184522

Agenda Item 239-241 TESTIMONY 2:00 PM TIME CERTAIN

CITYWIDE TREE CODE – TESTIMONY ON AMENDMENTS ONLY

IF YOU WISH TO SPEAK TO CITY COUNCIL, PRINT YOUR NAME, ADDRESS, AND EMAIL.

NAME (print)	ADDRESS AND ZIP CODE	Email
✓ John Gibbon	9822 SW. Quail Park	jtgovygun@aol.com
✓ Laurie Butler	222 SW Columbia Portland, OR 97201	ljbutler@firstam.com
✓ Justin Wood	1834 SW 58th Ave #102 Portland, OR 97221	JUSTIN@fishconstructionnw.com
✓ Nick Hunt	P.O. Box 66902 Portland OR 97290	nickhunthomes@yahoo.com
NO MOE SALEM	P.O. Box 991 HUBBARD OR 97032	MOE@westsidedrywall.com
✓ Bob Sallinger	Audubon	bsallinger@audubonportland.org
[illegible]	[illegible]	[illegible]
✓ PAUL SOLIMANO	WILLAMETTE CULTURAL RESOURCES ASSN.	Paul@willametteCRA.com
✓ JUDITH REES	1965 SE HEMLOCK AV PDX	JREES@POBOX.COM
✓ DAVID KAPLAN	1630 SE ELLIOTT AVE HOSFORD ABERNETHY N.A. / SAVEOURELMS	DAVIDALAN KAPLAN@GMAIL.COM
✓ RICHARD ROSS	2041 SE ELLIOTT AVE 97214 HOME RESIDENT.	richardhross@earthlink.net

Date 03-09-11

184522

Agenda Item 239-241 TESTIMONY 2:00 PM TIME CERTAIN

CITYWIDE TREE CODE – TESTIMONY ON AMENDMENTS ONLY

IF YOU WISH TO SPEAK TO CITY COUNCIL, **PRINT** YOUR NAME, ADDRESS, AND EMAIL.

NAME (print)	ADDRESS AND ZIP CODE	Email
✓ RYAN O'BRIEN	1862 NE ESTATE DR. HILLSBORO OR 97124	RYANOBRIEN1@FRONTIER.COM
✓ Veronica Bennett	1117 S.W. Stark, Portland, Ore 97205	Veronica_melody@yahoo.com
✓ Jim Laubenthal & ✓ John Laf	8105 NE 33rd Dr Portland 97211	laubenthaljim@gmail.com
✓ MARK DANE	13005 SW FOOTHILL DR. PDX 97225	mark@markdaneplanning.com
✓ DAVID ODOM	6317 NE 15th Ave 97211	yo.odom@gmail.com
✓ MIKE GILLILAND	17 SW TAYLORS FY RD. PDX97219	MIKEGLA@gmail.com
✓ ~~Jeff~~ FISH	1834 SW 58th #102 Pdx 97221	Jeff@FishConstructed NW.com
Ted Casian	7244 SW Durham Rd PDX 97224	tedc@superflows.com
✓ Holly Hinderbrecht ORG CHARLES DOEPKEN	8250 N. LOMBARD PDX 97203	Holly@STJOHNSMAINSTREET.ORG
✓ Linda Robinson	1115 NE 135th 97230	lrobinspdx@comcast.net

Date 03-09-11

184522

Agenda Item 239-241 TESTIMONY 2:00 PM TIME CERTAIN

CITYWIDE TREE CODE – TESTIMONY ON AMENDMENTS ONLY

IF YOU WISH TO SPEAK TO CITY COUNCIL, **PRINT** YOUR NAME, ADDRESS, AND EMAIL.

NAME (print)	ADDRESS AND ZIP CODE	Email
✓ Barbara Quinn	7034 N. Charleston Pdx	barbaraquinn@clarion-des Con

Date 03-09-11

184522

March 9, 2011

Portland City Council
City Hall
1221 SW 4th Avenue
Portland, Oregon 97204
Cc: Susan Anderson, Director, Bureau of Planning and Sustainability
Re: Citywide Tree Project

Dear Portland city council members and Ms. Anderson,

In regard to the proposed amendments to the Citywide Tree Project, I ask that the small lot exemption not be widened to include lots from 3,000 to 5,000 sq. ft., but rather to require permitting to protect older and more valuable trees that may be present.

On non-development lots, it is also important to protect our mature trees in light of the fact that most of north Portland's largest trees including native Oregon oak and Pacific madrone are sitting on private lots, some exceeding 200 years of age. There are currently only 2% of native oak left in the Willamette Valley, due mostly to development encroachment. Both oak and madrone are exceedingly slow growing and notoriously difficult to transplant and manage. They mature around 100 years, making it difficult if not impossible to see the results of our efforts. Nature does it best and it's important to save the stock we have when possible.

These trees can live several centuries and are known to provide the highest food and habitat value to a variety of wildlife. They create thousands of square feet of vertical habitat not to mention acorns needed for regeneration. By preserving them we get a double bang for our restoration buck and save money in the long run.

Thank you,
Barbara Quinn, chair
Friends of Cathedral Park Neighborhood Association
Friends of Baltimore Woods

Testimony of John T. Gibbon – Land Use Committee Chair for SWNI –

Re: Proposed Tree Code – Title 11

SWNI supports City Council approval of the tree policy review and regulatory improvement project and urge its implementation, but with the caveat that we recognize the project recommendations are not perfect and will need revision.

The following testimony is submitted to support the content of the SWNI resolution

In my initial presentation to the Council on this matter I gave each of you a road map to two small areas of SW Portland that I know would quickly illustrate for you the manifest problems with the current unwieldy and inequitable tree regulation "system". The two areas include my daily route to work and the neighborhood in which I live so I have had the opportunity to watch the trees in these two areas evolve as part on the natural and built environment for the past fifteen years. I hope each of you took the time to drive from Barbur Blvd. to Capitol Hiway along Capitol Hiway (the test question being how one is able to do this) and drove through Quail Park PUD (where I live) off Huber and on into the neighboring Indian Hills subdivision off Taylors Ferry Road. If you did you will have seen for yourself (along Capital Hiway) the manifest problems created by the City's current tree regulatory process and the promise provided by the simpler more equitable tree regulation process embodied in the proposed Title 11 (by comparing Quail Park [subject to tree removal regulation by private covenant and zoning conditions] with Indian Hills (developed before tree regulations were first implemented by the city and without any private controls).

Right now the City suffers from too much too complicated tree regulation that is more, I fear, for the employment of planners than to assist any implementers (public or private, paid or volunteer, or an owner) trying to responsibly maintain trees or reestablish functioning canopies. The end result of this approach is, literally, a patchwork of tree regulation requirements applicable to individual parcels and lots that in the end is disrespected by almost the entire community even, in the event and on their own property, the most ardent of advocates for strict land use planning.

I am concerned about this situation not only as an owner burdened with the obligation of maintaining a tree covered lot and its adjacent common area (the situation that prompted me to once become involved as an citizen activist to work on the SWNI Tree report) and as the Land Use Chair of the SW Neighborhoods as well as a member of the Public Utility Review Board because a viable tree canopy is a valuable part of the City's storm water infrastructure. In this capacity I am convinced that the City's tree regulation system, much more geared for show rather than work, is significantly impacting the efficacy of the City's efforts to comply with the Clean Water Act which is presaged on the assumption the maintenance of a viable tree canopy throughout the City especially along its streets and in environmental zones. This concern is heightened by recent reports I have received from other interested

agencies that the Clean Water Services Agency is beginning to get demonstratively superior storm water quality results in areas of the watersheds where it shares jurisdiction with the City of Portland.

In light of these reports I believe that the City may soon be called to account how its environmental zoning approach can, in comparison to fee acquisition programs more commonly used in CWS's jurisdiction, be improved to produce adequate results in relation to Clean Water Act requirements. It appears to me, the new Title 11, by demonstrating not only a commitment to comprehensive regulation but the beginnings an effort to enhance the tree resources city wide can be an important first step in any City response to any questioning whether it is committed improving water quality by responsibly managing its storm water. But I believe this will only be true if the regulation is truly comprehensive (affecting in some way **every** property in the city) and coupled with a clear effort (such as the promulgation of the Tree Manual) to enhance the resource.

Right now I see the problem with the City's tree program is that it relies too heavily on its review component (probably because it is the easiest point at which fees can be charged) and (although it appears to have quite competent technical expertise) it, even now, fails to provide sufficient extension agent like services to all the owners that have the need for assistance with tree and environmental area maintenance. Trees are an important part of the City's "Green Infrastructure" but not even in Portland's relatively forgiving temperate forest environment are trees something that are wisely left unmanaged. It seems reasonable to try to respond to this natural environment, but naïve to believe that retaining "native" trees and vegetation in an area substantially modified for urban uses is in anyway a guarantee that they will actually provide environmental benefits without imposing, on both their public and the owners of the property upon which they are "retained", substantial maintenance costs. I can guarantee you that, having tried to responsibly manage and live on "naturally" treed small lot that it is a truly expensive challenge with my tree maintenance and removal costs at least equaling if my structural maintenance costs during my 15 years of ownership. Be realistic the proposed Title 11 cannot help but impose some of these costs on all property owners in Portland, in my opinion, fairly given both the market and the infrastructure benefits the trees will provide.

I therefore strongly support the adoption of Title 11 in order to bring Citywide consistency to the tree regulation process. However as much as I believe that the best course would to adopt the 12 inch standard for every tree would be the best from a public policy point of view (as well for reason of e practical implementation and ease of administration) I believe that such an imposition of owners of currently developed lots will generate substantial conflict and refusal to cooperatively participate in the permitting program so I support the 20 inch baseline recommendation of the Planning Commission. Moreover I believe even in environmental zones tree removal and replacement should only be regulated through permit and inspection requirements not through additional and expensive environmental review on a tract by tract basis. I believe individual owners ought to be given the certainty of developed environmental plans identifying native trees and appropriate replacement trees based either on neighborhood or probably more appropriately watershed plans. I would urge that if large acreage environmentally zoned private owners have submitted a programmatic permit specifying which native

replacements they will utilize after native removal that their only obligation should be to have that replacement inspected after the removal.

I encourage the city to aggressively advertise and pursue it's storm water charge reduction program based on the standards adopted in Title 11 to raise the level of voluntary compliance with the new Title. I strongly hope the end result of the adoption of this new provision will be that City workers, in the mode of extension agents, not as planners or regulators will be working with all the citizens to co-operatively expand our City's tree canopy.

184522

John T. Gibbon Thoughts on Tree Amendments

(Personal Not Position of SWNI or PURB But Informed By Both)

Based on my experience of expense and hazard in Quail Park I would not mandate preservation of large native trees within the interior of lots smaller than 5000 square feet. I recommend this reluctantly, these trees have immense environmental canopy benefits but create major safety and property maintenance problems when growing close to structures. I think that for the interior lots between 3000 and 5000 feet there should be a mandatory tree replacement requirement with tree appropriate in scale to the development of the property and an absolute requirement of a street tree. If the property lacks sufficient property or frontage for the required tree condition it can be satisfied by tract or easement preservation or planting or contribution to Tree Fund. I feel even the smallest of lot's can successfully manage property boundary tree preservation at least inside a functioning tree trimming and cutting permit system.

I support the proposed street tree programmatic approach and want to see a similar approach or alternatively a programmatic permit system available to commonly owned tracts and properties, provided the owners demonstrate adequate power to enforce compliance by all common owners. I believe any such program to handle tree maintenance without individual permits should require owners put of record agreements to follow pruning and maintenance requirements of City Tree Manual and watershed guideline.

184522

Moore-Love, Karla

From: Tamara DeRidder, AICP [SustainableDesign@tdridder.users.panix.com]
Sent: Wednesday, March 09, 2011 3:05 PM
To: Moore-Love, Karla
Cc: Anderson, Susan
Subject: City Council Review of Proposed Tree Ordinance - Testimony for Consideration

Importance: High

Attachments: SustainableDesign.vcf

SustainableDesign.vcf (381 B)

Dear Honorable Mayor Adams and Fellow Commissioners:

Thank you for accepting my testimony via-email as I am currently taken a break from work and am unable to be there in person to testify. I am writing you on behalf of Rose City Park Neighborhood Association as the Co-Chair of the Land Use & Transportation Committee. My comments are 2-part:

1. Transferable Development Rights or Flexible Density Right should be tool applied in this Tree Ordinance. No where in the document, except in a brief reference in Exhibit 3 that references Action Item 2.E.1 does this document offer the use of flexible densities to preserve existing groves of established trees. However; in following this reference lead your documents do not provide any further information on this topic.

A Flexible Density Right allows changes to height and, possibly, setbacks for a proposed residential structure. A Transferable Development Right allows the transfer of a buildable right to a 'receiving area', which then needs to be tracked by deed & may be sold as a commodity.

The issue at hand is there are a number of Urban Pockets of what is considered 'Buildable Land' throughout the Portland urban area.
However; these properties have not been developed typically due to the fact they have had either site design or ownership issue that made it harder to develop. Many of these sites now contain groves of mature trees that have become a welcomed constant in the neighborhoods that surround these sites. What I am proposing is a way in which residential development could still proceed while preserving these groves for future generations.

A Flexible Density Right could allow the residential structure to consume only 40% rather than 60% of the lot area, allowing an additional story to get allowed square footage. It could also encourage alternative designs of single family residences such as detached bedrooms with a smaller residential structure used for kitchen and laundry purposes. The goal would be to preserve groves of trees, where possible, while still honoring development rights and maintaining a tight urban form.

2. Consider a 'Friends of Trees Shadow Unit' that will help residents on the edge of homelessness from being forced to pay fees or fines over food. The City instated a 'Leaf Pickup Program' without the consent of the residents - forcing those on fixed incomes to fork out $60 or more just before the 2010 holiday season. Now with water rates proposed to increase 85% we are now finding that we may be faced with a fine just for trimming trees located on our own property - if we have not paid for the proper permit...Instead, why not appoint a Volunteer Forester for each of the neighborhoods? Support them with acknowledgment, provide them tools for education, and maybe even give them educational credit for their services. Folks tend to want to do the right thing - But, often do know know all the rules, don't have the time to sleuth out the problem, or may just know very little about the natural environment around them. Like 'Friends of Trees' program - you attract more flies with honey!!

184522

Thank you for your time and consideration!!

My best,

Tamara DeRidder, AICP
Co-Chair, Land Use & Transportation Committee Board, Rose City Park Neighborhood Association
503-706-5804

CC: Susan Anderson

Moore-Love, Karla

184522

From: Kathy Shearin [Kathy@emswcd.org]
Sent: Wednesday, March 09, 2011 1:36 PM
To: Moore-Love, Karla
Subject: Tree Ordinance comments
Attachments: CitywideTreeProject_EMSWCD_3-8-11.doc

Hi Karla,
Please find EMSWCD's comments attached.
Thanks!
Kathy

Kathy Shearin
Program Manager, Sustainable Urban Landscapes
East Multnomah Soil & Water Conservation District
5211 N. Williams Ave.
Portland, OR 97217
Kathy@EMSWCD.org
503-935-5365

184522

March 8, 2011

Portland City Council
1221 SW Fourth Ave
Portland, OR 97204

Re: Citywide Tree Policy Review and Regulatory Improvement Project (Citywide Tree Project)

On behalf of the East Multnomah Soil and Water Conservation District, I would like to express support for the City of Portland's proposed Title 11 which consolidates, fixes, and updates the city's tree codes.

We have a few suggestions that we feel would strengthen this policy even further:

1) There will be significant personnel time required to make these new rules real on the ground. We believe that trees are among this City's greatest treasures – they define our region. **We urge the Council to fund the capacity needed to fully implement this "new code".**

2) **We believe the diameter of trees to be protected is too large.** Large diameter trees, certainly those with a diameter of 12 inches or more, provide significant ecosystem services that newly planted trees won't replace for many, many years. These new trees may never provide the same quality of services if the homeowner replaces a large tree with a smaller and/or shorter-lived species.

3) As part of the development of the Portland Plan, Mayor Adams convened a group of governments operating within Portland's boundaries to discuss alignment of goals and opportunities to better coordinate our work. The East Multnomah Soil and Water Conservation District welcomes this approach. Currently, invasive species are the single most costly problem that EMSWCD is working on. If Portland allows invasives such as Norway Maples to be planted, we as a region will likely find ourselves paying for the consequences as some of those seeds inevitably show up in natural areas. We will be more successful if we work together on this critical environmental problem. **We ask the City to resist making any exceptions to its own invasive species policies.**

4) Trees perform essential ecosystem services like reducing energy costs, improve air quality by filtering toxins from the air and producing oxygen and improve water quality helping to slow and filter often-polluted stormwater before reaching our waterways. Trees also help to "soften" the built surroundings, making for a more pleasant place to live and work. **For these reasons we ask that the City not exempt industrial zones from this or other landscaping ordinance. It is these areas that need trees the most – especially when they are located so close to our waterways.**

We thank you Mayor and Councilpersons for your efforts to protect and enhance our urban canopy and appreciate the opportunity to comment on this important issue.

Kathy Shearin

Kathy Shearin,
on behalf of EMSWCD
5211 N. Williams Ave.
Portland, OR 97217

Moore-Love, Karla

184522

From: Alice Blatt [aliceb@pacifier.com]
Sent: Wednesday, March 09, 2011 1:18 PM
To: Moore-Love, Karla
Subject: Citywide Tree Project

To: Whom it may concern

As a long-time community activist, I would like to voice my support for the Audubon Society's testimony as submitted by Bob Sallinger and Jim Labbe on March 9, 2011.

Alice Blatt
15231 NE Holladay
Portland, OR 97230

184522

Moore-Love, Karla

From: Debbie Kitchin [dkitchin@interworksllc.com]
Sent: Wednesday, March 09, 2011 11:45 AM
To: Moore-Love, Karla
Subject: Citywide Tree Policy Comments from CEIC
Attachments: Tree Policy Letter 3-10-11 (2).pdf

Thank you for the opportunity to comment on the Citywide Tree Policy.

Debbie Kitchin
LEED AP
InterWorks, LLC
Commercial Tenant Improvement
Earth Friendly Remodeler
503-233-3500 office
971-563-0208 cell
dkitchin@interworksllc.com
www.interworksllc.com

CENTRAL EASTSIDE INDUSTRY COUNCIL

P.O. Box 14251, Portland, OR 97293-0251
Ph: 503-768-4299 – Fax: 503-768-4294
Email: ceic@ceic.cc – Web: www.ceic.cc

184522

Mayor Sam Adams
Commissioner Nick Fish
Commissioner Amanda Fritz
Commissioner Randy Leonard
Commissioner Dan Saltzman
City of Portland
1221 SW 4th Ave.
Portland, OR 97201

RE: Citywide Tree Policy Review

March 9, 2011

Dear Mayor Adams and City Commissioners:

The Central Eastside Industrial Council would like to provide the following comments on the Citywide Tree Policy under consideration by the City Council.

In the current economic environment, it is very important to focus primarily on restoring jobs and the economic vitality of our City so that the entire community can prosper and provide the services we need and support. We urge you to keep this in mind in all aspects of City regulations and policies.

We support the effort represented in this process to simplify, consolidate and streamline the City's existing tree regulations. We are generally in favor of efforts to save money and increase efficiencies for City Bureaus and for businesses and residents of the City. We are concerned, however, that the existing proposals are more complex in many ways and may be difficult and costly to enforce. In fact, the complexity and difficulty in administering the program may lead to unintended results for increasing the tree canopy and for realizing cost savings from streamlining and simplifying tree regulations. We are not in favor of outcomes that increase the cost of doing business in the City.

That said, we strongly support the proposed exemption of industrial lands where landscaping in not currently required from the tree regulations and would urge the Council to maintain these exemptions in the future. We also support the inclusion of an affordable fee in lieu of tree replacement to provide an option to property owners with sites under other constraints.

We understand that the landscaping requirements for other employment and commercial property will not be increased under this ordinance, but that property owners will be required to provide more tree canopy within the existing landscaping set asides. While we appreciate this element of the proposal, we are concerned that there may arise issues that increase costs for doing business that are unanticipated when this rule is applied to specific properties. We would also support allowing property owners to replace trees at other properties they own within the City to create more flexibility for property owners.

We would urge the City Council to consider taking an approach that is less regulatory in nature and more focused on education, incentives and utilizing the passion and dedication of our citizens and business owners to be more sustainable. A greater allocation of resources to non-regulatory approaches could achieve the goal of increased tree canopy at a significantly lower cost.

We would urge the City Council to consider a process to revisit and evaluate the program both for its costs to the City and its constituents as well as other outcomes of this change within 2 years.

Thank you for the opportunity to comment on the Citywide Tree Policy Review.

