' side / 25' rear	Area: 19,200 SF Width: 160'
R2	Area: 7,200 SF Width: 60'	30' front / 8' side / 25' rear	Area: 14,400 SF Width: 120'
R3	Area: 6,000 SF Width: 50'	30' front / 6' side / 25' rear	Area: 12,000 SF Width: 100'
R4	Area: 5,000 SF Width: 40'	30' front / 4' side / 25' rear	Area: 10,000 SF Width: 80'
RT1	Area: 3,000 SF Width: 25'	30' front / 9' side / 25' rear	Area: 6,000 SF Width: 50'

Density and Dimensional Standards



R3 Lot Example

- Already allowed in T, RT2, and RM zoning districts.
- Lots still need to meet zoning code requirements for minimum lot size per unit, width per unit, and setbacks, and building code requirements.

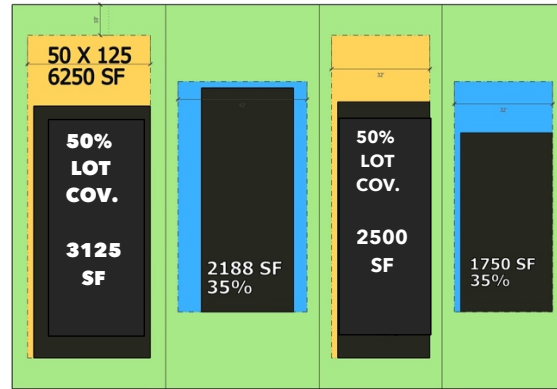
PROPOSED LOT COVERAGE

Images below illustrate the increase in lot coverage with the proposed setbacks.

ANALYSIS An unintended consequence of the new standards will be to encourage attached garages.



LEFT: "typical" 40 foot and 50 ft wide lots, Orange represents new allowable built area (within setbacks) and blue existing allowable built area



RIGHT: Same "typical lots and color legend, with 50% lot coverage maximum size structures (in black)

Changes to Cluster Developments 65.130

The stated intent is to allow more housing types and additional neighborhood-scale dwellings on larger lots "if adequate common open space and pedestrian connections

are built within the development.” The actual language adds a requirement for “sharing an open space” in the definition, but “open space” is not defined. Footnote B seems to contradict this goal, “Required yards within a cluster development may be reduced or eliminated provided required yards are maintained along the periphery of the cluster development.”

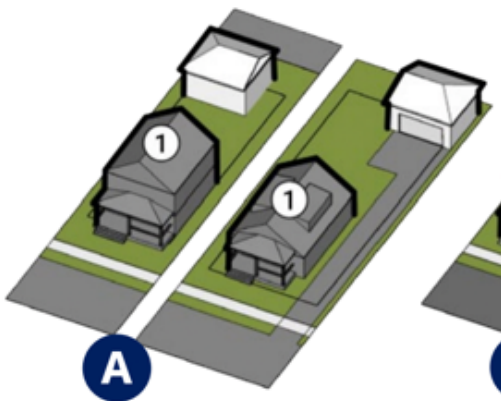
A minimum lot size of 9,600 and a maximum size of ½ acre are introduced. This would replace the current minimum standard of 80 feet of street frontage. Cluster development are allowed higher lot coverage limits: H1, 55%; H2 and H3, 60%.

ADUs are allowed, with a limit of one ADU per single family. ADUs would not count toward the minimum lot size unit standard (d)

ANALYSIS: In summary, the new cluster development standards are exceptionally opaque.

II.c: Visual Examples

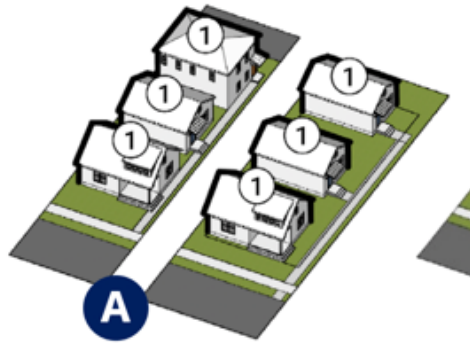
The images below are conceptual illustrated examples by City Staff.



A. Existing Single-Family Home with Garage

40' Lot
(Alley)

50' Lot
(No Alley)

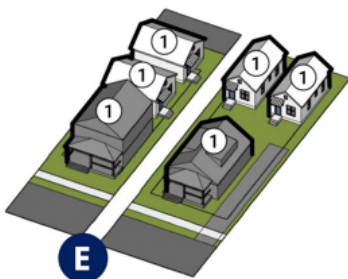


A. Three Principal Structures

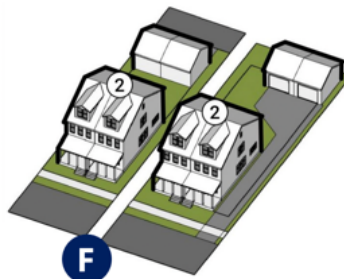
40' Lot
(Alley)

50' Lot
(No Alley)

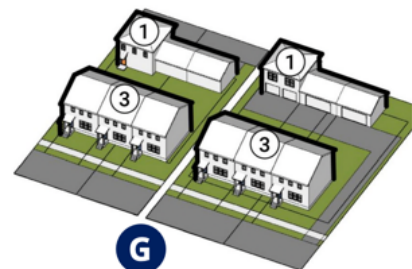
The image on the left shows an example of current St Paul lots: a “typical” minimum residential lot in St Paul is 40 x 125 feet (5,000 SF) and is zoned R4. Presently, it can have at most one single family house and one ADU (accessory dwelling unit). The image on the right shows a conceptual example for infill housing. Under the new changes, this “typical” lot would be re-zoned H2 and could have three principal units and up to two ADUs. The three principal units could be in several forms: triplex, rowhouses, or a combination of separate structures. The image below shows more conceptual examples:



E. Existing House with Twin Cottages



F. Twin Homes



G. Rowhouses on Double Lot

The provided image below is included in the Staff Memo as an illustration of possible H3 infill development, however, **they generally show example well below dimensional maximums.**

ANALYSIS: Estimated dimensions of examples are:

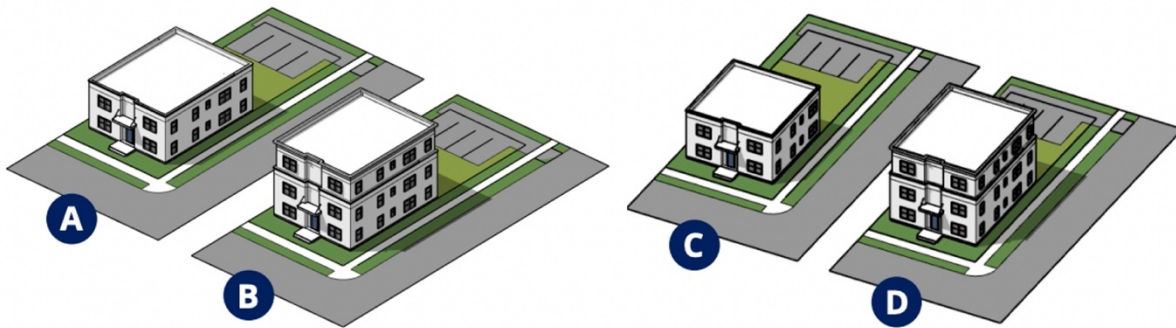
Lot coverage and footprint and lot coverage

A: 50 x 120 lot (6,000 SF)	40x 55 (2,200SF)	37%
B: 50 x 120 lot (6,000 SF)	40x 55 (2,200SF)	37%
C: 50 x 120 lot (6,000 SF)	40x 55 (2,200SF)	37%
D: 50 x 120 lot (6,000 SF)	40x 55 (2,200SF)	37%

SETBACKS & HEIGHTS

A: SIDE:5 FT	FRONT: 10 FT	REAR: 55 FT	HEIGHT: 20-22 FT
B: SIDE:5 FT	FRONT: 10 FT	REAR: 55 FT	HEIGHT: 30-32 FT
C: SIDE:5 FT	FRONT: 10 FT	REAR: 55 FT	HEIGHT: 20-22 FT
D: SIDE:5 FT	FRONT: 10 FT	REAR: 55 FT	HEIGHT: 30-32 FT