Sincerely,

Debbie Kitchen
CEIC Board Representative

184522

Moore-Love, Karla

From: Jortner, Roberta (Planning)
Sent: Wednesday, March 09, 2011 11:13 AM
To: Moore-Love, Karla
Subject: FW: Audubon Comments on City-wide Tree Project--March 9, 2011 Hearing
Attachments: March 9, 2011 AudubonCommentsonCitywideTreeProjecttoCityCouncil-final.doc

FYI

From: Bob Sallinger [mailto:bsallinger@audubonportland.org]
Sent: Wednesday, March 09, 2011 9:18 AM
To: Commissioner Fritz; Commissioner Saltzman; Commissioner Fish; Adams, Sam; Leonard, Randy
Cc: Ruiz, Amy; Howard, Patti; Marriott, Dean; Santner, Zari; Jortner, Roberta (Planning); Zehnder, Joe; Grumm, Matt; Hicks, Emily; Ames, Betsy; Blackwood, Jim; Bizeau, Tom; Rosen, Mike; jlabbe@urbanfauna.org; mredisch@audubonportland.org; 'Lynn Herring'; 'Josh Cerra'
Subject: Audubon Comments on City-wide Tree Project--March 9, 2011 Hearing

Dear Mayor Adams and Portland City Council,

Please accept the attached comments from the Audubon Society of Portland regarding the draft Citywide Tree Project--2nd hearing.

Thank you

Bob Sallinger
Conservation Director
Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

(503) 292-9501 ext. 110

184522

March 9, 2011

Portland City Council
1221 SW 4th Avenue Room 110
Portland, Oregon 97204

Dear Mayor Adams and Members of Portland City Council,

We are writing on behalf of Audubon Society of Portland to offer our comments for the second hearing on the Citywide Tree Policy Review and Regulatory Improvement Project. We are growing increasingly concerned about the expanding list of changes and amendments that are being proposed for incorporation into the tree plan. Since the plan emerged from the nearly two year long stakeholder process, we have seen steady reduction in outreach and enforcement resources, funding resources and regulatory protections associated with the plan. There seems to be a perception that we are simply shifting emphasis, for example from a regulatory approach to educational approach, but in fact every element of this plan has now been substantially reduced from its original ambitions.

The plan is suffering the proverbial "death by 1000 cuts." We have been repeatedly advised that various individual cuts to the plan only affect 2-3% of the trees in the city. However, those cuts have added up over the course more than year-long adoption process. We are not convinced that city any longer has a strong grasp on how the succession of cuts may have cumulatively impacted the overall efficacy of the plan or in the plan's ability to achieve citywide tree canopy targets. We are particularly disappointed about the extensive changes that are now being proposed given the fact that the draft pan represented both a surprisingly high level of consensus and a remarkably low price tag.

We are very familiar with the iterative nature of the legislative process, but we have to respectfully note with growing alarm what seems to be a growing chasm between the public stakeholder processes and the council decision-making process. As the city's public stakeholder processes have grown increasingly elaborate and labor intensive they also seems to have become increasingly disconnected from the legislative adoption process.

The following are our specific comments regarding proposed amendments that we believe would substantially weaken the tree plan:

Amendment 2.A.1. Exempts Industrial and Commercial Zones that do not have existing landscaping standards from the tree preservation and tree density requirements: In order

Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

(503) 292-6855
www.audubonportland.org

to meet the city's tree canopy targets, all land use types will have to do their fair share. Exempting Industrial and Commercial Zones may be necessary in order to resolve issues associated with the recent LUBA Ruling. However the city should explicitly commit revisiting this issue as soon as the LUBA Ruling is resolved and ensuring that industrial and commercial zones contribute to restoration of the urban canopy.

Amendments 3.C.1 a. or b. Reduces Tree Permit Thresholds: Audubon strongly opposes both these amendments. This proposal strikes at the heart of the new Tree Plan by significantly increasing thresholds and reducing oversight (permitting) of tree removal on private, non-dividable, residential lots up to 10,000 square feet. It goes far beyond what was recommended by the stakeholder group, Planning Commission and Forestry Commission. This issue was repeatedly discussed and debated throughout the entire process and many stakeholders believe that the existing already goes too far in terms of leaving trees unprotected. These amendments would remove significant portions of the tree canopy from the regulatory framework.

Amendment 3.D.1: Allows Removal of Larger Trees for Programmatic permits. Programmatic permits allow large developers like the Port of Portland develop large projects more efficiently. Audubon opposes expanding the tree diameter threshold for programmatic permits beyond the currently proposed 6 inches UNLESS the ability for the public to appeal programmatic permits is restored. The appeal provision was removed by the Planning Commission when the 6 inch cap was put in place. We believe removing the cap only makes sense if the appeal process is restored. The public has a right to weigh in on programmatic permits that could impact large portions of the landscape.

Amendment 2.B.1. Reduces the tree preservation standard from 35% of 12" diameter trees to 33% of 12" diameter trees on construction sites: This decision will result in a significant loss of trees on construction sites. For example a site with 3 threes would now be required to protect 1 tree rather than 2. A site with 6 trees would be required to protect 2 trees rather than 3.

Amendment 2.B.1.b.: Eliminates the tree mitigation requirements for small lots between 3000-5000 square feet. Audubon strongly opposes this added exemption. The Planning Commission already added an exemption for development lots 0-3000 square feet to the original draft tree plan which included no exemptions for small lots. Audubon believes that the problem is not lack of space for trees but rather developers overbuilding small lots. There is plenty of room on 3000-5000 square foot lots to preserve or mitigate for trees.

Amendment 2.B.3.: Expand building coverage exemption from 90% to 80%: Audubon sees no valid basis for this reduction. This is simply an effort to reduce developers' responsibility to preserve and mitigate for trees rather than a true conflict.

Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

(503) 292-6855
www.audubonportland.org

Amendment 2.C.1: Counts street trees towards density standards on lots less than 3000 square feet: Audubon opposes this amendment. In order to achieve city tree targets it is critical that the city get into areas outside the right of way, specifically to encourage planting on private property.

Amendment 2.D.1: Deletes provision allowing outdoor area to encroach into front yard setback for the purpose of protecting existing healthy non-nuisance trees 12 inches or greater: Both developers and conservation organizations agreed that creating flexibility in this area was desirable. This provision will only apply in a very limited number of circumstances. We believe that their is a market for larger front yards especially as the city works to activate streetscapes and reduces restrictions on activities such as gardening in the right-of-way. We see this provision as exactly the type of flexibility the city needs to provide in order to integrate the build and natural environments.

Amendment 3.A.1: Deletes proposed tree replacement requirement for City-listed nuisance trees except in e-zone: Audubon strongly opposes this change as it would entirely exempt up to 13% of the existing trees in the city from mitigation. Replacement of these trees is critical to achieving the City's canopy targets. The committees did carefully consider the issue of whether requiring a replacement tree would serve as a disincentive to removal of the these trees. Given that the goal is gradual transition (removal and replacement with non-nuisance trees) over time rather a precipitous change, the committee determined that that minimizing regulatory barriers and requiring replacement planting was the best strategy to achieve the city's desired outcomes. The currently proposed amendment creates a worst case scenario---minimal barriers to removal and no replacement---which could result in a steep loss in canopy. We believe the tree for tree replacement standard is reasonable and will not create an impediment to removal.

We would end by noting that this plan even in its strongest formulation was far from the cutting edge. Other local jurisdictions as well as city's across the United States have instituted far more aggressive tree preservation and restoration programs. At best, we believe the tree plan that arrived at Council gave the city a reasonable chance of achieving its tree canopy targets and eliminating the most egregious problems associated with tree management. That limited vision now seems slipping from our grasp.

Thank you for your consideration of our comments.

Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

(503) 292-6855
www.audubonportland.org

184522

Respectfully,

Bob Sallinger, Conservation Director
Audubon Society of Portland

Jim Labbe, Urban Conservationist
Audubon Society of Portland

Audubon Society of Portland
5151 NW Cornell Road
Portland, OR 97210

(503) 292-6855
www.audubonportland.org

184522

Moore-Love, Karla

From: richardnross@earthlink.net
Sent: Wednesday, March 09, 2011 10:45 AM
To: Moore-Love, Karla
Cc: Commissioner Fritz; Hicks, Emily; Jortner, Roberta (Planning); Bizeau, Tom; Ruiz, Amy
Subject: Tree Code, Council Direction on Norway Maple and Cultural Landscape policy
Attachments: Council Letter, Tree Code Norway Maple and Cultural Landscape Policy, 3-9-11.doc

Please include this letter in the record prior to the Tree Code hearing at 2 p.m. this afternoon.

I also plan to present this proposal for additional Council policy direction at the hearing.

Richard N. Ross, AICP
2041 SE Elliott Ave.
Portland, Or. 97214
H 503-235-8194 C: 503-807-0612 Fax: 503-235-8194

March 9, 2011 VIA E Mail

184522

Mayor Adams and Commissioners

1221 SW 4th Ave, Portland Or. 97204

RE: Tree Code, Norway Maple and Cultural Landscape, Council Policy Direction

Dear Mayor and Commissioners

As a co-founder of Save Our Elms (SOE), an urban forestry non-profit in seven city neighborhoods, I continue to be concerned about the impacts of the Norway Maple street tree ban and how the city resolves significant cultural landscape issues, in Ladd's Addition and elsewhere.

I'm disappointed that the final Council amendments contain no provision for a Ladd's Addition Norway Maple Exception, as proposed by the Landmarks Commission and HAND. Expert horticultural testimony from a founding member of the Oregon Invasive Species Council supports this exception, and found that it would pose a "low risk" to any City natural areas (Keith Warren, Director of Product Development, J Frank Schmidt, February 1, 2011, Letter to Council).

If the Council adopts the Tree Code as now proposed, I hope you will provide additional policy direction to the appropriate bureaus on several broader issues raised in the Tree Code process:

1. Develop a citywide Norway Maple Street Tree Replacement Strategy, as an addition to the current Urban Forest Action Plan, to protect and expand existing and future street tree canopy. This strategy would recognize that the Tree Code bans replanting of Portland's most widely used street tree, affecting 9% of its current street tree canopy.

2. Formalize coordination of cultural landscape issues between the Parks Bureau, the Urban Forestry Commission, Bureau of Planning and Sustainability, and the Historic Landmarks Commission. The City should address cultural landscape issues upfront in City planning processes, not as an afterthought.

WHY SHOULD THE COUNCIL PROVIDE ADDITIONAL POLICY DIRECTION?

1. A Norway Maple Replacement Strategy should Protect Existing and Future Canopy

The proposed Tree Code bans Portland's most common street tree without guidance for their orderly replacement and maintaining street canopy cover. The Tree Code will prohibit replanting of Norway Maples on large parts of Portland's streetscape where they now predominate.

According to the **Urban Canopy Report** (2007, p 17), Norway Maples are the City's "most important" street tree in numbers (20,681 trees), leaf area, and street canopy. They now provide substantial environmental, stormwater, microclimate, habitat, social and economic benefits for the street system in many neighborhoods. Portland's streets only have an estimated 17% total canopy cover now. While the current **Urban Forest Action Plan** (2007, p 2) calls for doubling this street canopy, without a larger strategy for Portland's streetscape, the Tree Code ban could undermine the Plan's canopy enhancement goals.

*A **Norway Maple replacement strategy** in the Urban Forest Action Plan could include prudent actions to assure the orderly transition of existing Norway Maple street trees, streetscapes and canopy. The Urban Forestry Division should develop this strategy, working with affected bureaus, neighborhoods, interested groups and individuals.*

2. Better Coordination of Portland's Cultural Landscape Issues Is Needed

Historic Landmarks Commission review of the Ladd's Norway Maple issue happened at the tail end of the three-year Tree Code process in November 2010, partly because HAND kept pushing this issue. This review occurred after Planning Commission hearings, and after bureau positions on the Norway ban and on overriding the Ladd's District Guidelines had been set. Coming at the end, the Landmarks review was not integrated into Planning Commission review or the broader Tree Code public process.

- Currently, there is confusion about the roles of the Parks Bureau, the Urban Forestry Commission, Bureau of Planning and Sustainability, and the Historic Landmarks Commission in resolving issues that affect important cultural landscapes and cut across organizational boundaries.

- With so many City actors involved, historic district stakeholders are in limbo about the process for resolving important cultural landscape issues, and who is in charge.

- Maintaining the integrity of historic public tree plantings, where they exist, is critical to protecting the character of Portland neighborhoods. A more coordinated approach is needed to better protect the value of these plantings, and to resolve issues when the City or property owners plan, remove, or plant new trees in historic districts. (Chapter 11.60.020D Technical Specifications, Species Requirements)

- While Portland has numerous historic districts and landmarks, less than ten of its significant cultural landscapes or parks (including Ladd's Addition) are currently recognized on the National Register.

- However, multiple new National Register nominations are in the works, first for Terwilliger Blvd and the North and South Park blocks, and then proposed for up to 24 parks under the Parks Bureau's 2007 Cultural Resources Management Plan.

All of these things show the need to establish more upfront Landmarks Commission involvement, more coordination among bureaus, and more timely public involvement in cultural landscape policy issues, like the Tree Code issues in Ladd's Addition.

***An inter-bureau protocol on cultural landscape roles and responsibilities** could become part of the Urban Forest Action Plan or a future Title 11 Trees Amendment, or a wider agreement.*

Sincerely Yours
Richard N Ross, AICP
2041 SE Elliott Ave
Portland Or 97214
503-807-0612
richardnross@earthlink.net

184522

Moore-Love, Karla

From: Alyssa Isenstein [alyssaisenstein@yahoo.com]
Sent: Tuesday, March 08, 2011 10:59 PM
To: Moore-Love, Karla; Ali Young
Subject: Re: petition supporting non-invasive replacement trees in Ladds Addition

Attachments: Maple Petition Page 4.jpg

Maple Petition
Page 4.jpg (427..

Attached is an updated Page 4 of the Ladd's Addition petition with three additional signatures. Please add this to the original petition you received from Ali Young on Friday.

Thank you,
Alyssa Isenstein Krueger
2348 SE Tamarack Ave.
Portland, OR 97214
503-231-9393
alyssaisenstein@yahoo.com

--- On Fri, 3/4/11, Ali Young <rana.redlegged@gmail.com> wrote:

> From: Ali Young <rana.redlegged@gmail.com>
> Subject: petition supporting non-invasive replacement trees in Ladds
> Addition
> To: karla.moore-love@portlandoregon.gov
> Date: Friday, March 4, 2011, 12:09 PM
> Dear Ms. Moore-Love,
>
> Attached you will find copies of a petition from Ladds Addition
> residents in opposition to an exemption to the Citywide Tree Project
> allowing Norway Maples to be planted as a replacement tree in Ladds
> Addition. Signers of this petition ask to work with the City's Urban
> Forester to come up with a historically suitable non-invasive
> replacement tree for Norways Maples.
>
> In the last two weeks, myself and my neighbor Alyssa Isenstein have
> spoken with 63 neighbors. While we have not had time to canvas the
> whole neighborhood we collected 59 signatures. Out of the people we
> were able to speak with over the two week period 94 percent signed the
> petition in support of a non-invasive replacement tree. The four who
> did not sign asked to be given more time to think the issue over and
> may sign when we are able to visit them again.
>
> Please pass this petition on to the mayor and city council members.
> The petition totals 5 pages. Please also confirm that you received
> this e-mail.
>
> Thank you very much,
>
> Ali Young
> 1737 SE Maple Ave
> Portland, OR 97214

Moore-Love, Karla

184522

From: Margot Barnett [mbarnett2@earthlink.net]
Sent: Wednesday, March 09, 2011 7:46 AM
To: Moore-Love, Karla
Cc: Jortner, Roberta (Planning)
Subject: Comments on Citywide Tree Code Project
Attachments: M. Barnett Comments Tree Code 3_9_2011.pdf; ATT00001.htm

Please find attached and included below my comments on the Citywide Tree Code Project proposal and amendments.

9-March-11

Portland City Council
Portland City Hall
1221 SW Fourth Ave
Portland, OR 97204

RE: Citywide Tree Project-February 2011 Proposed Draft, and proposed amendments being considered on March 9, 2011

Dear Mayor Adams and City Council Members:

I am submitting this written testimony since I am unable to attend the hearing on March 9, 2011. This written testimony includes some oral testimony I have provided and additional comments on recently proposed amendments that are before you.

I have been involved in urging the City to revise the tree code since 2005 researching and co-authoring the report Tree Protection and Preservation in Portland a Call to for Reforms while a member of the Southwest Neighborhoods, Inc Tree Committee (a subcommittee of the Land Use Committee). I have continued to participate in the discussions of Urban Forestry policy in the city through service on the Urban Forestry Commission and the Stakeholder Working Group for the Citywide Tree Project.

I urge you to move ahead with approval of the proposal brought to you in February with minimal changes. The proposal brings forward many of the changes that were requested years ago by the SWNI Tree Committee. Consolidating code, eliminating loopholes, education and enforcement are all critical elements of what otherwise is incomplete package to protect a valuable infrastructure asset that provides a wide variety of ecosystem services that are well delineated in the code purpose statements and supported by cited research. I particularly appreciate efforts to recognize the value of healthy large trees, native trees and groves of trees.

It is important as we become more reliant on green infrastructure for services utilizing green roofs, trees, swales other innovative approaches that site inspectors be appropriately trained and view these elements from the infrastructure perspective rather than as an aesthetic amenity. This

184522

proposal moves us in that direction.

This proposal creates consistency, and provides for education and enforcement, that when implemented support the success of programs and plans which rely on trees like the Portland Watershed Management Plan, The Urban Forestry Plan, Grey to Green and the Climate Change Action Plan.

My interest in urban forestry stems from my environmental health training which recognizes the vital role urban forests play in providing clean air, shade, water filtration, and other human health benefits in addition to habitat, stormwater and carbon sequestration functions. This proposal does have costs attached but these costs are small compared to the costs of not caring for and sustaining this asset. The phased approach will help reduce costs.

At least half of the urban forest canopy is on private property thus it is important to ensure that we provide resources to address this vital aspect of Portland's livability. Portland is becoming a more mature city with most building being redevelopment and infill. As such it is important that we be forward thinking and find ways to encourage the stewardship and growth of our urban forest canopy on properties that are already developed in addition to preserving trees during the development process.

Please do not adopt the following proposed amendments:

Amendment from Commissioner Fish, Pruning of street trees – Please do not eliminate the City's existing street tree pruning permit. If the Council feels changes must be made to this permitting system please institute a self-issued permit system that can be done online or via a form that is completed and sent in rather than the proposed property owner notification. A *permit* is enforceable, a *notification* has less teeth. The self-issued permit system would still allow for the property owner to request assistance or consultation, and would not have a delay.

Item 2.A.1. Exempts Industrial and Commercial Zones that do not have existing landscaping standards from the tree preservation and tree density requirements. I recognize the need for this to be in place temporarily but would like a clear specification to revisit this when when LUBA remand issues are addressed. While industrial zoned properties need some additional flexibility and lower required tree densities they also need to bear some of costs and burdens of providing tree canopy, especially since these zones typically add to the heat island effect, increase pollutant levels that are at least partly remediated by trees.

2.B.1. Preservation Percentage. Change the preservation standard from 35% of >12" diameter trees to 33% of >12" diameter trees on development sites [Mayor Adams 2/2/11] I am not sure I understand the rationale for this amendment, and it does result in the preservation of substantially fewer trees.

2.B.1.b.: Eliminates the tree mitigation requirements for small lots between 3000-5000 square feet. Without mitigation requirements there are fewer incentives to use design techniques to preserve trees. It also once again brings forward the question of why trees are less important for neighborhoods that are being developed more densely.

2.B.3.: Expand building coverage exemption from 90% to 80% - The conflict that this change seeks to resolve is not clearly specified or justified by the information provided.

2.D.1: Deletes provision allowing outdoor area to encroach into front yard setback for the purpose of protecting existing healthy non-nuisance trees 12 inches or greater. This will not impact many properties, but allows flexibility for those rare sites where it makes sense to preserve a particularly desirable tree.

184522

3.A.1: Deletes proposed tree replacement requirement for City-listed nuisance trees except in e-zone.

This item was discussed at length during stakeholder group meetings and it was my impression that there was consensus on this issue. Mature nuisance trees do provide some of the same ecosystem services that desirable species provide, especially if the nuisance species is the only large tree present on a site. Replacement should be required otherwise we will continue to lose canopy.

3. B. Private Tree Removal Permits – For simplicity and equity please do not add a lot size exemption. Portland faces many challenges. I firmly supporting a compact urban form, using infill while doing our best to preserve and enhance the green infrastructure of the region both within and outside of the urban growth boundary. Shade, clean air, and greenery are elements of livability that should be distributed equitably across housing types. While the original proposal moves us in that direction, I am particularly concerned about proposed changes exempting lots <5000 ft^2 from tree preservation requirements. The overall impacts of this change on the city's canopy may not be very large its impact on sectors of the city with larger amounts of infill development is large in terms of the character of neighborhoods and important aspects such as summer cooling, air quality. These issues were discussed at great length by stakeholders, and the two advisory Commissions who did not recommend exemptions. Please do not move forward with this amendment.