HEIGHT ESTIMATED BASED ON 10 FOOT FLOOR-TO-FLOOR WITH THE MAIN FLOOR NEAR GRADE



A. Family-Sized Fourplex 50' Lot (corner)	B. Family-Sized Sixplex 50' Lot (corner)	C. Market-Sized Fourplex 50' Lot (corner)	D. Family-Sized Sixplex 50' Lot (corner)
-----------------------------------------------------	----------------------------------------------------	-----------------------------------------------------	----------------------------------------------------

ILLUSTRATIONS ARE ALL BELOW MAXIMUMS AND MINIMUM LIMITATION

III.a PART 3: A CLOSER LOOK AT DETAILS

Pages 32-163 go into deeper detail, spelling out the exact wording of the proposed text amendments. Analysis and descriptions are interwoven with the specific edits. Below are descriptive highlights, in the order they appear in the zoning code.

[ANALYSIS: There is a lot here and unfortunately this review is incomplete. The biggest concerns are unintended consequences from so many small changes. In particular, the watering down of the “match existing” provision for existing front setbacks is of concern, as well as the additional changes to RM districts, to further allow even more loss of light and air around developments of multifamily residential parcels.](#)

Changes to Allowed Land Uses (66.221)

Table 66.221 is edited to expand allowed uses: duplexes will be allowed in all districts; multi-family will be allowed in all districts other than RL. Cluster developments will be “permitted/conditional” in all districts. “Conditional” allows developments to exceed dimensional standards using the CUP process instead of the variance process.

PAGE
32

Changes to Density & Dimensional Standards (66.231)

Table 66.231 is edited to, generally, reduce setbacks and increase height limits, allowing more and larger structures on existing lots. The setbacks standards for H1-H3 will be reduced and unified with 10 foot front and rear setbacks, and 5 foot setbacks. Height limits are the only dimensional difference between H1, H2, and H3. Currently front setbacks are 30-25 feet, and rear setbacks are 25 feet. Current side setbacks range from 4-10 ft R1-R4, and are 9 feet for RT1 and RT2.

Lot width would no longer be linked to a “per unit” standard. Currently, a duplex requires a wider lot than a single family home. Under the proposed changes, the minimum lot width would not increase with the number of units. Proposed required minimum lot widths would range from 25-30 ft for H1-H3, reduced from 40-80 ft for single family, and 50 ft and up for non-single family. The lot area minimum is proposed to be significantly reduced, to 2,000 – 1,000 SF per unit for H1-H3. Limits are currently 9,600 - 5,000 SF per unit for R1-R4, and 3,000 – 2,000 SF per unit for RT1 and RT2.

Presently single family homes are limited to 30 ft in height and duplexes and townhouses are limited to 40 ft. This makes 30 feet the dominant height limit for most of neighborhoods in St Paul. H1 retains the 30 ft/35ft limit and H2 increases to 35 ft/40 ft; 40 ft/ 45 ft is proposed for H3. An additional 5 ft “height bonus” is allowed, subject to conditions.

[ANALYSIS: Under the proposed changes, H2 will be the most common district effectively increasing the allowed height limit for the majority of St Paul neighborhoods.](#)

Increases in Allowed Lot Coverage (66.232)

The changes aim to allow increased lot coverage in all districts. Currently, low-density residential districts are generally limited to 35% lot coverage by principal structures,

and detached accessory buildings are limited to 1,200 SF. The proposed changes would increase allowed lot coverage by district: 40% in H1, 45% in H2, and 50% in H3

Changes to RM Density & Dimensional Standards (66.231)

Changes to proposed to reduce setbacks for the RM (residential Multifamily) districts as well. Front setbacks would be reduced for 25 feet to 10 feet for RM1-RM3 . RM1 currently has a rear setback of 25 feet, it is proposed to be reduce to 9 feet to match RM2 and RM3.

Changes to Density & Dimensional Footnotes (66.231)

Newly, height limits are allowed to be increased by footnote. This “Height Bonus” is in Table note (c), which allows for up to 5’ in additional height, is described below.

A Density Bonus is also proposed in Table Note (b), which would allow an additional 5% lot coverage for affordable housing, or for providing large units. Based on recent developments this is more likely to result in density bonuses for large, luxury rentals, with particularly concerning effects on the conflicts the results from concentration of student housing.

Changes to ADU and Garage heights (63.501)

Current garage height limits are proposed to be raised by 3 feet. Currently the limits for garages are : 12 ft flat roofs and 15 feet all other roofs; proposed is 15 feet for flat roofs and 18 feet for all other. ADUs currently have a height limits of 25 feet, but are also limited to be shorter than the principal structure. The “height of the principal structure” limit is proposed to be removed

Changes to Driveways (63.308)

Re-written to weaken limits on parked vehicles backing out onto public streets. Currently the zoning requires a turnaround space to prevent vehicles backing onto roads for all districts. The changes will allow single family, duplexes, triplexes, and 4-plexes to back directly into traffic on residential streets. Turnaround space would be required only for “more than or 4 dwelling units” (a)

Re-written to allow wider driveways (up to 20 feet, instead of 12) when any portion of building is more than 150 feet from the street, for “fire access requirements”

Re-written to allow stacked parking without an attendant for 6 units or fewer. An attendant will still be required for more than six units.

Changes to porches (63.105)

Currently, front porches can project 6 feet into the front yard, that will be reduced to 5 feet. With the reduced front yards, this is likely to prevent porches abutting the sidewalk.

From: [Sophia Rees-Hoofnagle](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Proposed zoning amendments
Date: Monday, April 17, 2023 8:01:36 AM

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I enthusiastically support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Soph Rees-Hoofnagle
1600 Grand Ave St. Paul MN 55105,
Student at Macalester College

From: [Stuart Knappmiller](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Ave E
Date: Friday, April 7, 2023 12:52:24 PM

Are there educational citizen meetings planned between now and when you want input? Or a recording of a public meeting? I am in favor of most all plans generated by public employees of our city and county. I'm not a NIMBY.

We bought a 1941 infill house on a 40 ft lot 46 years ago. Phalen Heights or "Pill Hill" as a realtor friend calls it. Each side of us are wider lots with 2 story homes, one of which added a room on the second floor, which removed our view of the morning sun.

If I understand correctly, these houses could be removed and a building 5 feet from the property line could be constructed. That would eliminate any setting sun. If that's the case, you would understand we would have a strong opposition to this plan. But since I don't understand the details, I have no idea if this worst-case scenario could happen.

The house to our east, when we removed our downspouts from the storm sewer system, directed their rain into our property against our basement wall, which led to removal of damaged cement blocks and new work before we could redash our stucco. An unanticipated expense for us.

Across from us is a duplex or triplex. Our neighbor indicated the unit on the top floor was a prostitute's home for some years. We were both working and apparently oblivious to the trade there. The block east of us has a triplex, which was the site of multiple calls for all night music and loud voices on Saturday nights until those renters moved out.

Stuart Knappmiller
1112 Orange Ave. E.
651-470-6124

Emma Brown

From: Luke Hanson <lukehanson91@gmail.com>
Sent: Wednesday, April 5, 2023 11:35 AM
To: *CI-StPaul_1to4HousingStudy
Cc: Sustain Saint Paul
Subject: Public comment from Sustain Saint Paul
Attachments: Planning Commission Memo.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Greetings!

My name is Luke Hanson, and I am a co-chair of Sustain Saint Paul, a volunteer-led advocacy group focused on housing and transportation issues in Saint Paul. I am writing to submit a public comment on behalf of Sustain Saint Paul's board of directors; it is attached to this email as a PDF file. Thank you for the opportunity to comment on the proposed zoning amendments. Let me know if you have any questions.

Luke Hanson
1423 Eleanor Avenue



Abundant housing, low-carbon transportation, and sustainable land use

Sustain Saint Paul

PO Box 16164, Saint Paul, MN 55116

www.sustainstpaul.org | info@sustainstpaul.org

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Zak Yudhishtu

Our Mission

Sustain Saint Paul champions abundant housing, low-carbon transportation, and sustainable land use in the City of Saint Paul through education, advocacy and political action, to ensure a more just and equitable city for all current and future residents.