Changing the size of the tree size for permits to 16 inch diameter is potentially confusing and will not help with concerns about species diversity and retaining mature trees of species with slower growth rates and smaller diameter at full maturity (this includes some native species). It would be more consistent and make more sense to use the 12 inch diameter if there is a change.

I conditionally support Amendment 3.D.1: Allowing the Removal of Larger Trees for Programmatic permits - as long as the amendment includes the opportunity for public appeal.

I support the following amendment:

2.F.2. Adopt chapter 33.860, Comprehensive Natural Resource Plans that allow master planning for sites containing one or more environmental resource overlay zones. [staff 2/2/11]

There are several items that are not addressed by the current proposal that I wish to bring to the Council's attention for future consideration. I have mentioned these items before, but wanted to include them in written comments. As we move forward with the Portland Plan we will need to find creative ways to balance the needs for density, other forms of green infrastructure (green streets, swales, etc.) and solar access with the need to support a diverse urban forest across a variety of urban land uses.

The City needs to address the costs of repairing damage to sidewalks from tree roots. If we are asking citizens to plant more trees, get permits for removal and pruning of streets we need to look at ways to help citizens reduce the additional costs imposed by property owner responsibilities for sidewalk maintenance when damage is caused by tree roots. Hopefully the City can look at models used in other jurisdictions and find ways to share costs and\or help property owners (especially low income home owners) finance repairs.

Bear in mind as you look at the proposed code and consider any amendments that there are some elements in the code that are based upon balancing input from stakeholders and tradeoffs that were created during this lengthy Project. Changes may upset that delicate balance that was created over a year of intensive group work followed by staff code development and further vetting through two City Commissions which worked together and took public comment over an extended period.

I urge you to help this proposal move forward. Thanks to staff for all of their hard work on this project and to you for

184522

your careful consideration of this code improvement and implementation strategy.

Sincerely,

Margot Barnett
9912 SW 25th Ave
Portland, OR 97219

184522

Moore-Love, Karla

From: Peter Torres [peter@multnomahtree.com]
Sent: Tuesday, March 08, 2011 6:55 PM
To: Moore-Love, Karla
Subject: Trees

Attachments: peter.vcf

peter.vcf (314 B)

I am 100% in favor of Commissioner Fish proposal to replace street tree pruning permit. I am owner of Multnomah Tree Experts and have been working in Portland since 1992. The permit requirement causes much ill feeling between residents and the City due to City incompetence and/or under staffing. Same is true of tree removal permits on or off the private lots, by the way. I recommend a statement of requirements to be sent with the annual property tax invoice. Peter Torres

Moore-Love, Karla

184522

From: hollyheidebrecht@gmail.com on behalf of Holly Heidebrecht [holly@stjohnsmainstreet.org]
Sent: Tuesday, March 08, 2011 5:52 PM
To: Moore-Love, Karla
Cc: BPS City Tree Project; Charles Doepken
Subject: citywide treee policy review letter
Attachments: tree letter to city council.doc

Please see attached for the Mayor and City Council.

--
Holly Heidebrecht
Executive Director
St. Johns Main Street
503.961.2055

184522

March 7, 2011

Mayor Sam Adams
Commissioner Nick Fish
Commissioner Amanda Fritz
Commissioner Randy Leonard
Commissioner Dan Saltzman

City of Portland
1221 SW 4th Avenue
Portland, OR 97204

Re: Citywide Tree Project

Dear Mayor and Commissioners:

It has been genious to implement the Main Street approach in St. Johns. We have been givin the organization skills to directly address the biggest needs in the most direct approach possible. Livability, the desire to keep St. Johns a vibrant historical neighborhood has been marked as the highest priority. We have narrowed our goals to three focused efforts, crime abatement, cleanliness and ease of walking in a 20 minute neighborhood. The trees and how they are performing is the biggest deterant for people walking downtown.

184522

Moore-Love, Karla

From: Dave Nielsen [daven@hbapdx.org]
Sent: Tuesday, March 08, 2011 4:31 PM
To: Adams, Sam; Commissioner Fritz; Commissioner Fish; Leonard, Randy; Commissioner Saltzman
Cc: Moore-Love, Karla; Jortner, Roberta (Planning); Ruiz, Amy; Kuhn, Hannah; Esau, Rebecca
Subject: RE: HBA 3/8 letter re: Citywide Tree Policy
Attachments: HBA ltr to City Council re Tree Policy amendments.doc

Mayor Adams and Honorable Commissioners,

Attached are our comments regarding the proposed amendments shown in attachment 1 of the materials provided last Friday. I am also emailing a copy of this to staff we've been working with in BDS, BPS, and the Mayor's Office of Sustainability.

Thanks once again for your courtesy in reviewing and considering our feedback. Several of members or our Portland Infill Housing group will be attending tomorrow's City Council meeting and we look forward to the opportunity of answering any questions or providing additional feedback.

Dave

David Nielsen, CAE
CEO
Home Builders Association of Metro Portland
15555 SW Bangy Rd., Ste. 301
Lake Oswego, OR 97062
503-684-1880
503-684-0588 (fax)

184522

Home Builders Association
of Metropolitan Portland

March 8, 2011

Portland City Council
City of Portland
1221 SW 4th Avenue, Rm. 140
Portland, OR 97204

Re: Citywide Tree Project and proposed tree code amendments

Mayor Adams and Honorable Commissioners:

At the city council meeting on Wednesday March 9th, you will be asked to hear and vote on proposed amendments to the proposed tree code. I would like to share our views on a few of the key amendments that directly impact the members of the Home Builders Association and their ability to provide affordable infill housing in the city of Portland.

- Item 2.B.1 – This amendment will lower the preservation standard from 35% to 33%. This amendment was presented by Mayor Adams and staff supports this amendment as well. **33% is a more practical number that is easier to calculate and easier to implement. Our strong recommendation is to accept motion option 1.**

- Item 2.B.2 – There are two amendment options on this item. Staff recommendation was to raise the small lot exemption from less than or equal to 3,000 sq.ft. to less than 5,000 sq. ft. **Our strong recommendation is to accept motion option 2. Exempting lots less than 5,000 sq.ft. in the city would account for 22% of all lots in the city while impacting less than 3% of total tree canopy.** The majority of all infill building in Portland occurs on small lots. These lots need maximum flexibility if builders are going to meet the city's goals for infill housing and redevelopment. While we appreciate the amendment from the Mayor's office, the staff recommendation is easier to administer. It will also require significantly fewer lots for staff to review, while the impact on overall tree canopy is small. In addition, builders still have to meet tree density requirements on the lots, which helps ensure new trees are planted and the tree canopy is maintained.

- Item 2.B.3 – If motion option 2 is accepted on item 2.B.2 (raising the minimum lot exemption to lots less than 5,000 sq. ft.) then this is not as critical of an issue to us. By allowing exemptions on smaller lots, the City is also allowing needed flexibility on lots where there would be high building

Home Builders Association
of Metropolitan Portland

coverage. We do not have a strong recommendation on this item assuming the minimum lot size exemption is raised to lots less than 5,000 sq.ft.

- Item 2.C.1 – This amendment has options to include street trees into lot tree density calculations, which we support. Of the listed motion options, motion option 2 is closer to our recommendation. However this option only allows street trees to be counted towards density requirements on lots less than or equal to 3,000 sq.ft. At the very least this should be raised to lots less than 5,000 sq.ft. to be consistent with our recommendation on the small lot exemption. However, our question still remains why street trees do not count on all lots. A tree contributes to the canopy regardless of where it is and should be counted. **Therefore our strong recommendation would be to change this amendment and at a minimum raise the street tree inclusion to lots less than 5,000 sq.ft.,** but we would also urge street trees be included towards density requirements for all lots regardless of size.

- Item 2.D.1 – There are definite pros and cons to this motion option regarding flexibility on recreational outdoor space requirements, so we do not have strong feelings either direction. We understand and appreciate Commissioner Fritz's desire to allow some backyard space for families to have with their homes and we support this wherever feasible. Generally, though, we would endorse any regulation that allows for flexibility in the setbacks to preserve trees so our recommendation would be to accept motion option 2,

- Item 3.B – While this motion regarding private tree removal does not apply to development situations, accepting motion options 2 or 3 would remain consistent with lot size exemptions proposed for development situations. Accepting a lot size exemption of less than 5,000 sq. ft. for both private and development situations makes it easier to enforce and understand.

I sincerely thank you for the courtesy of your time in hearing our feedback once again. We continue our commitment to working with the City to effectively meet desired housing needs while also accomplishing tree canopy and other important livability goals.

Respectfully,

David Nielsen
Chief Executive Officer

Moore-Love, Karla 184522

From: lorraine guthrie [lorraineguthrie@earthlink.net]
Sent: Tuesday, March 08, 2011 4:06 PM
To: Moore-Love, Karla
Subject: tree regulation comments

Karla

I would like to comment on the tree regulations that are being considered by City Council.

I am a resident of the west hills and an architect. Our property has several large trees and is partially in an environmental overlay zone. Some of my residential clients consider additions as we study how to make their homes work better for their families. In these two contexts, I have dealt directly with tree removal questions. Streamlining the presentation of the current regulations is desirable. I do not, however, agree with the City Council's proposals to increase regulation of trees.

I support the idea of a dense urban canopy, but find that the "all or nothing" attitude that attempts to save trees can take, is sometimes misguided. Many trees within the city are self-seeded, with no consideration, by nature, of the location or future impact on the use of the land. These trees are allowed to grow, because they are pleasing and do not restrict, and perhaps even enhance, one owner's use of the property. There does come a time however, when their size, or location becomes untenable. The restrictions the City is considering unreasonably limit owners' options by making it difficult to remove ill-placed trees. We have experienced this personally with a 40'+ maple and similarly sized alder that are touching the foundation of the home we purchased 4 years ago – both had diameters over 20". I am quite certain they self-seeded were allowed to grow by a succession of owners. I see new seedlings on our lot of at least 3 cedars, 2 hazelnuts and an alder. All will be fine for a few years, but if allowed to reach maturity, will be too large for their locations. Lack of management of these seedlings, and the proposed regulations, could create an unnecessary burden on a future homeowner who would like to deal with their poor placement.

There are similarly, many trees in the City that were planted with little consideration given to their ultimate size. People plant without realizing that a tree can get to be 40+ feet tall, or not minding because they know they won't ever have to deal with their 5-gal ,maple for more than a few years. Over the years these trees outgrow their location and the regulations being considered hinder an owner's ability to remove the these ill-fitting trees without penalty.

There are also issues with trees that while not yet dead, are severely compromised in health, and could create a hazard to people and property. There needs to be a way for trees that fall in this category to be removed without penalty.

Some of the outstanding questions that I understand are being considered....
Diameter of tree to be regulated. One size does not fit all species. A fir and a maple of similar height are quite different in diameter. In a survey of friends, most underestimated the diameter of the trees. The trees are bigger than people think. If the City Council determines that trees must be regulated, and diameter must be imposed, I support the largest diameter – 20". A quite medium canopy tree can easily have a 12" or 16" diameter.

The requirements should differ between commercial/multi-family residential and single family residential properties because the other limits and possibilities for development are different. For example the parking requirements for some commercial lots in itself considerably limits the area of a

184522

site which may be occupied by a building.

The tree canopy percentages proposed are much too dense for realistic development of houses, especially on the standard 5,000 sf lot. The proposed tree canopy leaves little space for play and other open areas. It also creates too much shading for vegetable gardens and enjoying the sun in our sun-deprived locale. The canopy requirements will create greater overlap of trees over multiple properties, limiting not only the owners use of the property but also the adjacent owners. I do support street trees, as currently required, and believe they should be counted towards the property's overall coverage density, if imposed, on lots of all sizes. The tree actually takes up more "space" on the lot than its canopy diameter – for proper maintenance and safety, a margin of space needs to exist between the trees and buildings.
Using the models – 2 small canopy trees (30'canopy dia..... area = 1,413f) + 3 medium canopy trees (55' canopy dia.....area=7,124sf) = 8,549sf of canopy coverage. This leaves no space for a house on a 5,000, or even a 10,000 sf lot leaves insufficient building area. This overplanting represents the same misguided/ill-informed planting scenarios I mentioned earlier in my letter.

I enjoy and appreciate the very special tree canopy in Portland. I also support property owners' ability to realistically develop their lots. This supports the City's goals of more dense urban development. Open space and maximum area requirements on a lot already, and properly so, limit the buildable area. The proposed tree regulations place excessive additional limitations on buildable area.

Thank you for your consideration.

Lorraine Guthrie
2748 SW Patton Court, Portland OR 97201
503.804.5725

184522

Moore-Love, Karla

From: Dkbre@aol.com

Sent: Tuesday, March 08, 2011 12:45 PM

To: Moore-Love, Karla

Subject: Tree Policy

Thank you for the opportunity to have input on the City of Portland Tree Policy.

I am concerned that there is not congruity between your policy to promote increased tree canopy, and your new fine policy for property owners who have trees. You should provide incentives for people to have trees, not fine them for having street trees, especially the large canopy trees that you seem to desire.

I urge you to cancel the system of fining property owners who have trees that may happen to fall into the street. Reasons include:

1) The fine is a cost burden. Having street trees is already expensive - I spend about $400 a year on pest management, pruning and maintenance, plus 40 hours or more pruning and raking, each year. Why should I pay a fee in addition for cleaning the street in front of my house?

2) The fine is not equitable. Many neighbors without trees as well as visitors park under our shade trees, especially in summer - why should it be my sole responsibility to pay for leaf pickup and street cleaning?

A better policy would be to pay for leaf pick-up and street cleaning through our taxes, which as a homeowner and business owner I aleady pay plenty of (and Sam says there is a surplus!). I would also note that, if we had weekly yard waste pickup, there would be enough room to put my street tree leaves in my yard waste containers - we are all hoping that weekly pickup can happen soon.

Thank you,
Kamala Bremer
2224 SE Grant St.

Moore-Love, Karla

184522

From: James Wentworth [jwpfortrees@yahoo.com]
Sent: Monday, March 07, 2011 7:26 PM
To: Moore-Love, Karla
Subject: Response to amendments for the Tree Code: Chapter 11

Hello,

I'm Jim Wentworth-Plato. I participated as the professional arborist on the Stakeholder Discussion Group and have spent more than 100 hours working on this project as a volunteer. I'm disheartened by some of the proposed amendments. I feel strongly that industrial land should be regulated the way smaller parcels are regulated. The first three points below are related to the latest round of amendments I've seen. The other points are included because I haven't seen any discussion or action on them, but I feel they would make the code better.

1. It looks like you are proposing to exempt most commercial land from having trees (#2 of the discussion items). This is unfortunate and I'd like to see this worked out for consistency. Think back to the reasons for this code amendment, to create a more uniform code and align the city's goals with grey to green and watershed management plans. Businesses have a responsibility to the community they serve. We have discussed the benefits of trees ad nauseum and despite these discussions, and written goals, this amendment is yet again thrown in to maximize profit, speed, and square footage.

2. Item 2c is unfair and will be confusing. Remember we're trying to create a more uniform, easier to understand code. If you're counting street trees for small property densities, then you should also count it for larger properties.

3. I support Comm. Fritz recommendation for the permit threshold to be 12" for consistency and ease. I understand the problem of staffing site visits, but simplification is a problem here. Think about counting the rings on a tree stump. There can be 10 in an inch. A 20" diameter tree has a 10" radius, and that makes a 100 years. On the other end of the spectrum I see Ailanthus trees, on the invasive species list, with growth rings as big as an inch. The inspector can tell at a glance the species of tree, and have a better idea of value to the urban forest. It doesn't have to be a long drawn out inspection, and will serve the city's goals better.

4. **Citizens and arborists should be allowed to prune lower branches on street trees to provide clearance from sidewalks and streets without a permit.** The time saved could be utilized on other site visits. A simple three picture diagram can show proper pruning technique in the tree manual, and a note about risk, traffic, and electrical hazards can help people decide if they need a professional.

5. **Replanting should be encouraged to be done in the wet months**, instead of the current 30 day timeframe. It would increase planted survival.

184522

6. I encourage you to consider requiring businesses that get licensed for tree work in the city to have **certified arborists on every job site.** The ISA has a widely accepted program for certification. See www.isa-arbor.com. Biological systems are complex. Over simplification of the code will result in an urban forest with less diversity and increased risk. Different trees act differently under stress. Arboriculture is more than cutting trees. The city has diverse and complex code regulating electricians, plumbers, and others. The code doesn't have to be simple enough for a sixth grader. It should address the more technical nature of trees. The tree manual can be super simplified to show people where to go in the code. If you believe that plumbing and electrical mistakes constitute a bigger threat to society and require more oversight, consider a 100' fir tree toppling due to construction induced root loss.

7. **Putting Tree preservation plans on Portlandmaps.com** in addition to the contact person would increase compliance. There are many trees in the city that are under protection of tree preservation but few arborists or homeowners know if the tree they are working on is on a preservation plan. There needs to be an easy way to access this database if you want compliance

8. **The required sign in 11.60.030C1c should also have the number for the person at the city with the ability to address violations in a timely manner.** Because root damage from construction, grade changes, and compaction, rarely manifest for 3-5 years from the time of injury. It behooves us to enforce preservation now to avoid larger problems later. This will also reduce repeat offenses.

9. **The contact person at the city should be staffed during daylight hours, or within an hour or two of dawn and dusk and on weekends.** That's when the most violations are occurring, I believe. This position doesn't need to be 24/7.

10. **Will payments into the tree fund go to purchase easements or mini-parks to keep trees in infill communities?** I support the concept of infill but not the current incarnation. I'm witnessing a shrinking and decline of our urban forest as well as the livability of our neighborhoods. Smaller lot sizes don't leave room for a large canopy tree and a building. I understand the decision has been made that more people close together is in our best interest, but if you're serious about it, then there isn't room for trees on site. A 3,000 square foot lot barely provides enough room for the building, some screening shrubs, and the garbage can.

11. **The tree manual is one of the best things to come out of this proposal.** I have a lot of ideas, tons of reference material, and a willingness to help put together a manual that will address basic questions about the code, the relationship to grey to green, watershed plans, and other codes, simple tree care, simple hazard identification, and references to other resources. Call on me for help.

Thank you for taking the time to review my concerns. Once the Code has been amended according to my suggestions, I trust you'll hear additional testimony.

Sincerely,

Jim Wentworth-Plato

3/8/2011

BCMA #PN-1314B

184522

Jim Wentworth-Plato
Board Certified Master Arborist PN-1314B
Emerald Tree llc
503.310.5046

Our ordinary mind always tries to persuade us

that we are nothing but acorns and that our greatest happiness will be to become bigger, fatter,shinier acorns;

but that is of interest only to pigs.

Our faith gives us knowledge of something better: that we can become oak trees.

- E.F. Schumacher

184522

Moore-Love, Karla

From: Kria Lacher [kria.lacher@gmail.com]
Sent: Monday, March 07, 2011 1:14 PM
To: Moore-Love, Karla
Subject: Tree policy

Karla

I agree with many of the proposed tree policies. I do however concur with Mr Fish regarding small lots and buildable space. If there is street tree possibilties I think that should be allowed as a trade for removing a tree. Especially if there are solar panels involved. I do not agree with HBA's idea that seems to point to the idea that we are placing an undue burden on the builders. That is where it should be.

I think it is a mistake to decrease the density for any zone. I also would like you to consider putting trees in all the street "bullets". Those are right in the middle of a large heat sink. Planting trees in them would add safety and would cool the streets

--

Kria Lacher
Portland's Green Real Estate Broker Meadows Group Inc. Realtors

c~ 971-506-4663
o~ 503-548-4495
f~ 503-238-1704

184522

Moore-Love, Karla

From: M'Lou Christ [mnortie@yahoo.com]
Sent: Monday, March 07, 2011 12:17 PM
To: Moore-Love, Karla
Subject: Citizen Draft for City-wide Tree Canopy

Dear Mayor and Councilors:

I am very disappointed and angry to hear of the many amendments proposed for the tree policy, amendments which will require fewer companies and individuals to help this city maintain its tree canopy, which will require fewer and smaller trees to compensate for ones felled before their time, the list of offenses proposed to this initiative goes on and on.
How can you profess to want trees for the health --physical and economic--and beauty they provide, but entertain policy changes which will reduce rather than expand that canopy?!
And all this bowing before developers is just short-term gain, anyway, and you know it. They'll be grateful now, but we'll lose our status as a "tree city" and our overall good city ranking will diminish, bringing in far fewer folks who care about quality of life, perhaps even driving out some already here.
Get a grip. Vote for more protection and expansion of our tree canopy, not less!
--M'Lou Christ
inner SE Portland

184522

Moore-Love, Karla

From: Greg Schifsky [gregschifsky@yahoo.com]
Sent: Sunday, March 06, 2011 4:47 PM
To: Moore-Love, Karla
Subject: tree amendmentrs

Karla,

On the amendments for the upcoming Tree Policy changes, I would add that it makes no sense including street trees for approval of a partition or development on a lot that should have trees. Street trees stand alone, protect mostly sidewalk and streets, and in most cases, add a small amount only, of tree canopy---which is a target of this City, adding canopy.