Dear Planning Commissioners,

Thank you for the opportunity to submit a public comment regarding the proposed zoning code amendments stemming from Phase Two of the City's 1-4 Unit Housing Study, and for the specific questions you posed to the community regarding the proposal in March. This letter includes responses to each of those questions.

We'll address Questions 1 and 2 from the "Questions for the Community" memo together:

Question 1: "Does this draft ordinance propose a zoning approach that supports more new housing options for all Saint Paul residents in a fair or neutral way? Why or why not?"

And Question 2: "Do you support creating two lower-density residential districts – the proposed H1 district (for areas currently zoned R1-R3) and proposed H2 district (for areas currently zoned R4-RT2) – or should the H1 and H2 districts be combined into one district that uses the proposed H2 standards?"

While the proposed zoning changes would represent a monumental improvement to the current zoning rules (which reinforce patterns of exclusion along the lines of race and class, as you note), they fall short of total fairness or neutrality. To achieve a fair and neutral approach to zoning, the City should consolidate the current zoning districts R1-RT2 into one district that uses the proposed H2 standards.

We see no compelling reason why the residential areas currently zoned R1, R2, or R3 should allow fewer housing units per lot (except on corner lots), or require more Lot Area Per Unit, wider

minimum lot widths, and lower maximum building heights than the areas currently zoned R4, RT1, and RT2. On the contrary, we see three compelling reasons why areas zoned R1-R3 should be consolidated into the same standards as R4-RT2:

- Houses in districts R1-R3 tend to be more expensive— and thereby more exclusive— than areas zoned R4-RT2, because current zoning rules require much more land per house in those districts. For example, the minimum lot size in the current zoning district “R1” (e.g. the areas along Edgcumbe Road and Montreal Avenue in Highland) requires that every house must have a yard of at least 9,600 square feet, *more than three times larger* than the amount of land required for a single home in R4, RT1, or RT2. If our city is fully committed to dismantling the invisible barriers that exclude people from living in certain neighborhoods based on wealth, we should hold the most expensive neighborhoods to the same standards as every other neighborhood.
- The areas currently zoned R1-R3 are among the places where infill housing development potential is the highest, precisely because they have large yards.
- Consolidating the existing districts into one new district instead of two makes the code simpler, cleaner, and easier to understand.

3. Should more areas be rezoned to the proposed new H3 district? If so, which locations and why?

Yes. We recommend that the H3 district be applied to a quarter-mile radius of High-Frequency Transit Routes (i.e. the Green Line, current and future Bus Rapid Transit Routes) and Neighborhood Nodes (both those defined by the 2040 Comprehensive Plan, and those that may be designated in the future). In past zoning proposals, the Planning Department has applied the quarter-mile radius in the same way, and explained that a quarter-mile has been found to be the distance that residents are generally willing to walk to a transit stop or a local business. We would also support the rezoning of lots along arterial streets to H3.

4. Does the draft ordinance strike the right balance of encouraging more neighborhood-scale housing to be developed over the long term on lots throughout the city, while also managing the pace of change to minimize potential displacement pressures on existing neighborhoods and residents? Why or why not?

Yes, we believe it does. In fact, we would argue that Saint Paul’s current zoning code poses a greater threat of displacement than the proposed zoning amendments do. For example: in areas where our current rules forbid multi-family buildings, a developer who might otherwise build two or three modestly-sized homes on a 80-foot wide lot only has the option of building a single-family house. In order to turn a profit, the developer would likely choose to build a large house with expensive features; it would not be profitable to build a modest, affordable single-family house. This worrisome trend is already at work in many parts of Saint Paul, where modestly-sized homes are torn down and replaced with McMansions. We expect that by legalizing more types of



modestly-sized homes and smaller yards, the proposed zoning amendments will mitigate this problem.

More generally, we regard zoning reform as one tool among others to address displacement, and hope that such efforts are paired with complementary policies to ensure the creation and maintenance of affordable housing.