Also: existing residents sometimes don't want a street tree, sometimes homes are sold and a tree will be added. A street tree should not be a "condition" of approval of development.

Greg Schifsky
SW Portland

184522

Moore-Love, Karla

From: Rejuvenation Artisans [rejuve@rejuve.net]
Sent: Saturday, March 05, 2011 12:54 PM
To: Moore-Love, Karla
Subject: Tree Code Testimony for City Council

Attachments: Tree Code Testimony for City Council.pdf; ATT00001.txt; Supporting Documents.pdf; ATT00002.txt; ecobiz-LOGO-LANDSCAPE-C.gif; ATT00003.txt


Tree Code stimony for City (


ATT00001.txt (70 B)


Supporting :uments.pdf (1 M


ATT00002.txt (424 B)


ecobiz-LOGO-LA DSCAPE-C.gif (8.


ATT00003.txt (209 B)

Tree Code Testimony for City Council:

Hello,

Please submit the following letter, and attached supporting documents as testimony for the upcoming City Council meeting scheduled on March 9th, 2011.

Thank you!

~Micha Sinclair

184522

Rejuvenation Artisans Landscapes

5010 SE 44th Ave• Portland, OR 97206• Phone: (503) 459-9541
E-Mail: rejuve@rejuve.net Web: www.rejuve.net

March 4th, 2011

Portland City Council
Amendments to the Citywide Tree Project Recommended Draft
1221 SW Fourth Avenue, Room 140 Portland, OR 97204
Karla.Moore-Love@portlandoregon.gov

Dear City Council:

We have a strong concern about the following provision in the code, under: **30. Goal 5, Natural Resources, Scenic and Historic Areas, and Open Spaces**

What you have now proposed currently reads:

> The City requires a Title 11 permit to remove, replace or plant any trees in City rights-of-way. The City Forester is authorized to require or prevent the planting of specific species, and to require removal of trees planted in violation of these rules. The provisions of Title 11, Trees require the City Forester to consider adopted historic guidelines in approving permits to plant trees. These procedures are sufficient to ensure protection of the historic character and associated Goal 5 resources in Ladd's Addition.

We believe that it should be changed to read instead:

> The City requires a Title 11 permit to remove, replace or plant any trees in City rights-of-way. City Forester is authorized to prevent the planting of specific species, and to require removal of trees planted in violation of these rules. The City Forester is further authorized to require that tree selection is in accordance with a specific aesthetic. The provisions of Title 11, Trees require the City Forester to consider adopted historic guidelines in approving permits to plant trees. These procedures are sufficient to ensure protection of the historic character and associated Goal 5 resources in Ladd's Addition.

We believe this change is vital. By allowing the City Forester to not only prevent, but also require "specific species", and then stating that the city "require the City Forester to consider adopted historic guidelines in approving permits to plant trees" you are effectively directing him to continue to enforce a monoculture planting plan for neighborhoods like Ladd's Addition. You are simply now changing which monoculture of trees he will direct his staff to allow planted.

First I would like to remind you that article 30 explicitly states why using a single species of tree isn't necessary to protect the historic aesthetic of Ladd's Addition. According to the Oregon State Historic Preservation Office, the street trees in Ladd's Addition are "a character defining feature of the historic district," and "the existence of street trees is important and the large scale, size, and over-arching shape and size of the tree canopies are important." Those are the things that matter in the eyes of the National Register with regard to the trees in Ladd's Addition, not their specific species.
So, as it is understood that it is not necessary to limit any street to only one species of tree in order to maintain the historical aesthetic, I would like to now address why it is not only unnecessary, but also a horrible idea to do so.

The level of arboricultural knowledge in the last 100+ years has increased dramatically. We now know that monoculture planting plans in general are an inappropriate choice for street tree plantings. We need only apply the current example of Dutch Elm Disease sweeping unhindered from tree to tree in Ladd's Addition, Eastmoreland, and other neighborhoods to realize how vulnerable our urban canopy becomes if we rely on one specific species of tree to forest an entire neighborhood. Diseases such as Dutch Elm Disease are able to spread directly from tree to tree by roots of the same species grafting directly together underground with neighboring trees. There are also other vectors it travels on, but all are either aided or--as in the case of root grafting--enabled by direct proximity of other trees of the same species. Because of this, there is little to be done in preventing large sections of neighborhoods like Ladd's Addition from becoming deforested. This is directly due of the lack of variety of tree species to hinder the spread of blight, or resist its effects.

Solutions like "inoculation" of the trees are misnomers. They are expensive, unsustainable, and in the long run they don't work. The process this term refers to does not truly inoculate the trees at all. No natural resistance is created. The trees are simply being repeatedly injected with fungicide (poison) to slow the spread of the disease. A better description would be chemotherapy for a patient that has absolutely no chance of going into remission. In fact, because it encourages people to wait longer before removing infected trees, "inoculation" actually leads to increased exposure of infected plants to the surrounding trees of the same species.

The only real protection against blight is diversification of species. Variation of species creates "fire breaks" when blight starts to spread through a species, slowing, and in many cases even stopping its proliferation. Furthermore, if one species of tree is wiped out, it would only represent perhaps a fifth of the trees on a given city block. The overall aesthetic of the neighborhood is maintained until suitable replacements for the felled trees are able to

reach maturity, a process that takes many years.

You may be tempted to think of Dutch Elm Disease as an unusual occurrence. Please don't let yourself be fooled. Time and time again it has been shown that if a single species is planted monoculturally in over abundance, something will come along to kill it.

For another example that is specific to Ladd's Addition, one only has to look at the current historic planting plan's use of birch trees in certain areas of Ladd's Addition. Because of overplanting of birch trees in this area (a fad that began in the early 1970's) The Bronze Birch Borer (*Agrilus anxius*) is now posing an immediate threat to all birch trees in the Pacific Northwest. With this in mind, the idea of repeating the historical mistake of monoculture street tree planting seems particularly ill advised. And yet, by the current wording of the article we proposed changed above, the city forester would be encouraged to require that only birch trees be planted on these streets.

This is not theory. Our company was directed as recently as late 2010 by tree inspectors in Ladd's Addition—with further insistence by their supervisor—to only plant birch trees along particular streets in southeast Ladd's Addition, and continue to follow the antiquated monoculture planting plan. The street tree supervisor for all of Southeast Portland told us unequivocally that permit requests for any other species of tree would be denied. Only by appealing to the City Forester directly were we able to overturn this decision. You will find a copy of my appeal to the City Forester, and a follow up letter in response to the street tree supervisor, attached to this document (I have blacked out the client's address in order to protect her privacy).

Our company has the greatest respect for history. Out of that respect, we feel it is better to learn from history, rather than blindly follow its mistakes out of a misplaced sense of piety. We now know that street trees are not just an aesthetic choice, but also a civil engineering choice, as they help us manage Portland's storm water and pollution, and help abate the city's heat island effect.

The nuance of these simple few lines of street tree code will effect historic neighborhoods like Ladd's Addition for decades and even centuries to come, as the original monoculture planting plan of 1891 effects us to this day. As we watch helpless as Dutch Elm Disease runs unhindered even by our best efforts to fight it, felling tree after tree, I ask that you consider its inherent lesson. Please don't allow the mistakes that led to this terribly sad deforestation by blight be repeated. My proposed small changes to these few sentences will make the difference. They uphold the principles of Goal 5, while protecting Portland's urban canopy. Honor history by learning from it. Diversity of species on every city block is the only real way to protect a city's arboriculture. With careful selection and implementation it is not even necessary to sacrifice aesthetics in order to incorporate diversity of species, so there is absolutely no intelligent reason not to do so.

Sincerely,

Micha Sinclair

Rejuvenation Artisans Landscapes

rejuve@rejuve.net

www.rejuve.net

184522

From: Micha Sinclair <michas@rejuve.net>
Subject: **Street trees in Ladds Addition**
Date: October 14, 2010 12:06:30 PM PDT
To: David McAllister <David.McAllister@portlandoregon.gov>

1 Attachment, 7.9 KB

Hello Mr. McAllister,

I don't now if you remember me, but I'm a contractor that spoke at the Forestry Commission meeting on July 29th, about street tree code. Our concern has been, and continues to be, monocultural street tree plantings in areas like Ladd's Addition, and the dangers it poses to our urban canopy, and our city's storm water management system.

I currently have a client that owns a property at [redacted] in Ladd's addition, and she does not wish to plant more birch trees. With the threat that the Bronze Birch Borer poses to all varieties of birch trees in the Northwest, forcing proliferation of birch as street trees seems a particularly poor idea.

When I spoke with your inspector this morning, Ned Soja, he said he made it clear that anything other than a birch tree would be unlikely to be approved, and that he would have to run it by his supervisor, and notify the Save the Elms people. He mentioned "Toby" by name. Why does a city inspector feel he has to notify a private organization about a city permit of this type? Ned then said it would be weeks before he had an answer.

I then called his supervisor, Rob Croutz, directly, since Mr. Soja said he would have to run it by him. Mr. Croutz shut me down hard, was completely uninterested in hearing what street trees we proposed. He seemed angry at me, and said unequivocally that he would deny anything other than birch trees on SE Palm Street. He made it clear that this was because of "neighborhood associations", which seemed to me to likely be another reference to the Save the Elms organization. I do not understand why this organization is being allowed to set policy with the City of Portland's inspectors, and supervisors. Especially when the science, and current local evidence has shown this sort of monocultural planting plan to be harmful to our city's urban canopy.

My understanding at the forestry commission was that you--and the majority of the commission--shared our concerns about monocultural planting, and have recognized the devastating effects that they are having on areas like Ladd's addition, where it has allowed Dutch Elm disease to jump unhindered from tree to tree.

I would like to informally appeal this decision to you, before filling a formal appeal on behalf of our client to the Forestry Commission.

I was never able to give Mr. Croutz the names of the trees we were proposing. They are as follows:

1st Tree: Strawberry Tree--botanical name: Arbutus 'Marina'
(backup suggestion: Madrone--botanical name: Arbutus menziesii)

2nd Tree: Little Gem Evergreen Magnolia--botanical name: Magnolia grandiflora 'Little Gem'
(backup suggestion: D.D. Blanchard Evergreen Magnolia--botanical name: Magnolia 'D.D. Blanchard')

Thank you,

~Micha Sinclair

Rejuvenation Artisans Landscapes, LLC
www.rejuve.net

Micha Sinclair ~ Hardscape Designer, Builder, BES Certified
Grace Constantine-Sinclair ~ Landscape designer, Certified horticulturist, BES Certified

184522

December 8th, 2010

Mr. Robert Crouch
Urban Forestry Program Coordinator
City of Portland - Parks & Recreation
10910 N Denver, Portland, OR 97217
Robert.Crouch@portlandoregon.gov

Dear Mr. Crouch:

It was the homeowner's decision—not ours as the contractor—on what trees were to be planted at [redacted]. (though her decision was informed by our certified horticulturist's expert advice). Our client at [redacted] was informed about the Ladd's Historic Guideline recommendation for street trees. However, because the level of arboricultural knowledge in the last 100+ years has increased dramatically, and we now know that birch trees specifically—and monoculture planting plans in general—are an inappropriate choice for street tree plantings in Portland, our client opted for a different choice in trees for her property. We now know that street trees are not just an aesthetic choice, but also a civil engineering choice, as they help us manage Portland's storm water and pollution, and help abate the city's heat island effect.

Our client felt, as do we, that the weak rooting of birch makes them a hazardous choice for a street tree, as a significant quantity of them simply fall over. Also, the fact that they require more water than our Portland summers provide (except in the case where their roots have broken into city and private storm water systems, as is common in Ladd's Addition) and the fact that they are not particularly long-lived trees, also makes them an unsustainable choice for Portland.

This decision of our client's to look beyond the Ladd's Historic Guideline recommendation for her choice of street trees also took into account the current example of Dutch Elm Disease sweeping unhindered from tree to tree in her neighborhood. Due in great part to the disease being able to spread by an elm's roots grafting directly together underground with neighboring elm trees (among other vectors) there is little to be done in preventing large sections of Ladd's from becoming deforested. This is because of the lack of variety of tree species to hinder the spread of blight, or resist its effects.

The Bronze Birch Borer (*Agrilus anxius*) is now posing an immediate threat to all birch trees in the Pacific Northwest. With this in mind, the idea of repeating the historical mistake of monoculture street tree planting seems particularly ill advised.

Our company has the greatest respect for history. Out of that respect, we feel it is better to learn from history, rather than blindly follow its mistakes out of a misplaced sense of piety.

Sincerely,

Micha Sinclair
Rejuvenation Artisans Landscapes

184522

Moore-Love, Karla

From: Ali Young [rana.redlegged@gmail.com]
Sent: Friday, March 04, 2011 10:10 AM
To: Moore-Love, Karla
Subject: petition supporting non-invasive replacement trees in Ladds Addition

Attachments: maple_petition_page1.pdf; Maple_petition_page2.pdf; MaplePetition_pages4-5.pdf; maples_petition_page3.pdf


maple_petition_
ıage1.pdf (4 MB.


Maple_petition_
ıage2.pdf (4 MB.


MaplePetition_p
ages4-5.pdf (44..


maples_petition
_page3.pdf (3 M..

Dear Ms. Moore-Love,

Attached you will find copies of a petition from Ladds Addition residents in opposition to an exemption to the Citywide Tree Project allowing Norway Maples to be planted as a replacement tree in Ladds Addition. Signers of this petition ask to work with the City's Urban Forester to come up with a historically suitable non-invasive replacement tree for Norways Maples.

In the last two weeks, myself and my neighbor Alyssa Isenstein have spoken with 63 neighbors. While we have not had time to canvas the whole neighborhood we collected 59 signatures. Out of the people we were able to speak with over the two week period 94 percent signed the petition in support of a non-invasive replacement tree. The four who did not sign asked to be given more time to think the issue over and may sign when we are able to visit them again.

Please pass this petition on to the mayor and city council members.
The petition totals 5 pages. Please also confirm that you received this e-mail.

Thank you very much,

Ali Young
1737 SE Maple Ave
Portland, OR 97214
503-284+0698
rana.redlegged@gmail.com

PETITION FOR AN ECOLOGICALLY SUSTAINABLE TREE CANOPY IN LADDS ADDITION NEIGHBORHOOD

In 1909, when Emanuel Mische designed a formal landscape plan for the gardens in Ladd's Addition, little was known about invasive species and monoculture. Today, Norway Maples are on the City of Portland Nuisance Plant List because they are invasive. Their seeds spread miles, choke out native trees and compromise the health of the extensive natural area network the city has worked hard to build. Norway Maples have spread to Mount Tabor, Reed Canyon, and other local natural areas with no nearby parent tree source. Norway Maple seeds leave the neighborhood and spread easily via cars and bikes.

Many of the maple trees in Ladd's Addition are infected with verticillium wilt, a fungus that prevents roots from transporting water, causing great stress to the tree. Once a diseased tree is removed, the fungus remains in the soil and the only "cure" is to plant a tree resistant to this fungus. Planting a maple, regardless of maple variety, in the same location where an infected maple was removed perpetuates the problem.

The founders of our neighborhood did not have the understanding that invasive species can harm native plants, nor did they understand that single species planting of trees are more vulnerable when infected with a pathogen such as verticillium wilt or Dutch Elm Disease.

There are differing opinions about how to maintain the historical nature of our neighborhood. Some believe that we need to hold to the specifications called for in the original landscape plan. Others believe we should apply the knowledge we have today about the harm continual plantings of Norway Maples can bring to the regional tree canopy and ecosystem. We the undersigned Ladd's Addition residents are opposed to an exemption to the Citywide Tree Project that would allow Norway Maples to be planted as replacement trees in our planting strips. We believe that the history of Ladd's Addition is important and will work with Urban Forestry to find historically suitable, non-invasive, verticillium resistant replacement trees for the Norway Maple. We believe the historic integrity of the neighborhood can be maintained with replacement trees that bring in new leaf colors and tree shapes, continuing to grow our beautiful tree canopy for the next 100 years.

Name	Signature	Address	e-mail	phone
Ali Young		1737 SE Maple Ave 97214	alikyoung@yahoo.com	5038691718
Monique Pritchard	MP	1737 SE Maple Ave 97214	pritchamonique@yahoo.com	1743284 OCT
Amanda Weber-Welch	Amanda Weber-Welch	1725 SE 16th Ave. 97214	awbw@teleport.com	503-287-1519
Bill Welch		1725 SE 16th Av 97214	"	503-287-1519
Shannon Buchanan	Shannon Buchanan	1509 SE Holly 97214	shannar@eroi.com	503 230-1259
Jenny Phillips		1442 SE Palm St 97214	jenny.phillips@gmail.com	
Scott Lomas		1748 se poplar ave 97214	lomasandlomas@yahoo.com	235-5081
Rea Lomas		1748 SE Poplar Ave 97214	lomasandlomas@yahoo.com	235-5081
[illegible]		1737 SE Maple Ave 97214	[illegible]@live.com	503 850 9782
Wm E. Ryan	Wm E. Ryan	1759 SE Maple Ave 97214	ryanwillmee@msn.com	503 233 6389
Liza Kaskan		1743 SE Maple Ave 97214	playafit@gmail.com	503-329-0859
Zach McCall		1581 SE Maple Ave 97214	zachryant@yahoo.com	503-332-1658
Reece Dano		1551 SE Holly St	reece.dano@gmail.com	503-807-5847
Tristen Robinson		1551 SE Holly St 97214	tristen_robinson@yahoo.com	503-524-8747

1845222

PETITION FOR AN ECOLOGICALLY SUSTAINABLE TREE CANOPY IN LADDS ADDITION NEIGHBORHOOD

Name	Signature	Address	e-mail	phone
Julie Yeggy		1820 SE 16th Ave PDX 97214	jyeggy@earthlink.net	236-5115
John Patrick Gonzales		1820 SE 16th ave., Portland 97214	gonzomonth@earthlink.net	(503) 539-8608
Kathy Logan		1605 SE Holly St Portland 97214	Kathy3336@yahoo.com	503-358-3170
Marilyn Beach		1559 SE Maple Ave. Portland 97214	mbeach@mbeach.org	503-719-4188
Terence Barr		1559 SE MAPLE AVE. PORTLAND 97214	TJBARR@AFFEXNTZ.com	503-719-4188
Erin Nuccio		1591 SE Maple Ave Portland, OR 97214	erinnuccio@mac.com	503.701.6752
Jordan Nuccio		1591 SE Maple Ave Portland, OR 97214	jhecad@mac.com	510 910.9019
Gillian Scott		1561 SE Holly, PDX, 97214	gillian77scott@	239-4005
Scott Francis		1551 SE Holly PDX 97214	Scottfra2@yahoo.com	239-4005
Alfred Wallis		1530 SE. Holly PTL, 97214	FSBHolly@AOL.com	503 238-1916
Hilary Basco		1938 SE ELLIOTT PDX 97214	hvbasco@yahoo.com	5035220122
Matt J Basco		1938 SE Elliott 97214	basco1@yahoo	503 522-7006
Carol McIntosh		1703 SE 16th 97214	carolm@easystreet.net	233-4075
Bill Bulick		1703 SE 16th 97214	bbulick@aol.com	503-233-4075
Adriana Voss-Andreae		1517 SE Holly st Portland 97214	weissman@ohsu.edu	5033312309
Susan Dabrof		1430 SE Palm st 97214	lawyerbabe1@aol.com	503 230 2074
JEFF WARREN		1431 SE Main st 97214		503.358.9553
TAB FOSTER		919 SE ELLIOTT 97214	foster.tab@gmail	503/380-1188
Mia Meyer		1518 SE Hickory 97214	miaems@yahoo.com	503.232.9774
Jon Emens		2304 SE Ladd 97214		503-234-1734
NATHAN DAY		2323 SE TAMARACK 97214	Nathanthanyday@hotmail	503-473-2412
Heidi Bours		2219 SE TAMARACK 97214	bourshe@ohsu.edu	503-730-2145
Jonathan Evans		" "	jwcezi@gmail.com	303-877-9002
Matt Vosburg		1500 SE HICKORY St. 97214	matt.vosburg@gmail.com	503-708-7301
Mike Kellas		2237 SE Elliott Ave 97214	michael_kellas@yahoo.com	503-236-6728
Amy Ernst		1821 SE Elliott Ave 97214	amynernst@gmail.com	503 232 5918
Shathra Nolke		1706 SE Elliott Ave 97214	shathra@comcast.net	503 888-2397
Lisa Delaney		1538 SE Holly St 97214	Morganandlisa@gmail.com	5034917283
Morgan Delaney		1513 SE Maple Ave 97214	Morgan@globaltaxi.org	971.207.8084

1845222

PETITION FOR AN ECOLOGICALLY SUSTAINABLE TREE CANOPY IN LADDS ADDITION NEIGHBORHOOD

In 1909, when Emanuel Mische designed a formal landscape plan for the gardens in Ladd's Addition, little was known about invasive species and monoculture. Today, Norway Maples are on the City of Portland Nuisance Plant List because they are invasive. Their seeds spread miles, choke out native trees and compromise the health of the extensive natural area network the city has worked hard to build. Norway Maples have spread to Mount Tabor, Reed Canyon, and other local natural areas with no nearby parent tree source. Norway Maple seeds leave the neighborhood and spread easily via cars and bikes.