5. Are there other policy goals that the City should consider incentivizing in the form of density bonuses?

Yes. In addition to incentivizing 80% AMI affordable units and three-bedroom units, we would encourage the City to consider incentives for cooperative ownership models, and for developers who promise not to install gas hookups to new buildings (to reduce dependency on fossil fuels).

In closing, we want to express our great enthusiasm for this proposal, and our gratitude for the work that you and the Planning Department have done so far. We believe that the proposed zoning amendments would be a monumental step in the right direction for Saint Paul, towards a healthier housing market, more vibrant and walkable neighborhoods and less carbon emissions from car travel, and a growing tax base to support the needs of current and future residents. We hope that our comments are instructive as you work to improve the proposal before making your recommendations to the City Council. If you have questions for us, please don't hesitate to connect.

Sincerely,

Sustain Saint Paul's Board of Directors



From: [TOM DIMOND](#)
To: [Karoline Finlay](#)
Subject: Submission to Planning Commission for April 14th public hearing
Date: Wednesday, April 12, 2023 2:01:37 PM

Think Before You Click: This email originated **outside** our organization.

Tom Dimond

2119 Skyway Drive

Saint Paul, MN 55119

Saving our single-family residential neighborhoods is essential for Saint Paul

The Planning Commission is considering a radical and ill-conceived housing ban. Single-family residential neighborhoods would be prohibited in Saint Paul. Single family neighborhoods are the economic backbone of the city.

The proposed ban reduces neighborhood housing choices. A ban on single family residential neighborhoods eliminates our most popular residential neighborhood choice. Saint Paul can ill afford to ban the public's preferred choice. Neighbor cities offer single family neighborhoods, less gun violence, and lower taxes. Few in Saint Paul even know this ban is proposed.

Existing zoning allows home owners a choice of the zoning they want. The proposed ban prohibits homeowner choice in single family neighborhood zoning.

We did this before. After WWII there was a push for housing. Saint Paul allowed subdividing of single-family homes and incompatible infill. When housing choices became available, families abandoned cramped housing for homes with their own yard for their kids, pets and boat. Inner city neighborhoods became blighted and impoverished. Crime, violence, and taxes increased.

The most expensive purchase most people make is their home. Protecting home values, and safety are high priorities. A ban on single family home neighborhoods and proposals to increase taxes, negatively impact home values and neighborhood livability. Industrial, commercial, and high value homes subsidize City services. Banning single family

neighborhoods eliminates funding essential to provide City services and neighborhood stability.

The choice of where to buy a home is based on many factors. Prohibiting single family neighborhoods will increase neighborhood overcrowding and increase conflicts like not having a place to park your car. Doubling, tripling or quadrupling the number of residences on a single lot will increase conflicts. The proposal even requires sharing your driveway with your neighbor. There already is an excess of violence, crime, and taxes in Saint Paul. The City must retain single family neighborhoods so you can relax and recharge with your family.

Many 3M workers lived in Battle Creek and Highwood. Not anymore. They and others left the City. The jobs did not go away. Homeowners who have options are choosing to leave Saint Paul. Crime, shootings, increasing taxes, and eliminating single family neighborhoods push families with good jobs out of our City. This affects the tax base, ability to provide services, neighborhood stability, and the economy of our neighborhoods. The ban is another case of Saint Paul shooting itself in the foot.

The State, Saint Paul and homeowners have invested much work and millions of dollars into restoration of homes and neighborhoods. Abandoning neighborhood residents, their hard work and the money spent to restore our neighborhoods would be a tragic waste.

There is no consideration of environmental or historic impacts. Doubling, tripling, and quadrupling of impervious surfaces means runoff has to go somewhere. There is no plan to address increased runoff, reduced surface area to replenish our aquifer and loss of habitat.

We are losing a significant number of ash trees. Doubling or tripling development on single lots increases urban tree loss, higher temperatures, and reduced air quality.