Many of the maple trees in Ladd's Addition are infected with verticillium wilt, a fungus that prevents roots from transporting water, causing great stress to the tree. Once a diseased tree is removed, the fungus remains in the soil and the only "cure" is to plant a tree resistant to this fungus. Planting a maple, regardless of maple variety, in the same location where an infected maple was removed perpetuates the problem.

The founders of our neighborhood did not have the understanding that invasive species can harm native plants, nor did they understand that single species planting of trees are more vulnerable when infected with a pathogen such as verticillium wilt or Dutch Elm Disease.

There are differing opinions about how to maintain the historical nature of our neighborhood. Some believe that we need to hold to the specifications called for in the original landscape plan. Others believe we should apply the knowledge we have today about the harm continual plantings of Norway Maples can bring to the regional tree canopy and ecosystem. We the undersigned Ladd's Addition residents are opposed to an exemption to the Citywide Tree Project that would allow Norway Maples to be planted as replacement trees in our planting strips. We believe that the history of Ladd's Addition is important and will work with Urban Forestry to find historically suitable, non-invasive, verticillium resistant replacement trees for the Norway Maple. We believe the historic integrity of the neighborhood can be maintained with replacement trees that bring in new leaf colors and tree shapes, continuing to grow our beautiful tree canopy for the next 100 years.

Name	Signature	Address	e-mail	phone
Alyssa Isenstein Krueger	[signature]	2348 SE Tamarack 97214	alyssaisenstein@yaho	503-231-9393
Anna Sorton	[signature]	2406 SE Tamarack 97214	[illegible]@gmail.com	971.344.1326
ROBERT KRUEGER	[signature]	2348 SE TAMARACK 97214	robert_krueger@hotmail.com	503-231-9393
Tom Meyer	[signature]	2422 SE Tamarack 97214	tmeyer72@hotmail	548-3142
DANIELA KREBS	[signature]	2324 SE TAMARACK AVE 97214	PINKILA@MSN.COM	503 224-1307
Alex Krebs	[signature]	2324 SE Tamarack Av. 97214	portlandalex@gmail.com	503 224 1307
BRUCE Bikle	[signature]	2228 SE " " "	bikleb@skymail.csus.edu	233 1812
Peggy Kendellen	[signature]	2208 SE Cypress 97214	pkendellen@earthlink.net	2316081
Douglas Prior	[signature]	2208 SE CYPRESS AVE 97214	TWOSNAPSHOTS@EARTHLINK.NET	2316081
Lyndale Gossen	[signature]	2323 SE Tamarack 97214	gossen@solar[illegible]	971 222 5712
Chelsea Allhands	[signature]	2925 SE 50th Ave 97213	cchumati@gmail.com	503/422-3499
Daniel Sharkey-Jacoby	[signature]	2323 SE Tamarack 97214	dbsharkeyjacoby@gmail.com	971-678-2869
Katie Proctor	[signature]	2419 SE 16th Ave 97214	katie-proctor@gmail.com	~~97214~~ 6072620439
Catherine Whims	[signature]	1542 SE Hickory St	cathy@[illegible].com	503 235 6042

184522

PETITION FOR AN ECOLOGICALLY SUSTAINABLE TREE CANOPY IN LADDS ADDITION NEIGHBORHOOD

Name	Signature	Address	e-mail	phone
Michael Crim		2446 SE Tamarack Ave	GiantJunkBox@gmail.com	503.784.[illegible]
Melanie Mayer		1905 SE Division PDX OR	melanie2005@mac.com	503-422-0864
MARK E. Leslie		2444 SE TAMARACK AVE.	Meleslie@earthlink.net	233-6199
Eric Wilson		2406 SE Tamarack	jab[illegible]@yahoo.com	503-[illegible]-9372
FUF Vollmayer		2128 SE Hemlock Ave	[illegible]	503/233-1804

1845222

PETITION FOR AN ECOLOGICALLY SUSTAINABLE TREE CANOPY IN LADDS ADDITION NEIGHBORHOOD

Name	Signature	Address	e-mail	phone
Liz Bothwell		1931 SE Lexington Ave	lizbothwell@mac.com	2132487677

CITY OF
PORTLAND
BUREAU OF
TRANSPORTATION

184522

Sam
Adams
Mayor

Susan D.
Keil
Director

March 1, 2011

Mayor Sam Adams
Members of City Council
City of Portland
1221 SW 4th Ave
Portland, OR 97204

AUDITOR 03/01/11 PM 2:55

Dear Mayor Adams and Members of City Council:

The Portland Bureau of Transportation is in support of the Citywide Tree Project and its goal of adding 100 additional acres of tree canopy per year. Transportation has been a part of the planning process; however, to ensure the success of this goal, we feel that on-going and future funding issues need to be addressed.

Upon adoption, it is crucial that the long term costs of trees, planted in the right of way, to City Bureaus be allocated in a manner which reflects the benefit derived: water quality and quantity management, neighborhood livability and safety.

Citizens and property owners also need a clear understanding of their responsibilities as trees pertain to the existing and surrounding infrastructure. An equitable distribution of costs associated with those responsibilities is key to a successful implementation of this new tree program.

There may be unrecognized consequences of increasing the tree canopy which will result in increased maintenance and operations costs:

- Costs of maintaining trees (trimming, inoculating, watering during establishment) are the responsibility of the adjacent property owner, or in many areas, the City. Certain regions in the City have lower economic demographics and may not be able pay for the increased maintenance or repair costs (i.e. pruning, sidewalk or sewer lateral repairs) to the extent that other portions of the City are able. Additionally, all business owners, including small business owners, may indirectly or directly be responsible for bearing additional costs associated with tree maintenance, care or repair to sidewalks.

- Additional leaf removal from streets will be required, adding additional costs. Storm drains become blocked by leaves and cause localized flooding and safety issues.

- Sidewalk repair is the responsibility of adjacent property owners. In commercial districts, sidewalks are regularly inspected and posted for repair. The Business Owners and Managers Association (BOMA) has estimated the costs of repairing sidewalks damaged by tree roots, in order to meet safety standards and ADA requirements, to be $10 million annually in business districts. Residential properties

are subject to the same standards and those sidewalks are inspected on a complaint driven basis.

- Tree roots cause damage to streets allowing water to seep into the base layer. This undermines the base structure requiring maintenance or replacement. In FY 09-10, PBOT spent $81,000 repairing street pavement that was damaged by roots.

- Street lights, traffic signs and signals can become obscured by trees growing over them. This creates safety hazards which must be addressed by pruning. PBOT spent $30,000 in FY 09-10 to trim 100 trees that had foliage blocking street lights. These trees were identified through complaints from citizens. To handle this on a proactive basis, the costs would be much higher.

- Sewer lines are often impacted by roots which cause blockage and leaking. Sewer rate payers already pay for most of these problems.

Upon Implementation, Transportation recommends:

- All affected bureaus create a proposed budget outlining the additional maintenance and operations costs resulting from increased tree canopy.
- Direct City Bureaus to identify benefits derived from trees and appropriate mission driven allocation of costs.
- Examine the distribution of costs for additional operations and maintenance, city-wide rather than through specific geographic regions (e.g. leaf removal).
- Cross bureau partnerships are established to determine maintenance needs and equitable cost sharing.
- Partner with utilities, small businesses, industrial land owners and residents to be a part of the budget conversation related to trees.

Transportation is committed to making the new tree code a success given a sustainable funding source and a sustainable maintenance plan to ensure that sanitary and storm water management, sidewalks, streets and safety of pedestrians, cyclists, motorist, residents and business owners are not adversely impacted as we add trees.

Thank you for your consideration,

Susan D. Keil

Sue Keil
Director, Portland Bureau of Transportation

184522

Parsons, Susan

From: Marlene Kate Dalziel [mkdalziel@gmail.com]
Sent: Friday, February 25, 2011 12:11 PM
To: Moore-Love, Karla
Subject: Tree project

More trees: a very good thing!

I sincerely hope something is done, and done soon, about the invasive killer English Ivy and European Holly that is creeping up the trunks and into the canopies of our lovely Portland trees. These trees will suffocate and soon die unless these scourges are eradicated.

There are so many leaning, weakened trees along, for instance SW Barbur Blvd, that traveling by bike or car in the outside southbound lanes is life-risking as a tree may topple at any moment.

Additionally, English Ivy on hillsides causes the top layer of soil to slough off causing landslides.

Thanks,
M. K. Dalziel
503-841-5350

--
Check for new PACE Blog posts

184522

Moore-Love, Karla

From: Lary Roe [roescity@gmail.com]
Sent: Sunday, February 27, 2011 5:24 PM
To: Adams, Sam; Commissioner Fritz; Commissioner Fish; Leonard, Randy; Commissioner Saltzman
Cc: Moore-Love, Karla
Subject: Additional Tree Code Comments

Dear Commissioners;

Thank you for your public meeting regarding the Tree Code three weeks ago. It was the first Council meeting that I have attended during my twelve years as a Portland resident. I was heartened by observing the process and delighted about your dedication of a significant amount of time for the improvement of our City.

I have some additional comments that I submit for your consideration. These may have been already debated during the drafting of the Code, but I wanted to raise them to either add them to the discourse or to add my voice to those that you have already heard from other city homeowners.

It is appropriate that the Friends of Trees and the Portland chapter of the Audobon Society want us all to enhance the trees of Portland. I personally agree with much of their message and support changes in the way that the City manages publics trees. However, I believe that many homeowners manage gardens for various reasons, such as growing fruits and vegetables and providing natural settings for the enrichment of our families through gardening and daily reflection.

The city has noted that the public parks fall well below the old and proposed canopy targets precisely because they serve many needs for our community, not the least of which is the banking of sunny memories for our gray, winter days. I believe that homeowners should have similar latitude to manage private gardens for our diverse needs.

I am sure that we would all agree that the components of the draft ordinance arise directly to the Council police authority to protect the public health, safety and welfare. Examples include the removal or pruning of dangerous trees, the restrictions on trees that endanger the city piping systems, and the regulation of tree root systems that stabilize our city hillsides. In general, my reading of the draft ordinance indicates that these issues have been well addressed.

However, much that is in the ordinance is more in line with minority views that I believe do not have general support. I recall that the Council agreed that calling 911 if a tree is threatened with imminent death was unreasonable. Further, I submit to you that strategies that have potential to improve our welfare are best pursued on public lands and should not have priority over homeowners pursuit of happiness in private gardens. It is very difficult for the City to know what is best for me and my family in my own garden.

There are proposed changes within Title 11 that will supercede the current language in Title 33. These modifications to Title 33 will place a new burden on hundreds of homeowners whose gardens are within environmental overlay zones, including mine. Currently, these homeowners maintain existing gardens in accordance with standard arboreal practices and without a need to acquire permits to "cut, prune, break,..." any trees with diameters greater than 6 inches. With the high winds, snow, ice storms, and the aging of plants affecting my garden, I currently perform these activities several times each year in my efforts to maintain my garden.

I respectfully request that the provision that owners of existing gardens be free to maintain them without the addition of a permitting process continue to be a feature of Titles 33 and 11.

Thanks for your consideration,

Larry Roe
14409 NW Mactavish Lane
Portland, OR

184522

PORTLAND OEM
OFFICE OF EMERGENCY MANAGEMENT

An Equal Opportunity Employer

Sam Adams, Mayor
Carmen Merlo, Director

1001 SW 5th Avenue/ Suite 650
Portland, Oregon 97204
Phone: 503-823-4375
Fax: 503-823-3903
TDD: 503-823-3947
www.portlandonline.com/oem

February 23, 2011

Portland City Council

RE: Support for Title 11; Citywide Tree Policy

As the City bureau responsible for coordinating emergency preparedness programs to protect lives, property and the environment, the Portland Office of Emergency Management supports the concepts outlined in the Citywide Tree Policy. The Portland Office of Emergency Management strives to identify actions that curtail the impacts of hazards on life, property and the environment. The preservation and cultivation of the tree canopy is integral to reducing the impact of hazards such as wildland urban interface fire, landslides, severe weather and invasive plants.

The City's 2010 Natural Hazard Risk Reduction Strategy (NHRRS), a document that identifies and coordinates city risk reduction projects, documents the importance of trees in inhibiting climate change, stabilizing steep slopes and providing cooled and filtered air necessary to a livable environment. Specifically the NHRRS calls out the following actions:

- Implement projects that retain vegetation including trees
- Identify criteria for developing in hazard areas
- Develop building standards for houses bordering forests

The NHRRS supports actions such as land use review, mapping protocols and implementation of programs that would control invasive plants, plant more trees and aid in controlling the impacts of climatic change. Actions are a part of the strategies for reducing the risk.

Approval of the Citywide Tree Policy allows for implementation of NHRRS and for that reason Portland Office of Emergency Management supports its adoption.

Respectfully,
Patty Rueter
Planning Manager

184522

REED COLLEGE

February 15, 2011

ECONOMICS
DEPARTMENT

3203 Southeast
Woodstock Boulevard
Portland, Oregon
97202-8199

telephone
503/771-1112

Portland City Council
1211 SW 4th Avenue Room 110
Portland, OR 97201

Dear Mayor Adams and Members of the Portland City Council:

I am writing to offer comments on the Citywide Tree Policy Review and Regulatory Improvement Project.

For the past twelve years, my research has focused on factors that influence the sale price of single-family residential properties in Portland, Oregon. Peer-reviewed published articles include an analysis of the relationship between the sale price of single family residential properties and environmental zoning (Netusil 2005), open spaces (Bolitzer and Netusil 2000; Lutzenhiser and Netusil 2001), and large patches of tree canopy (Netusil, Chattopadhyay, and Kovacs 2010).

A 2010 paper (Netusil, Chattopadhyay, and Kovacs 2010) focused on "large patches" of tree canopy in the city of Portland, which is defined as patches of tree canopy of 1 acre or larger where canopy provides between 76% and 100% coverage. We estimate the per property benefit from having 25% of the area within 1/4 mile of a property covered with tree canopy, which is close to the current average in Portland, to be between $4,600 and $13,500 (2 % to 6% of the mean sale price of properties in our data set). Our estimates show that the per property benefit from having 35% tree canopy coverage, which is close to the stated goal of 33% tree canopy coverage, is between $6,100 to $14,400 (2.75% to 6.5% of the mean sale price in our data set). These estimates are in 2010 dollars.

We also find that the effect of expanding tree canopy varies by quadrant with the largest estimated effects on sale price for properties in Northeast and Southeast—areas that have comparatively low tree canopy coverage.

There are other important benefits that should be considered when setting tree canopy targets other than the effect of tree canopy on a property's sale price. These "ecosystem services," which we all benefit from, include reduced stormwater runoff, carbon sequestration, enhanced fish and wildlife habitat, reductions in the urban heat island effect, and stabilization of steep slopes.

The goals outlined in the Citywide Tree Policy Review and Regulatory Improvement Project strike a balance between generating benefits for individual property owners while also promoting a coordinated policy for trees in the city that takes into account all of the benefits provided by this valuable resource.

Sincerely,

Noelwah R. Netusil

Noelwah R. Netusil
Stanley H. Cohn Professor of Economics

References

Bolitzer, B., and N. R. Netusil. 2000. The impact of open spaces on property values in Portland, Oregon. *Journal of Environmental Management* 59 (3):185-193.
Lutzenhiser, Margot, and Noelwah R. Netusil. 2001. The Effect of Open Spaces on a Home's Sale Price. *Contemporary Economic Policy* 19 (3):291-298.
Netusil, Noelwah R. 2005. The Effect of Environmental Zoning and Amenities on Property Values: Portland, Oregon. *Land Economics* 81 (2):227-246.
Netusil, Noelwah R., Sudip Chattopadhyay, and Kent Kovacs. 2010. Estimating the Demand for Tree Canopy: a Second-Stage Hedonic Price Analysis in Portland, Oregon. *Land Economics* 86 (2):281-293.

Estimating the Demand for Tree Canopy: A Second-Stage Hedonic Price Analysis in Portland, Oregon

Noelwah R. Netusil, Sudip Chattopadhyay, and Kent F. Kovacs

ABSTRACT. *The benefits of large patches of tree canopy are estimated by applying a hedonic price model to the sale of single-family residential properties in Portland, Oregon. The first-stage analysis provides evidence of diminishing returns from increasing tree canopy past a certain level. The second-stage analysis uses a survey of property owners' preferences and socioeconomic characteristics to overcome the problem of endogeneity. Average benefit estimates for the mean canopy cover within ¼ mile of properties in the study area, using the second-stage model, are between 0.75% and 2.52% of the mean sale price.* (JEL Q21, Q51)

I. INTRODUCTION

Large contiguous patches of tree canopy are considered to be an important part of an urban environment. In addition to the benefits received by private property owners, such as shade and privacy, these areas provide wildlife habitat, improve air quality, reduce runoff and flooding, lower noise levels, and moderate climate.

The Portland metropolitan area is highly urbanized and development is constrained by an urban growth boundary. Despite these pressures, the percentage of tree canopy in the city of Portland increased between 1972 and 2002 (Poracsky and Lackner 2004). This increase is attributed to a natural environment that is conducive to growing trees, Oregon's land-use laws, Portland's environmental zoning regulations, land purchases by the regional government, and planting efforts by nonprofit organizations (Poracsky and Lackner 2004).

Land Economics • May 2010 • 86 (2): 281–293
ISSN 0023-7639; E-ISSN 1543-8325

Portland's Urban Forestry Management Plan (Portland Parks and Recreation 2004, 12) lists "protect, preserve, restore, and expand Portland's urban forest" as one of its goals. The effect of this objective on the sale price of single-family residential properties is unknown but is important to assess since the incentives for private property owners to preserve tree canopy may—or may not—be consistent with this goal.

This paper estimates the effect of tree canopy located on single-family residential properties, and in the area within ¼ mile of these properties, on their sale price. In addition to estimating marginal effects this paper estimates, for the first time, the per-property benefits of nonmarginal changes in tree canopy using a second-stage hedonic price model. The second-stage model involves estimating an inverse demand curve for the percentage of tree canopy, which is necessary for measuring the per-property benefits of nonmarginal changes in tree cover. These estimates are provided for existing levels of tree canopy and for several hypothetical increases in tree canopy coverage.

II. LITERATURE

Several studies have examined the relationship between open spaces and the sale

The authors are, respectively, Stanley H. Cohn Professor of Economics, Reed College; professor of economics, San Francisco State University; and research assistant professor, Department of Resource Economics, University of Nevada–Reno. This research was supported by a Paid Leave Award from Reed College and a Goldhammer Summer Research Grant. The authors gratefully acknowledge research assistance provided by Sarah Klain and David Kling; Gary Odenthal provided help with the data used in our analysis. Helpful comments were provided by Joe Poracsky, participants at the 2005 W1133 meeting, and an anonymous referee.

price of single-family residential properties in Portland, Oregon (Bolitzer and Netusil 2000; Lutzenhiser and Netusil 2001; Mahan, Polasky, and Adams 2000; Netusil 2004a, 2005b). Tree canopy on a property and in the surrounding neighborhood is represented by a series of dummy variables in one paper (Netusil 2005a) and captured indirectly as a characteristic of natural area parks and forested wetlands in the other papers (Bolitzer and Netusil 2000; Lutzenhiser and Netusil 2001; Mahan, Polasky, and Adams 2000).

Multiple hedonic studies have found that property values increase if trees are located on a property (Anderson and Cordell 1985; Dombrow, Rodriguez, and Sirmans 2000; Morales 1980). Other hedonic studies have focused on the relationship between property values and forested areas in the surrounding neighborhood (Tyrvainen and Miettinen 2000), with some studies finding negative effects (Garrod and Willis 1992; Geoghegan, Wainger, and Bockstael 1997; Kestens, Theriault, and Rosiers 2004; Tyrvainen 1997).

Tyrvainen (1997) used apartment sales in Joensuu, Finland, to estimate how their sale price is influenced by distance to the nearest wooded recreation area, nearest forested area, and the relative amount of forested areas in the housing district. Sale prices are estimated to increase with proximity to wooded recreation areas and with increases in the amount of forested areas in the housing district. However, the sale price of apartments is found to increase as the distance from a forested area increases. The author attributes this result to the shading effects from dense forests in the study area.

In a related study, Tyrvainen and Miettinen (2000) estimated that a 1-km increase in the distance to the nearest forested area leads to an average 5.9% decrease in the sale price of residential properties in the district of Salo in Finland. Dwellings with a view of forests were found, on average, to be 4.9% more expensive than dwellings with similar characteristics.

Garrod and Willis (1992) used observations on properties located adjacent to Forestry Commission land across Britain to estimate a first-stage model that includes three tree categories and a second-stage model of the demand for broadleaved woodland. An increase in the proportion of Forestry Commission land with broadleaved trees is estimated to increase a property's sale price, while an increase in mature conifers is found to reduce sale prices. The double-log functional form used in the second-stage model, which uses a multiple market approach, results in an income elasticity estimate for the proportion of broadleaved woodland of 0.82 and an own price elasticity of -1.76.

The only second-stage hedonic model attempted for Portland, Oregon, is described by Mahan, Polasky, and Adams (2000). While the authors find evidence of market segmentation, they were unable to get reliable estimates of the demand curve for size of the nearest wetland.

III. STUDY AREA, PROPERTY CHARACTERISTICS, AND SURVEY DATA

The study area includes 91,250 acres of Portland, Oregon, located within Multnomah County (Figure 1). The study area is highly urbanized with an average lot size of 7,043 square feet. Between January 1, 1999, and December 31, 2001, there were 30,015 arms-length single-family residential property sales in the study area; these transactions are the core part of the data set used for the first-stage hedonic price model. Sale price and structural information were obtained from the Multnomah County assessor (2002).[1] Sale prices were adjusted to 2000 dollars using the *Consumer Price Index: All Urban Consumers* (Bureau of Labor Statistics 2002). Table 1 contains a complete list of explanatory variables used in this analysis; more detailed information about the data set is provided by Netusil (2005a). Properties on the west side (NW and SW) have a higher mean sale

[1] Assessment and taxation property records, January 1997 to June 2002, Multnomah County Assesor's Office.

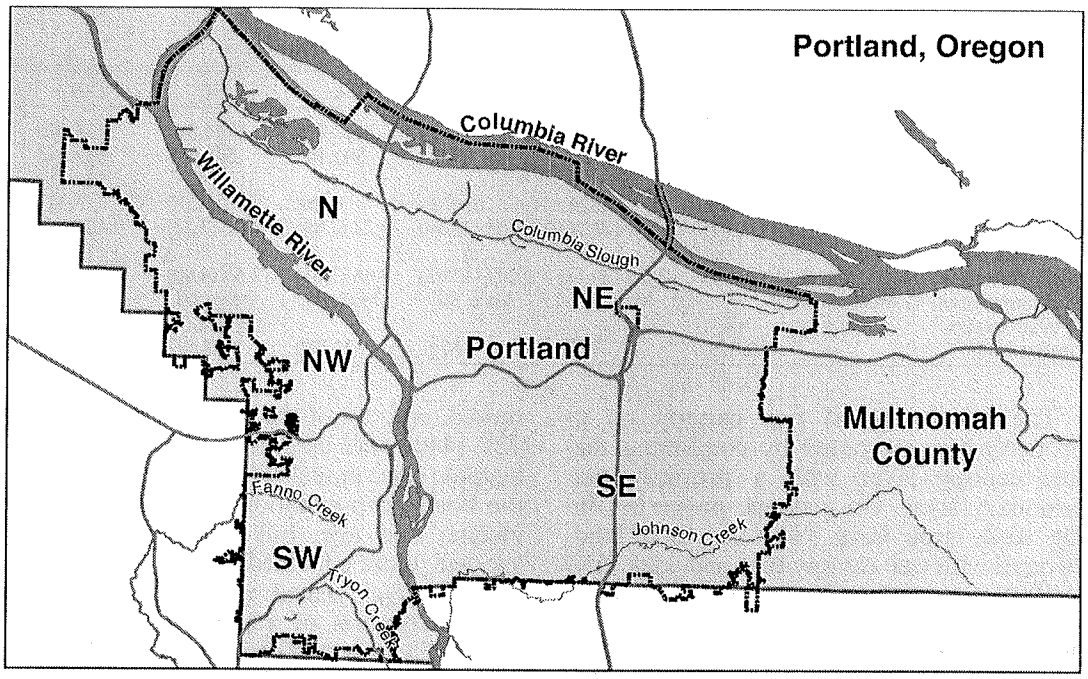


FIGURE 1
STUDY AREA

price, are located in census tracts with higher median incomes, and have a higher percentage of tree canopy on the property and in the area within 1/4 mile of the property than properties located east of the Willamette River (Table 2).

The tree canopy variables were generated using a canopy cover layer derived from satellite images (Metro Data Resources Center 2006). The canopy cover layer used a minimum mapping unit of 1 acre and categorized canopy cover based on the amount of coverage provided by the crowns of trees. For this study we focus on canopy that provides between 76% and 100% coverage, that is, patches of tree canopy of 1 acre or larger where canopy crowns overlap and cover 76% to 100% of the patch.

TABLE 1
EXPLANATORY VARIABLES

Property variables	Lot square footage, building square footage, garage square footage, total number of bathrooms, number of fireplaces, age, structure (1 story, 1 story unfinished attic, 1 story unfinished attic and basement, 1 story with finished basement, 1 story with finished attic, 1 story with finished attic and basement, 1 ½ story, 1 ½ story with finished basement, 2 story or 2 story with finished basement), base zoning (rural, low-density residential, medium density residential, high density residential, light commercial, heavy commercial, light industrial, or open space), distance to nearest industrial district, distance to nearest commercial district, distance to nearest industrial district
Location variables	Quadrant (north, northeast, northwest, southwest, southeast); quadrant * distance to central business district
Property amenity variables	Percentage of tree canopy on the property
Percentage of area within 1/4 mile of properties with amenities	Percentage of area within 1/4 mile of property with: tree canopy, wetlands, river, stream, and slope equal to or exceeding 25%

TABLE 2
SUMMARY STATISTICS (STANDARD DEVIATIONS IN PARENTHESES)

	Combined	NW	SW	SE	NE	N
Mean real sale price (2000)	$175,160	$443,588	$255,965	$152,679	$168,894	$125,090
Mean median income (census tract 2000)	$45,985	$84,834	$63,790	$41,145	$45,216	$37,148
Mean lot size (ft^2)	7,043	13,626	10,022	6,788	6,310	5,327
Mean percentage of tree canopy on the property	3.48 (14.44)	21.64 (31.26)	16.02 (28.56)	1.22 (7.89)	1.00 (7.22)	0.40 (4.67)
Mean percentage tree canopy within 1/4 mile of properties	7.21 (13.29)	40.26 (20.12) Max: 90	27.03 (17.83) Max: 86	3.86 (7.62) Max: 85	2.53 (4.80) Max: 68	2.66 (3.76) Max: 29
Observations	30,015	767	3,879	11,980	9,597	3,792

The percentage of tree canopy on a property was estimated by combining the tree canopy layer with a property tax boundary layer. On average, properties in the study area have 3.48% of their land covered with tree canopy that provides 76% to 100% coverage and is part of a patch that is 1 acre or larger. This is because much of the study area has no tree canopy at the high-level of coverage of 76% to 100%. In each area (NW, SW, SE, NE, N) there were properties completely covered with tree canopy and properties with no tree canopy.

Tree canopy within 1/4 mile of a property can be located on privately or publicly owned land. The majority of tree canopy for property sales in the data set is on privately owned land. North Portland is an exception with 1.25% and 1.41% of land covered by privately and publicly owned tree canopy, respectively (Table 3).

The second-stage hedonic price model uses socioeconomic and perception variables from a survey to estimate the inverse demand function; this function is then used to calculate the benefits of nonmarginal changes in tree canopy coverage. In the fall of 2005, a packet containing an eight-page survey, a cover letter, a map of the Portland-area highlighting seven regional parks, and a postage-paid return envelope was mailed to a random sample of 1,200 properties selected from the 2001 property sales.[2] Of the 1,141 deliverable surveys, 42% (479) were returned, and out of the 479 surveys returned 92% (440) were useable in the second-stage hedonic price model. The survey sample and the Portland population have similar mean income and age, but the sample is, on average, more educated (Table 4).

The survey asked respondents for (1) their perception of attributes of Portland parks, (2) their use of prominent Portland parks,[3] (3) their willingness to pay for a program to purchase and maintain a large regional park, (4) the features of their choice of residence, and (5) their socioeconomic characteristics. The perception variables of the attributes of Portland parks are from nine-scale Likert-type questions that ask about the influence of park attributes, such as tree canopy, on housing choice. The socioeconomic variables include age, education, income, and the number of family members in the household.

Table 4 includes summary statistics for the variables used as demand shifters and/or as instruments in the second-stage hedonic model. The section of our paper describing the estimation of the inverse demand function explains the hypothesized relationship between these variables and the demand for tree canopy.

IV. HEDONIC PRICE METHOD: FIRST- AND SECOND-STAGE MODELS

The first-stage hedonic price model relates the sale price of properties to their structural

[2] For additional information on the survey see Kovacs and Larson (2008).

[3] These include Forest Park, Mount Tabor, Tryon Creek State Park, Willamette Park, and Powell Butte.

TABLE 3

TREE CANOPY WITHIN 1/4 MILE OF PROPERTIES

	Combined	NW	SW	SE	NE	N
Percentage of tree canopy	7.21	40.26	27.03	3.86	2.53	2.66
Percentage on privately owned land	5.55	32.97	22.41	2.81	1.66	1.25
Percentage on publicly owned land	1.66	7.29	4.63	1.05	0.97	1.41

characteristics, neighborhood amenities, and location. While estimates for marginal changes in attributes can be derived from the first stage, the second stage is needed to estimate per-property benefits from non-marginal changes.

Rosen (1974) proposed that marginal prices from the first stage be used in a second-stage model to estimate the demand curve for the attribute of interest. However, for reliable estimation of the second stage, the inverse demand function must address two important econometric issues: identification of the second-stage demand parameters from the first-stage parameters, and endogeneity of the price and level of the attribute.

Problems with parameter identification arise because the attributes of the composite good cannot be unbundled, resulting in a nonlinear hedonic price function. Consequently, the same set of information is used for the first and second stages—leading to an identification problem unless additional information or structure is included in the second-stage model. Ekeland, Heckman,

TABLE 4

DEFINITIONS AND SUMMARY STATISTICS OF HOMEOWNER CHARACTERISTICS

Variable	Definition	Sample Mean	Sample Std. Dev.	2006 Population Mean[a]	Demand Shifter	2SLS Instrument
AGE	Age	40.76	10.30	37.1	X	X
EDUCATION	Years of schooling	16.75	2.42	14.26	X	X
INCOME	Annual family income	$77,352	$44,086	$76,550	X	X
SITETIME	The sum of the average on-site time spent per trip at five natural parks	194.41	148.56		X	X
AGE14	Number of family members younger than 14	0.57	0.90			X
AGE1425	Number of family members between 14 and 25	0.16	0.53			X
AGE2540	Number of family members between 25 and 40	1.06	0.89			X
AGE4060	Number of family members between 40 and 60	0.55	0.79			X
AGE60	Number of family members older than 60	0.08	0.35			X
PRKVIEW	Importance of view of park in housing choice	3.97	2.49			X
PRKTC	Importance of tree canopy at park	6.35	2.06			X
PRKHT	Importance of hiking trails at park	6.03	2.21			X
FRSTTIME	Average on-site time spent per trip at Forest Park	69.69	63.37			X
TBRTIME	Average on-site time spent per trip at Mount Tabor	52.37	49.76			X
PBTIME	Average on-site time spent per trip at Powell Butte Park	23.43	46.64			X
TCKTIME	Average on-site time spent per trip at Tryon Creek Park	26.92	46.80			X

[a] The total population of Portland, Oregon, in 2006 was 539,950. Population summary statistics are from the U.S. Census Bureau's American Community Survey, 2006 (U.S. Census Bureau 2008).

and Nesheim (2004) provide an interesting theoretical discussion of the identification issue, suggesting that the nonlinearities of the hedonic model be used to nonparametrically identify the structural parameters. Endogeneity arises because the marginal price of an attribute, and its level, are simultaneously determined. Under these conditions ordinary least squares (OLS) leads to inconsistent estimation of the second-stage parameters, but two-stage least squares (2SLS) will produce efficient estimates if the instruments used are correlated with the observed levels of the attribute but uncorrelated with the unobserved homeowner's tastes.

As in previous studies (Chattopadhyay 1999), we identify the second-stage parameters using functional-form restrictions, specifically, a quadratic model for the first-stage hedonic price function, and linear and double-log models for the second-stage inverse demand functions. To overcome endogeneity bias we use individual-level survey responses and socioeconomic characteristics of a randomly selected group of property owners who purchased their homes in 2001. While the first-stage hedonic price function uses all 30,015 transactions, the estimation of the inverse demand function involves combining the information derived from the first-stage results with survey responses from a relatively small subset of property owners: 440 observations for the linear model and 377 for the double-log model. We expect that this aspect of the estimation will provide additional structure to the second-stage estimation and a strong set of instruments for efficient 2SLS estimation of the inverse demand parameters.

V. RESULTS

First-Stage Hedonic Price Model

Our a priori expectation is that tree canopy will have either a positive but diminishing effect on a property's sale price, or will increase a property's sale price to a maximum point past which increases in tree canopy will cause a property's sale price to decline. Two models were developed to explore these expectations; the natural log of a property's real sale price was used as the dependent variable in both models.

In the first model, the percentage of tree canopy on a property, and within 1/4 mile of a property, is represented by a quadratic function, while the natural logs of these variables are used in Model 2. To preserve observations, the minimum amount of tree canopy on each property, and within 1/4 mile of each property, was set at 0.1% for Model 2, that is, observations with zero tree canopy for either (or both) categories were recoded to 0.1%—an approach justified by Smith and Cicchetti (1974) and Johnson and Rausser (1971). Of the 30,015 observations in the data set, there are 9,353 observations with no tree canopy within 1/4 mile of the property and 27,583 properties with no tree canopy on the property.

The results from both models are presented in Table 5. The estimated coefficients for the structural, amenity, and location variables are consistent with those of other studies (Netusil 2005a, 2005b). The estimated coefficients on home characteristics (lot square footage, building square footage, etc.), house style (one story, one story with finished basement, etc.), base zoning (low residential, medium residential, etc.), distance to the central business district, and nearest commercial and industrial districts are not included in Table 5. Full results are available from the authors. In Model 1, 40 of the 52 explanatory variables are significant at the 5% level, while in Model 2, 36 of the 46 explanatory variables are significant at the 5% level. In Model 1, the percentage of tree canopy that is estimated to have the largest impact on a property's sale price is approximately 18%.[4] The estimated coefficient on Model 2 is significant and negative, implying that the optimal tree canopy coverage on a property is zero, on average.

[4] This estimate is derived by solving the quadratic equation for a maximum.

TABLE 5
FIRST-STAGE MODEL ESTIMATED COEFFICIENTS AND ROBUST STANDARD ERRORS

	Model 1 Quadratic	Model 2 Natural Log
Percentage of tree canopy on the property	0.00046 (0.00035)	
Percentage of tree canopy on the property squared	−1.28e−05*** (4.42e−06)	
Percentage of tree canopy within 1/4 mile of the property: N	0.00767*** (0.0018)	
Percentage of tree canopy within 1/4 mile of the property: NW	−0.0140*** (0.00234)	
Percentage of tree canopy within 1/4 mile of the property: NE	−0.0049** (0.0021)	
Percentage of tree canopy within 1/4 mile of the property: SW	−0.0080*** (0.0019)	
Percentage of tree canopy within 1/4 mile of the property: SE	−0.00082 (0.00187)	
Percentage of tree canopy within 1/4 mile of the property squared: N	−0.00024** (0.000104)	
Percentage of tree canopy within 1/4 mile of the property squared: NW	0.000269*** (0.000105)	
Percentage of tree canopy within 1/4 mile of the property squared: NE	0.000132 (0.000111)	
Percentage of tree canopy within 1/4 mile of the property squared: SW	0.000248** (0.000104)	
Percentage of tree canopy within 1/4 mile of the property squared: SE	0.000134 (0.000104)	
Percentage of area within 1/4 mile of property with wetlands	−0.0008864 (0.0013852)	−0.0009005 (0.0013853)
Percentage of area within 1/4 mile of property with rivers	0.0072869 (0.0006611)***	0.0073019 (0.0006615)***
Percentage of area within 1/4 mile of property with streams	−0.0278367 (0.0076645)***	−0.018638 (0.00738)**
Natural log of percentage of lot with tree canopy		−0.004977*** (0.001786)
Natural log of percentage of area within 1/4 mile of property with tree canopy		0.018990*** (0.003931)
Natural log of percentage of area within 1/4 mile of property with tree canopy: NW		−0.083126*** (0.012220)
Natural log of percentage of area within 1/4 mile of property with tree canopy: NE		−0.008506* (0.004943)
Natural log of percentage of area within 1/4 mile of property with tree canopy: SW		−0.022236*** (0.006473)
Natural log of percentage of area within 1/4 mile of property with tree canopy: SE		0.005410 (0.004411)
Observations	30,015	30,015
R^2	0.7554	0.7546

* Significant at 10%; ** significant at 5%; *** significant at 1%.

To test for the presence of spatial error autocorrelation in the first-stage hedonic regression model, we carry out Moran's *I*-test, separately, for the data from 1999, 2000, and 2001. The results of the tests are as follows:

- 1999 data: Moran's *I*-statistic = 0.3956, *p*-value = 0.01 (n = 9,913)
- 2000 data: Moran's *I*-statistic = 0.4131, *p*-value = 0.01 (n = 9,537)
- 2001 data: Moran's *I*-statistic = 0.3716, *p*-value = 0.01 (n = 10,474)

The tests indicate the presence of statistically significant spatial error autocorrelation for each year of the data. However, it remains unclear whether the spatial error process is due to spatial dependence or spatial heterogeneity. An appropriate spatial lag model can correct for spatial dependence, but spatial heterogeneity can

TABLE 6
IMPLICIT PRICES FOR TREE CANOPY WITHIN 1/4 MILE OF PROPERTIES

	Number of Observations	Observations with Negative Implicit Prices Model 1: Quadratic	Maximum or Minimum of Quadratic Function	Observations with Negative Implicit Price Model 2: Natural Log
NW	767	767	97.36 (min)	767
SW	3,879	1,219	16.80 (min)	3,879
SE	11,980	176	33.32 (max)	0
NE	9,597	219	13.31 (max)	0
N	3,792	45	16.22 (max)	0
Total	30,015	2,426		4,646

be the result of error heteroskedasticity (Anselin and Bera 1998).

Correcting for spatial dependence involves specification of an appropriate spatial lag model (Anselin et al. 1996; Anselin and Bera 1998). Addressing spatial dependence requires at least two years of cross-sectional data that are temporally separated. This enables testing of the stability and asymptotic validity of the spatial lag parameters to determine the appropriate spatial lag specification to correct for spatial dependence (Anselin 2000). Unfortunately, our home sale data are for three consecutive years and, as such, do not enable us to specify a statistically accurate spatial lag model. A recent study that compares implicit prices of a hedonic price model with and without spatial dependence finds that spatially corrected estimates of implicit prices are found to be nearly the same as those obtained by OLS (Mueller and Loomis 2008). We address error heteroskedasticity, which could be the result of spatial heterogeneity, by estimating the regressions with robust standard errors (White 1980). In large samples, like the present case, heteroskedasticity-robust estimation can take care of the spatial clustering effect that is often encountered when using housing data (Anselin and Bera 1998).

Marginal implicit prices were derived using the results presented in Table 5. The estimated coefficients are consistent with the a priori expected relationship between the percentage of tree canopy within 1/4 mile of a property and its sale price in Model 1 for properties in SE, NE, and N Portland. However, increases in tree canopy up to 16.80% in SW Portland, and 97.36% in NW Portland, are estimated to decrease the sale price of properties located in those areas (Table 6).