Saint Paul has a National Park, State Critical Area, and State Scientific and Natural Area. I live in Highwood which is part of the National Park and State Critical Area. I live on the bluff of the Mississippi River in a Oak Savanna (a rare habitat the State works to protect). In order to protect and enhance this fragile bluff and habitat the City in conjunction with the MN DNR and neighborhood residents researched and adopted RL zoning as the minimum level of protection to save and enhance the valuable natural resources of this area. Without participation of neighborhood residents, the proposal would eliminate Critical Area protections.

Existing minimum levels of protection adopted by Saint Paul and approved by the MN DNR and Metropolitan Council are:

Existing minimum lot size for a single-family home is 21,780 sq. ft. – The proposal is 9,000 sq. ft. for 2 homes - this is 4,500 sq. ft. per home or less than 21% of the lot size approved to protect and enhance the River Corridor bluffland

Existing minimum rear lot setback 25' – The proposal is 10' or less than half the setback established for natural resource protection

Existing maximum lot coverage for single family residential is 35% - The proposal would allow 40-55% lot coverage

Existing protections for RL single family residential limited impervious surfaces to 7,623 sq. ft. of a 21,780 sq. ft. lot. The proposal would allow an increase of impervious surfaces of 4,950 sq. ft. on a 9,000 sq. ft. lot.

The proposal increases runoff, erosion, loss of trees and wildlife habitat in the State Critical Area. **Property owners were not consulted and have not approved any zoning change to their property.**

From Saint Paul's existing zoning code:

The district is designed to protect, maintain and enhance wooded areas, wildlife and plant resources, fragile bluff areas, topography and large expanses of natural vegetative cover; to reduce erosion and excessive stormwater runoff associated with higher-density development; and to facilitate installation of private wells and individual sewage treatment systems for one-family detached dwellings.

The City has failed to address environmental, historic, and property owner impacts. **Vote No !**

Emma Brown

From: Thomas Reimann <thosreimann@gmail.com>
Sent: Thursday, April 13, 2023 5:08 PM
To: *CI-StPaul_1to4HousingStudy
Subject: Proposed Zoning Amendments - Public Comment

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I support the proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Tom Reimann
2164 Juliet Ave
St Paul, MN 55105

From: [Zach Allen](#)
To: [*CI-StPaul_1to4HousingStudy](#)
Subject: Zoning Code Public Comment
Date: Monday, April 17, 2023 8:03:26 AM

Dear Planning Commissioners,

Thanks for the invitation to comment on the proposed zoning amendments stemming from Phase Two of the City's 1-4 Unit Housing Study. I support the proposal in general, and recommend the following changes:

1.
Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes.
2.
Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3.
I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels).

Thank you for your consideration.

Zach Allen

1315 Minnehaha Ave W, St Paul, MN 55104

Emma Brown

From: Zack Mensinger <zack.mensinger@gmail.com>
Sent: Thursday, April 13, 2023 11:23 AM
To: *CI-StPaul_1to4HousingStudy
Subject: I support the 1-4 Unit Housing Study and zoning changes!

Follow Up Flag: Follow up
Flag Status: Flagged

Dear members of the Planning Commission,

I am thrilled that Saint Paul and the planning commission are looking to further update and improve our zoning codes to reflect the needs of our city. I enthusiastically support Phase Two of the City's 1-4 Unit Housing Study proposal in general, and recommend the following changes:

1. Eliminate the proposed zoning district H1, and simply consolidate the existing zoning districts R1, R2, R3, R4, RT1, and RT2 into the proposed zoning district H2. There is no compelling reason why the areas of Saint Paul currently zoned R1-R3 should allow fewer homes per lot than the areas currently zoned R4-RT2; applying the same zoning standards to these areas would be a fairer and more neutral approach. It would also make the code simpler for people seeking to build new homes, especially smaller, local developers who lack or cannot afford access to expensive consultants.
2. Apply the proposed H3 zone to more areas: for example, a quarter-mile radius around Light Rail, current and planned Bus Rapid Transit routes, and the neighborhood business nodes identified in [the 2040 Comprehensive Plan](#).
3. I support the proposed "density bonus" that would incentivize developers to include affordable units and three-bedroom units in new buildings! Please also consider offering density bonuses to incentivize other good things, such as cooperative homeownership models, or agreements not to install gas lines to new buildings (to opt for electric heating instead of fossil fuels) and other climate-resiliency projects like indoor, secured bike parking.