The estimated coefficients in Model 2 are consistent with a priori expectations for properties in SE, NE, and N Portland, but properties in NW and SW Portland are estimated to experience a decline in sale price from increases in tree canopy. Negative marginal implicit prices in NW and in SW Portland make intuitive sense since further increases from already large amounts of dense tree canopy within 1/4 mile of properties may block highly desirable views of mountains, city lights, and the Willamette River.

Inverse Demand Function (Second-Stage Hedonic Price Model)

The marginal implicit prices estimated in the first stage are used as the dependent variable in the estimation of the inverse demand function. Since the marginal implicit price of tree canopy and the percentage of tree canopy are simultaneously determined, instruments need to be used that are correlated with the observed levels of the attribute, but uncorrelated with the unobserved homeowner's tastes to avoid endogeneity bias.

Perception variables of park attributes such as view, tree canopy, and hiking, and on-site time variables for visits to natural parks, such as SITETIME, reflect respondents' preferences for parks. The demand for tree canopy near a property is likely related to these preferences because parks are a logical substitute for tree canopy near

TABLE 7

ESTIMATED COEFFICIENTS: QUADRATIC FIRST STAGE, LINEAR SECOND STAGE (STANDARD ERRORS IN PARENTHESES)

%TREE_CANOPY	−20.35*** (4.58)
INCOME	0.0001071 (0.00047)
AGE	2.49 (2.05)
EDUCATION	−192.55** (81.47)
EDUCATION_SQUARED	5.85** (2.41)
SITETIME	−0.1229 (0.143)
Constant	2,150.48*** (695.58)
R^2	0.2719
Observations	440

** Significant at 5%; *** significant at 1%.

TABLE 8

ESTIMATED COEFFICIENTS: QUADRATIC FIRST STAGE, DOUBLE-LOG SECOND STAGE (ROBUST STANDARD ERRORS IN PARENTHESES)

LN_%TREE_CANOPY	−0.1682*** (0.0423)
LN_INCOME	0.1720* (0.0972)
LN_AGE	0.1927 (0.1825)
LN_EDUCATION	−0.5539 (0.3455)
LN_SITETIME	−0.0937** (0.0455)
Constant	5.409*** (1.569)
R^2	0.2161
Observations	377

* Significant at 10%; ** significant at 5%; *** significant at 1%.

a home, that is, homeowners who have little or no tree canopy on or near their property may make greater use of these parks.

Socioeconomic variables such as age, education, income, and the number of young children in a household are also related to the demand for tree canopy. Individuals who are older may have a preference for more tree canopy near their homes because they have more time available for passive recreation activities such as bird-watching; those with more education may desire neighborhoods with more tree canopy because there is a greater understanding and appreciation of the ecosystem services of tree canopy. Income may increase the demand for tree canopy near a home because of a greater ability to spend on amenities, while the number of family members in a household of different age groups influences household activities.

There was no a priori expectation about the functional form for the second-stage model, so two models were estimated: linear and double-log. We retained the negative marginal implicit prices estimated in the first-stage models in the linear model since these appear to be valid estimates for the study area. Other authors have taken a similar approach, although some authors have set these prices equal to zero or dropped these observations entirely (Zabel and Kiel 2000).

Results from the second-stage linear model are presented in Table 7. The estimated coefficient on the percentage of tree canopy is negative and significant. Income and age are positive, as expected, but not significant. Education, which is modeled as a quadratic, reaches a minimum at 16.46 years, which is close to the average education level in the survey data set, but much higher than the average education level in Portland. The availability of a substitute for tree canopy within 1/4 mile of a property is measured by SITETIME, the sum of the average on-site time spent per trip at five natural parks in the Portland-area. The estimated coefficient on this variable is negative, as expected, but is not significant.

Table 8 contains the results from the double-log model. For this model it is assumed that the minimum tree canopy within 1/4 mile of each observation is 0.1%; observations with a first-stage negative marginal implicit price are dropped, which decreases the number of observations to 377. The estimated coefficient on tree canopy is negative and significant: a 1% increase in tree canopy within 1/4 mile of a property is estimated to decrease the implicit marginal willingness-to-pay for tree canopy by 0.1682%. The coefficient on income is positive and significant, providing evidence that tree canopy is a normal good.

The coefficient on SITETIME, a variable that measures a substitute for tree canopy within 1/4 mile of a property, is negative and significant. Increasing the amount of tree canopy within 1/4 mile of a property by 1% is estimated to decrease the amount of time spent at the five natural parks in the Portland area by 0.0937%. Age is again positive but not significant. The negative sign on education is counterintuitive and is

TABLE 9
INSTRUMENT TESTS

	Underidentification	Weak Identification	Overidentification
Linear second stage	Anderson *LR*-statistic: 53.779 χ^2_{12}(*p*-value) = 0.0000	Craig-Donald Wald *F*-statistic: 4.897 $f_{0.05}$ = 11.51	Sargan statistic: 8.597 χ^2_{11}(*p*-value) = 0.6591
Double-log second stage	Kleibergen-Paap rk-LR-statistic: 26.811 χ^2_{12}(*p*-value) = 0.0132	Kleibergen-Paap rk Wald *F*-statistic: 3.170 $f_{0.05}$ = 11.51	Hansen *J*-statistic: 15.235 χ^2_{12}(*p*-value) = 0.2288

possibly the result of the double-log model's inability to represent the nonlinear relationship between the demand for tree canopy and education observed in the linear model.

Endogeneity

To examine the effectiveness of the 2SLS results we conducted tests for underidentification, weak identification, and overidentification of the instruments. As shown in Table 9, Anderson's likelihood ratio test (Kleibergen-Paap rk-LR-statistic) indicates the model is identified for both specifications; however, the Craig-Donald statistic (Kleibergen-Paap rk Wald *F*-statistic) suggests that both specifications of the model are only weakly identified. Sargan's statistic (Hansen's *J*-statistic) indicates that the instruments are valid, that is, not correlated with the error term and also correctly excluded from the estimated equation.

Per-Property Benefit Estimates

Per-property benefit estimates for a range of tree canopy levels are calculated using the second-stage results (Table 10). The estimated demand curve is integrated from zero canopy coverage to different tree canopy levels for each observation; the observation-level benefits are then averaged over the entire sample. Figure 2 is a graphical representation of the estimated demand curves.

The tree canopy levels evaluated include (1) the lowest average tree canopy coverage (2.53%), (2) the mean coverage (7.21%) for the study area, (3) a coverage level (15%) reflecting roughly a doubling of the average tree canopy within the study area, and (4) the level of tree canopy where we see a decline in benefit estimates in the quadratic model (40%). The average benefit estimates for the mean canopy cover (7.21%) within 1/4 mile of properties in the study area represent between 0.75% and 2.52% of the mean sale price of $175,160 under the two different specifications. A test of significance of the population mean benefits is performed for each estimated benefit reported in Table 10. The *t*-ratios for these tests against the alternative that the population mean benefit is different from zero are all greater than 100, signifying that the benefits are significantly different from zero. A 95% confidence interval for the population mean benefit is reported for each benefit estimate in Table 10.

The results also allow us to compute the change in the per-property benefits from a change in the level of tree canopy coverage. For example, for each observation in our data set we compute the difference between the per-property benefits obtained by integrating the second-stage benefit function from 0% to 7.21% and the per-property benefits obtained by integrating the second-

TABLE 10
PER PROPERTY BENEFIT ESTIMATES FOR ALTERNATIVE CANOPY COVER AND 95% CONFIDENCE INTERVALS

Percentage of Tree Canopy	Quadratic First Stage, Linear Second Stage	Quadratic First Stage, Log Second Stage
2.53	$1,671 ± $15	$548 ± $2
7.21	$4,416 ± $42	$1,310 ± $5
8.21	$4,944 ± $47	$1,459 ± $5
15	$7,988 ± $87	$2,409 ± $8
25	$10,747 ± $144	$3,684 ± $14
35	$11,453 ± $202	$4,874 ± $18
40	$11,037 ± $231	$5,447 ± $20

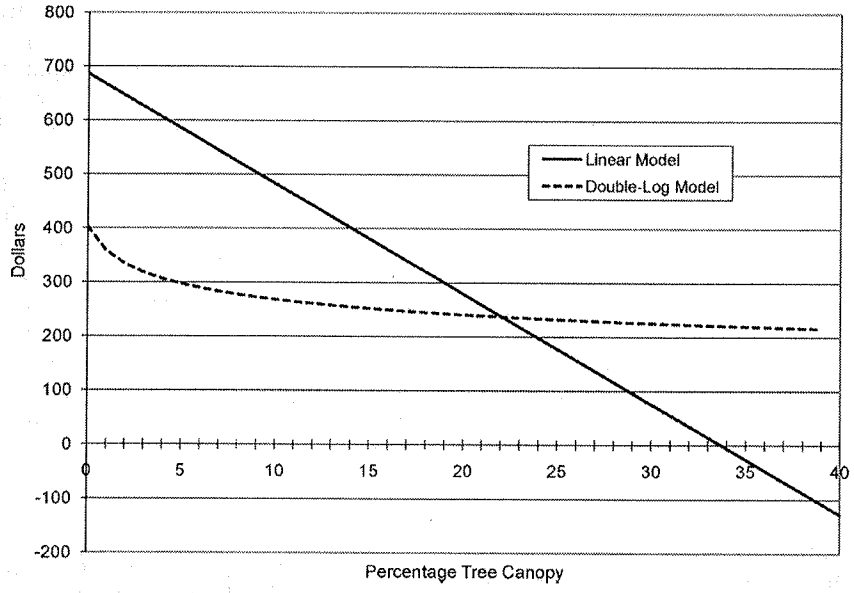


FIGURE 2
SECOND-STAGE DEMAND CURVES

stage benefit function from 0% to 2.53%. This difference, when averaged over the sample, produces a Marshallian surplus of $2,745 for a change in tree canopy coverage from 2.53% to 7.21% (Table 11). In Table 11 we report the results of increasing tree canopy from (1) 2.53% to the study average of 7.21%, (2) 7.21% to 8.21%, that is, a 1 percentage point increase in tree canopy cover, and (3) a doubling of tree canopy coverage from 7.21% to 15%.

An increase in tree canopy cover from 7.21% to 8.21% is estimated to increase per-property benefits from $149 to $528. This 1 percentage point change represents an additional 1.35 acres of tree canopy within 1/4 mile of a property, which corresponds to a per-acre benefit ranging from $111 to $391. The null hypothesis that the mean per-property benefit associated with the change from one level to another is zero is rejected with *t*-ratios all greater than 100. This suggests that the per-property benefit associated with each of the estimates in Table 11 is statistically different from zero.

The linear second-stage specification produces substantially higher benefit estimates than the logarithmic second-stage specification. One plausible explanation is that the perceived benefits of tree canopy decrease with increases in the quantity of tree canopy, but at an increasing rate. A linear demand function would not capture this nonlinearity and would produce benefit estimates that are too large. Thus, one should be careful in deciding which set of estimates to use for policy analysis.

VI. CONCLUSIONS

Portland, Oregon, is described as a "particularly green and well-treed city"

TABLE 11
PER-PROPERTY AND PER-ACRE BENEFIT ESTIMATES FROM PERCENTAGE CHANGES IN CANOPY COVERAGE AND 95% CONFIDENCE INTERVALS

Change in Percentage of Tree Canopy	Quadratic First Stage, Linear Second Stage	Quadratic First Stage, Log Second Stage
2.53 to 7.21	$2,745 ± $27	$762 ± $3
7.21 to 8.21	$528 ± $6	$149 ± $ 1
7.21 to 15	$3,572 ± $45	$1,099 ± $4
Per acre benefit from 7.21 to 8.21 increase	$391	$111

(Poracsky and Lackner 2004, 1). The mean percentage of tree canopy within 1/4 mile of properties in the data set is 7.21% with 5.55% on privately owned land and 1.66% on publicly owned land. This average, however, masks large differences in the distribution of tree canopy across the study area.

The estimated coefficients from the first-stage hedonic price model indicate that an increase in tree canopy in parts of the study area with small amounts of tree canopy (N, NE, SE Portland) is expected to increase the sale price of properties. However, in the heavily treed areas of SW and NW Portland, increases in tree canopy are estimated to decrease sale prices. This effect is attributed to the already large percentage of tree canopy in these areas and the potential that highly desirable views will be blocked.

The coefficients on the percentage of tree canopy within 1/4 mile of a property are consistently negative and statistically significant across specifications for the second-stage model; the signs on other explanatory variables are consistent with a priori expectations. Per-property benefit estimates for the mean canopy cover within 1/4 mile of properties in the study area range from 0.75% to 2.52% of the mean sale price of $175,160.

The hedonic price method is only able to capture benefits that are capitalized into the sale price of properties. The attribute that was the focus of this study—tree canopy that provides between 76% and 100% coverage and encompasses at least one continuous acre—generates many public benefits such as wildlife habitat, improved air quality, reduced runoff and flooding, lower noise levels, and climate moderation. Future research can use the results of this study to analyze the benefits and costs of Portland's urban forest (McPherson et al. 2002).

The small average lot size for residential properties in the study area points to the need for a coordinated effort to maintain and enhance tree canopy. Current regulations in the study area prohibit cutting healthy trees on large lots if doing so would create a "significant negative impact" on the "erosion, soil stability, soil structure, flow of surface waters, water quality, health of adjacent trees and understory plants, or existing windbreaks" and "the character, aesthetics, property values, or property uses of a neighborhood" (City of Portland, Oregon 2005). Our empirical results suggest that these regulations, tree planting programs sponsored by nonprofit associations, and efforts by the regional government to educate property owners about the benefits of wildlife habitat in their neighborhood will maintain, or perhaps enhance, the sale price of single-family residential properties in Portland, Oregon.

References

Anderson, L. M., and H. K. Cordell. 1985. "Residential Property Values Improved by Landscaping with Trees." *Southern Journal of Applied Forestry* 9 (3): 162–66.

Anselin, Luc. 2000. "Spatial Regression Analysis Short Course." ICPSR, University of Michigan, Ann Arbor, August 14–18.

Anselin, Luc, and Anil K. Bera. 1998. "Spatial Dependence in Linear Regression Models with an Introduction to Spatial Econometrics." In *Handbook of Applied Economic Statistics*, ed. Aman Ullah and David E. A. Giles. New York: Marcel Dekker.

Anselin, Luc, Anil K. Bera, Raymond Florax, and Mann J. Yoon. 1996. "Simple Diagnostic Tests for Spatial Dependence." *Regional Science and Urban Economics* 26 (1): 77–104.

Bolitzer, Benjamin, and Noelwah R. Netusil. 2000. "The Impact of Open Spaces on Property Values in Portland, Oregon." *Journal of Environmental Management* 59 (3): 185–93.

Bureau of Labor Statistics. 2002. *Consumer Price Index: All Urban Consumers Series, Seasonally Adjusted, U.S. City Average (Base Period: 1982–84 = 100)*. Available at www.bls.gov/cpi/.

Chattopadhyay, Sudip. 1999. "Estimating the Demand for Air Quality: New Evidence Based on the Chicago Housing Market." *Land Economics* 75 (1): 22–38.

City of Portland, Oregon. 2005. City Code and Charter, Chapter 20.42.090.

Dombrow, Jonathan, Mauricio Rodriguez, and C. F. Sirmans. 2000. "The Market Value of Mature Trees in Single-Family Housing Markets." *Appraisal Journal* 98 (1): 39–43.

Ekeland, Ivar, James J. Heckman, and Lars Nesheim. 2004. "Identification and Estimation of Hedonic Models." *Journal of Political Economy* 112 (S1): S60–S109.

Garrod, Guy, and Ken Willis. 1992. "The Environmental Economic Impact of Woodland: A Two-Stage Hedonic Price Model of the Amenity Value of Forestry in Britain." *Applied Economics* 24 (7): 715–28.

Geoghegan, Jacqueline, Lisa A. Wainger, and Nancy E. Bockstael. 1997. "Spatial Landscape Indices in a Hedonic Framework: An Ecological Economics Analysis Using GIS." *Ecological Economics* 23 (3): 251–64.

Johnson, S. R., and Gordon C. Rausser. 1971. "Effects of Misspecifications of Log-Linear Functions When Sample Values Are Zero or Negative." *American Journal of Agricultural Economics* 53 (1): 120–24.

Kestens, Yan, Marius Theriault, and Francois Des Rosiers. 2004. "The Impact of Surrounding Land Use and Vegetation on Single-Family House Prices." *Environment and Planning B: Planning and Design* 31 (4): 539–67.

Kovacs, Kent F., and Douglas M. Larson. 2008. "Identifying Individual Discount Rates and Valuing Public Open Space with Stated-Preference Models." *Land Economics* 84 (2): 209–24.

Lutzenhiser, Margot, and Noelwah R. Netusil. 2001. "The Effect of Open Space Type on a Home's Sale Price: Portland, Oregon." *Contemporary Economic Policy* 19 (1): 291–98.

Mahan, Brent L., Stephen Polasky, and Richard M. Adams. 2000. "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76 (1): 100–13.

McPherson, E. Gregory, Scott E. Maco, James R. Simpson, Paula J. Peper, Qingfu Xiao, Ann Marie VanDerZanden, and Neil Bell. 2002. *Western Washington and Oregon Community Tree Guide: Benefits, Costs, and Strategic Planning*. Albany, CA: Center for Urban Forest Research, USDA Forest Service, Pacific Southwest Research Station.

Metro Data Resources Center. 2006. Canopy Cover, 1998: Coverage Version. July 10. Available at www.oregonmetro.gov/index.cfm/go/by.web/id=24876.

Morales, Dominic J. 1980. "The Contribution of Trees to Residential Property Values." *Journal of Arboriculture* 6 (11): 305–8.

Mueller, Julie M., and John B. Loomis. 2008. "Spatial Dependence in Hedonic Property Models: Do Different Corrections for Spatial Dependence Result in Economically Significant Difference in Estimated Implicit Price?" *Journal of Agricultural and Resource Economics* 33 (2): 212–31.

Netusil, Noelwah R. 2005a. "The Effect of Environmental Zoning and Amenities on Property Values: Portland, Oregon." *Land Economics* 81 (2): 227–46.

———. 2005b. "Does Ownership Matter? Examining the Relationship between Property Values and Privately and Publicly Owned Open Spaces, Streams, and Wetlands." Working paper. Reed College, Department of Economics (June).

Poracsky, Joe, and Michael Lackner. 2004. *Urban Forest Canopy Cover in Portland, Oregon, 1972–2002: Final Report*. Portland: Cartographic Center, Geography Department, Portland State University.

Portland Parks and Recreation. 2004. *Portland Urban Forestry Management Plan 2004*. Portland, OR: Portland Parks and Recreation.

Rosen, Sherwin. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy* 82 (1): 34–55.

Smith, V. Kerry, and Charles J. Cicchetti. 1974. "A Note on Fitting Log-Linear Regression with Some Zero Observations for the Regressand." *Metroeconomica* 26 (1–3): 282–84.

Tyrvainen, Liisa. 1997. "The Amenity Value of the Urban Forest: An Application of the Hedonic Pricing Method." *Landscape and Urban Planning* 37 (3–4): 211–22.

Tyrvainen, Liisa, and Antti Miettinen. 2000. "Property Prices and Urban Forest Amenities." *Journal of Environmental Economics and Management* 39 (2): 205–23.

U.S. Census Bureau. 2008. *American Community Survey 2006. Data Profile Highlights for Portland, Oregon*. Available at www.census.gov/acs.

White, Halbert. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48 (4): 817–38.

Zabel, Jeffrey E., and Katherine A. Kiel. 2000. "Estimating the Demand for Air Quality in Four U.S. Cities." *Land Economics* 76 (2): 174–94.

THE EFFECT OF OPEN SPACES ON A HOME'S SALE PRICE

MARGOT LUTZENHISER and NOELWAH R. NETUSIL*

The relationship between a home's sale price and its proximity to different open spaces types is explored using a data set comprised of single-family home sales in the city of Portland, within Multnomah County, between 1990 and 1992. Homes located within 1,500 feet of a natural area park, where more than 50% of the park is preserved in native and/or natural vegetation, are found to experience, on average, the largest increase in sale price. The open space size that maximizes a home's sale price is calculated for each open space type. Natural area parks require the largest acreage to maximize sale price, and specialty parks are found to have the largest potential effect on a home's sale price. A zonal approach is used to examine the relationship between a home's sale price and its distance to an open space. Natural area parks and specialty parks are found to have a positive and statistically significant effect on a home's sale price for each zone studied. Homes located adjacent to golf courses (within 200 feet) are estimated to experience the largest increase in sale price due to open space proximity although the effect drops off quickly as distance from the golf course increases. (*JEL* Q2, R14)

I. INTRODUCTION

Throughout the United States, local, state, and federal government agencies are proposing and implementing plans to preserve open spaces. In 1998, voters in 26 states approved 124 open space ballot measures, raising more than $5 billion (Pritchard, 2000). In 1995, residents of Portland, Oregon, passed a ballot measure that raised $135.6 million to purchase open spaces. To date, almost 6,000 acres have been acquired.