Thank you for your consideration, I look forward to these updates to pass and help start improving our city!

Zack Mensinger
1226 Englewood Ave., Saint Paul

Emma Brown

From: Zakary Yudhishthu <zyudhishthu@yahoo.com>
Sent: Tuesday, March 28, 2023 9:28 AM
To: *Cl-StPaul_1to4HousingStudy
Subject: 1 to 4 Unit Housing Study Public Comment for the Planning Commission

Follow Up Flag: Follow up
Flag Status: Flagged

To the Saint Paul Planning Commission,

My name is Zak Yudhishthu, resident at 1411 Wellesley Avenue. I'm a student and renter in Saint Paul, and am also on the boards of the Macalester-Groveland Community Council and the organization Sustain Saint Paul. I'm writing to support the spirit of the 1-4 Unit Housing Study's proposed zoning amendments, while encouraging a few steps to strengthen these changes.

Overall, I am highly enthusiastic about these changes. I agree with the city staffers who drafted this report: Saint Paul needs to build more housing, and widespread bans on neighborhood-scale density prevent us from addressing that need. Furthermore, such rules often serve to keep privileged neighborhoods — such as my own — exclusive. Even worse, they push more development to far-out suburbs, with ensuing infrastructural and environmental costs.

As many jurisdictions around the country are recognizing, we can all gain from allowing more residences on each lot. As is, proposed zoning changes would increase opportunities for more affordable, vibrant, and environmentally sustainable cities.

However, I see a few places for further improvement to proposed changes.

- We should not maintain the distinction between H1 and H2 zoning, which is based on existing zoning designations. I understand that this bears a connection to the actual lot sizes we see today — potential H1 lots are lower-density and have larger lots — but this does not justify maintaining such arbitrary distinctions as currently exist between different gradients of today's neighborhood-scale zoning code. In fact, H1's larger existing lot sizes only seem to make it a stronger candidate for the neighborhood-scale housing that the city seeks.

On a deeper level, the premise of this study is that our zoning codes today don't work very well — they are exclusive and prevent healthy development in our city. To me, the proposed distinction between H1 and H2 bears the shadows of today's code. Hence, **I recommend consolidating H1 and H2, opting for H2-level requirements across the city.**

- The H3 district should be expanded to include $\frac{1}{4}$ mile from key transit stops and Neighborhood Nodes, instead of the proposed $\frac{1}{8}$ mile. $\frac{1}{4}$ mile is a typical distance for commuters to walk to transit from their residences.

In conversations with city staff, I understood that the $\frac{1}{8}$ mile threshold was chosen in part because a $\frac{1}{4}$ mile threshold would incorporate a huge proportion of residential land. But our foremost goal here should be to zone for healthy development in our city. We know that walking a $\frac{1}{4}$ mile radius to transit stops is typical for humans inhabiting cities — if incorporating this insight entails designating large quantities of land for transit-friendly zoning, it's the right decision. Hence, **I recommend expanding**

the H3 designation to include a ¼ mile from light rail stops, rapid bus stops, and Neighborhood Nodes.

- Regarding stability and the density bonuses, I'm happy to see the city exploring possibilities for incentivizing further affordable housing. It's also good to see that the proposed bonus policy is informed by careful pro forma analysis. I'm no expert in the finances of development, so I'm reassured to know that the city has worked with those who are experts to create affordability bonuses that could plausibly pencil and lead to affordable units being created.

At the same time, we know that 80% AMI additions aren't going to save the people most in need. For residents at very low incomes, missing-middle housing won't solve the problem, and targeted subsidy is a must. I see housing subsidies as deeply complementary to regulatory reforms: when we take these types of efforts to increase housing options, we can help cool the overall housing market, hopefully putting our government-funded affordability needs within greater reach.

On the whole, I commend city staffers for the work they've done so far, and hope that the planning commission continues moving this good work forward.

Best,
Zak Yudhishthu