Open spaces can include parks, golf courses, and cemeteries. The characteristics of these areas, such as the breadth of recreation opportunities and acreage, can vary dramatically both within and across open space types. This article seeks to estimate the effect on a home's sale price resulting from proximity to different open space types. Additionally, the size of each open space type that maximizes the sale price of a home is also determined.

Numerous studies use the hedonic price technique (Mahan et al., 2000; Bolitzer and Netusil, 2000; Do and Grudnitski, 1995; Frech and Lafferty, 1984; Correll et al., 1978; Weicher and Zerbst, 1973) to investigate the relationship between a home's sale price, or assessed value, and its proximity to an open space.

Frech and Lafferty (1984) estimate that actions taken by the California Coastal Commission to preserve open spaces raised home values in their study area by at least $990 and in some cases by as much as $5,043 (1975 dollars). Do and Grudnitski (1995) conclude that homes abutting a golf course experience an increase in sale price of 7.6%. Bolitzer and Netusil (2000), focusing on Portland, Oregon, estimate that homes located within 1,500 feet of a public park sell for $2,262 more than homes located more than 1,500 feet from any open space; the effect for homes within 1,500 feet of a golf course is estimated to be $3,400 (1990 dollars).

*Support for this research was provided by a Bernard Goldhammer Summer Collaborative Grant. The authors would like to thank Jeff Parker, Erin Boyd, Minott Kerr, Douglass Shaw, and Lia Waiwaiole for their help with this article.

Lutzenhiser: Assistant Economist, Public Power Council, 1500 NW Irving St., Suite 200, Portland, OR 97232. Phone 1-503-232-2427, Fax 1-503-239-5959, E-mail margotl@ppcpdx.org

Netusil: Associate Professor, Department of Economics, Reed College, 3203 SE Woodstock Blvd., Portland, OR 97202-8199. Phone 1-503-771-1112 ext. 7306, Fax 1-503-777-7776, E-mail netusil@reed.edu

Contemporary Economic Policy
(ISSN 1074-3529)
Vol. 19, No. 3, July 2001, 291–298

Mahan et al. (2000) present a detailed analysis of the relationship between a home's sale price and wetlands in Portland, Oregon. The authors estimate that increasing the size of the nearest wetland by one acre increases a home's sale price by $24 (1994 dollars) and reducing the distance to the nearest wetland by 1,000 feet increases a home's sale price by $436. Wetland type is not found to have a statistically significant effect on a home's sale price.

Studies have also found a negative relationship between open spaces and a home's sale price. Weicher and Zerbst (1973), focusing on five parks in Columbus, Ohio, find that homes facing a heavily used recreation area in one park sold for $1,150 less than properties one block away from the park. Negative externalities due to open space proximity are also discussed in Li and Brown (1980).

This article extends the existing literature by breaking apart the catch-all "park" category into three new categories—urban park, natural area park, and specialty park/facility—that are based on a park's characteristics. The determination of the open space size that maximizes a home's sale price, and how this varies across open space types reflects an additional contribution. Authors commonly include a measure of the open space size in the regression equation but not in a quadratic form. The study by Rosenberger and Walsh (1997) that values Western valley ranchland using contingent valuation represents an exception.

The estimates presented in this article reflect the benefit of preserving open spaces as transmitted through the housing market, that is, the authors are able to capture "private" benefits using the statistical technique presented herein. Benefits from preserving open spaces that have strong "public good" elements, such as reduced soil erosion, wildlife habitat, and improved water quality, will not be captured using this technique.

The next section provides an overview of hedonic price theory and the functional form used in the statistical analysis. An overview of the study area and data is presented in section III. Results are discussed in section IV; conclusions are in section V.

II. HEDONIC PRICE THEORY AND FUNCTIONAL FORM

Hedonic price theory views a home as a bundle of attributes, primarily, its structural and environmental characteristics as well as the attributes of the surrounding neighborhood (Freeman, 1993). These attributes, in combination, determine the sale price of a home.

Assuming a single competitive housing market, the relationship between a home's sale price and its attributes can be represented by the hedonic price function

$$(1) \qquad P_i = P(S_i, Q_i, N_i),$$

where P_i represents the price of the ith home, S_i is a vector of structural characteristics, Q_i is a vector of environmental characteristics, and N_i is a vector of neighborhood characteristics. The partial derivative of the hedonic price function with respect to a specific attribute represents the marginal implicit price of that attribute holding all other factors constant.

Economic theory provides no guidance on an appropriate functional form for the hedonic price function, although it is generally acknowledged that the equation should be nonlinear (Freeman, 1993). The Box-Cox transformation yields an implicit attribute price that depends on the attribute's level as well as the level of other attributes.

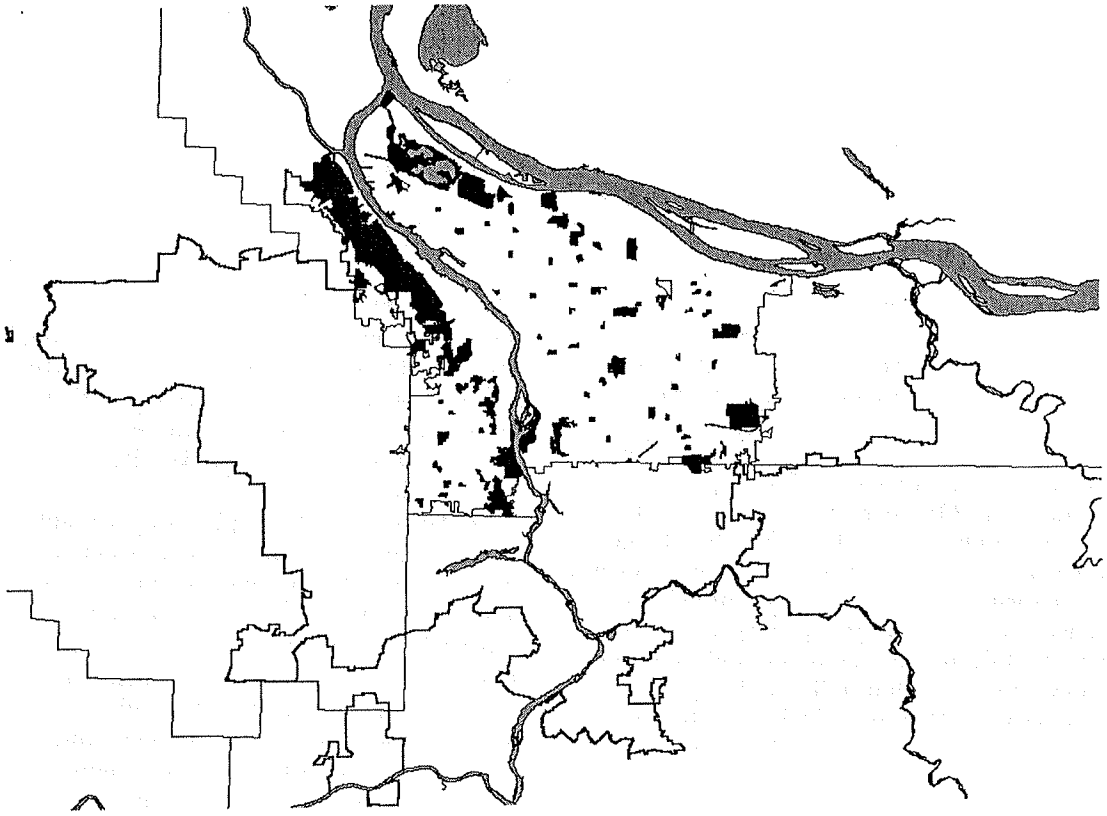
Cropper et al. (1988) suggest simpler functional forms (linear, semi-log, double-log) or more complex forms (linear Box-Cox) when certain variables are not observed or are replaced by a proxy. Recent applications, drawing on the work of Cropper et al. (1988), have primarily used Box-Cox models or have used Box-Cox models to inform their choice of functional form (Streiner and Loomis, 1995; Mahan et al., 2000; Kulshreshtha and Gillies, 1993). The flexibility of the Box-Cox model, and the lack of theoretical guidance on an appropriate function form, makes it an attractive model for estimating hedonic price functions.

The results presented in this article are based on a hedonic price function that is estimated using a Box-Cox transformation of the dependent variable:

$$(2) \quad y^{(1)} = (y^1 - 1)/1;$$

$$(3) \quad y_i^1 = b_0 + b_1 x_{1i} + \cdots + b_k x_{ki} + e_i.$$

FIGURE 1
City of Portland within Multnomah County with Major Rivers and Open Spaces



The maximum likelihood value for λ is estimated using equation (3); this value is used to estimate the parameters of the model using ordinary least squares.

III. DATA

The Portland metropolitan area (Figure 1) covers approximately 460 square miles and is highly urbanized. The study area includes the section of the city of Portland located within Multnomah County, an area of approximately 145 square miles that contains the most urbanized portions of the Portland metropolitan area.

The city of Portland is divided into five quadrants. The northwest quadrant of Portland is divided by the Willamette River, which flows north into the Columbia River. Streets east of the Willamette are labeled "North," and those west of the river are labeled "Northwest." Residents of southwest (SW) and northwest (NW) Portland have a higher income profile than residents of north (N), northeast (NE), and southeast (SE) Portland.

The data set consists of 16,636 single-family home sales in the city of Portland within Multnomah County for 1990, 1991, and 1992 and includes home characteristics such as the number of bathrooms, lot acreage, house total square footage, and age. Metro's Regional Land Information System Geographic Information System database was used to compute the distance from each house to the central business district, and the distance, up to 1,500 feet, to the nearest open space.

Home sale prices were adjusted to 1990 dollars using a housing price index constructed from data on the median home sale price for homes located in Multnomah County during the study period. Homes selling for less than their assessed land value and observations with obvious recording errors were deleted from the data set. Summary

TABLE 1
Summary Statistics for Home Characteristics

Variable	Mean	Standard Deviation	Minimum	Maximum
Real price (1990 dollars)	$66,198	$49,243	$3,846	$949,554
Age (years)	51.29	24.91	0	119
Fireplaces	0.90	0.71	0	9
Bathrooms	1.29	0.54	1	8
Total square footage	1,396	582	304	13,311
Lot acreage	0.16	0.16	0.01	7.2

statistics for homes in the data set are presented in Table 1.

Open spaces were assigned into one of five categories: urban parks, natural area parks, specialty parks/facilities, golf courses, and cemeteries. Definitions for the first three categories are provided in Table 2.

In total, 201 open spaces were identified in the study area. The majority of these open spaces are urban parks. The number of homes within 1,500 feet of the different open space types, the mean open space acreage, standard deviation, minimum, and maximum values are presented in Table 3. Open space summary statistics are calculated with respect to the number of homes within 1,500 feet of a specific open space type.

IV. RESULTS

Two models were estimated to explore the relationship between open spaces and a home's sale price. In the first model, dummy variables were created to reflect homes located within 1,500 feet of one of the five open space types. Interactive variables for acreage and acreage squared by open space type were also created. Results are presented in Table 4.

Coefficients on the explanatory variables were as expected and are consistent with prior results. Bathrooms, fireplaces, and house total square footage are positive and statistically significant, but age and heavy traffic noise, as compared to light traffic noise, are negative and statistically significant. Quadrant by central business district interactive dummy variables show signs that conform to expectations. Quadrants that are on Portland's east side show a decline in a home's sale price as distance from the central business district increases, whereas NW and SW quadrants show an increase in home

TABLE 2
Definition of Open Space Categories

Open Space Type	Definition
Urban park	More than 50% of the park is manicured or land scaped and developed for nonnatural resource dependent recreation (e.g., swimming pools, ball fields, sports courts).
Natural area park	More than 50% of the park is preserved in native and/or natural vegetation. Park use is balanced between preservation of natural habitat and natural resource–based recreation (e.g., hiking, wildlife viewing, boating, camping). This definition includes parcels managed for habitat protection only, with no public access or improvements.
Specialty park/facility	Primarily one use at the park and everything in the park is related to the specialty category, e.g., boat ramp facilities.

Source: Waiwaiole, personal communication.

TABLE 3
Summary Statistics for Open Spaces

Open Space	Number of Homes Within 1,500 feet	Number of Open Spaces	Mean Open Space Acreage	Standard Deviation (acres)	Minimum (acres)	Maximum (acres)
Cemetery	659	15	110.93	15.63	0.9	58.9
Urban park	7,070	115	19.89	36.71	0.38	195.66
Natural area park	1,093	34	78.21	155.88	0.03	645
Golf course	497	8	168.81	38.27	25.8	232
Speciality park/facility	741	29	7.21	19	0.18	175

TABLE 4
Estimated Coefficients—Open Space Dummy Variables

Variable	Estimated Coefficient	*t*-Statistic	Marginal Implicit Price (1990 dollars)
Bathrooms	0.2178*	11.88	$4,097.65
Age (years)	−0.00726*	−19.56	−136.63
Fireplaces	0.4690*	36.10	8,824.52
Home total square footage	0.00137*	79.10	25.71
Lot acreage	0.4870*	9.59	9,163.61
Average traffic noise	−0.0379	−1.26	−713.21
Heavy traffic noise	−0.2786*	−6.43	−5,242.47
*E*CBD*	−1.07*E*-6	−0.18	−0.02
*N*CBD*	−4.96*E*-5*	−33.27	−0.93
*NE*CBD*	−3.33*E*-6*	−3.50	−0.06
*NW*CBD*	4.77*E*-5*	19.17	0.90
*SE*CBD*	−1.95*E*-6**	−2.03	−0.04
*SW*CBD*	3.07*E*-5*	24.55	0.58
Cemetery	0.04561	0.797	858.24
Urban park	−0.1154*	−5.31	−2,171.93
Natural area	0.3332*	7.44	6,269.17
Golf course	−2.475*	−3.12	−46,567.59
Specialty park/ facility	0.1287*	2.93	2,421.64
Cemetery acreage	−0.00333	−.394	−62.82
Urban park acreage	0.00970*	8.24	182.57
Natural area acreage	0.00351*	4.14	66.16
Golf course acreage	0.0349*	3.89	655.77
Specialty park/facility acreage	0.0247*	5.69	463.95
Cemetery acreage^2	1.77*E*-4	1.09	3.32
Urban park acreage^2	−3.13*E*-5*	−5.26	−0.62
Natural area acreage^2	−7.03*E*-6*	−5.13	−0.13
Golf course acreage^2	−1.03*E*-4*	−4.20	−1.94
Specialty park/facility acreage^2	−1.13*E*-4*	−3.34	−2.12
Constant	17.60*	446.89	
Number of observations 16,636; $\lambda = 0.1005$*; adjusted $R^2 = 0.658$			

*,**,***denote significance at the 0.01, 0.05, and 0.10 levels, respectively. CBD = central business district.

sale price with increasing distance from the central business district.

The effect on a home's sale price of being within 1,500 feet of an open space is composed of three factors—the open space type dummy variable and two interactive variables, acreage and acreage squared by open space type. The estimated effect of being within 1,500 feet of an open space was evaluated using the mean acreage of each open space type (Table 3) in the data set. Results show that natural area parks, on average, have the largest statistically significant effect (1% level) of $10,648 in 1990 dollars, on a home's sale price holding all other factors constant. Golf courses ($8,849), specialty parks/facilities ($5,657), and urban parks ($1,214) are also found to have a positive and statistically significant effect (all at the 1% level); cemeteries, on average, do not have a statistically significant effect on a home's sale price.

The quadratic form for the acreage variable allows the open space size that maximizes a home's sale price to be calculated. The size of a natural area park that maximizes a home's sale price is estimated to occur at 258 acres—the largest size of the open space types studied. Golf courses were the second largest at 169 acres, followed by urban parks at 148 acres, and specialty parks/facilities at 112 acres. The optimal size of a cemetery was estimated to be negative eight acres. The quadratic function estimated for each open space type, the mean acreage of each open space type, and the estimated effect on a home's sale price in the study area (*), are displayed in Figure 2.

Though natural area parks require the largest acreage (258 acres) to attain the maximum impact on a home's sale price, the largest effect on a home's sale price is estimated to occur for homes located within 1,500 feet of a 112-acre specialty park/facility. The size of specialty parks, urban parks, and natural areas are below the acreage that would maximize the impact on a home's sale price—the mean size of specialty parks, 7.21 acres, is the *smallest* of the open space types in the study area. The maximum acreage impact for a golf course, 169 acres, is virtually identical to the mean golf course size in the study area, 168.81 acres.

A second model was estimated to determine if distance to an open space affects a home's sale price. Dummy variables were

FIGURE 2

Open Space Acreage and Home Sale Price ($1990)

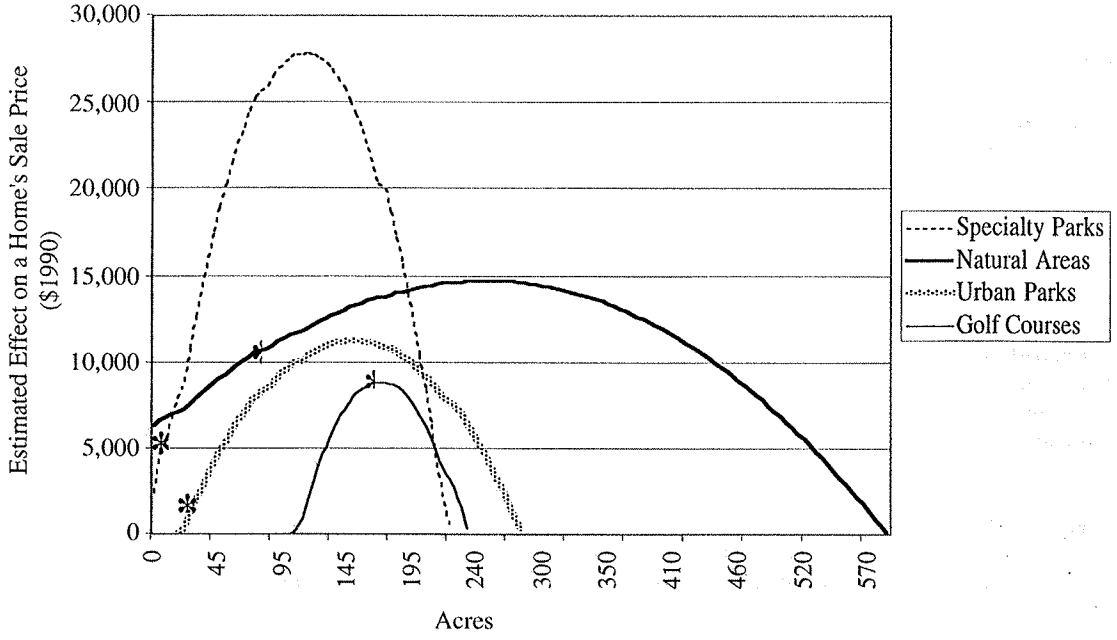


TABLE 5
Distance Variables Evaluated at the Mean Open Space for each Open Space Type (1990 Dollars)

Variable	Urban Park	Natural Area Park	Golf Course	Speciality Park/Facility
Distance ≤ 200	$1,926***	$11,210*	$13,916*	$7,396***
Distance 201–400	2,061*	10,216*	7,851*	5,744**
Distance 401–600	1,193***	12,621*	2,814	10,283*
Distance 601–800	817	11,269*	8,842*	5,661*
Distance 801–1,000	943	8,981*	8,898*	4,972*
Distance 1,001–1,200	1,691*	8,126*	4,391***	4,561*
Distance 1,201–1,500	342	9,980*	4,366**	t3,839*

Number of observations 16,747; $\lambda = 0.0995$*; adjusted $R^2 = 0.656$

*,**,***denote significance at the 0.01, 0.05, and 0.10 levels, respectively.

created to reflect the interaction between seven different zones that range in size from 200 to 300 feet and the open space types. Home and neighborhood variables used in the first model were retained for the second model, except the traffic (nuisance) variables, a possible negative externality from open space proximity that is captured by the interactive zone and open space dummy variables, were dropped. The estimated effect of home and neighborhood characteristics were virtually identical to those reported in Table 4.[1] Estimates of the relationship between a home's sale price and distance to an urban park, natural area park, golf course, and specialty park/facility, evaluated at the mean open space size in the study area, are presented in Table 5.

The estimated effects are composed of three factors—the open space type variable interacted with distance, and acreage and acreage squared interacted with open space type. Effects were calculated using the mean acreage of each open space type (Table 3) in the data set. Natural area parks and specialty parks/facilities are found to have a positive and statistically significant effect on a home's sale price for all seven zones. Urban parks have a positive and statistically significant effect for homes located up to 600 feet and within 1,001 and 1,200 feet of the park, but no statistically significant effect for the other distances. Homes adjacent (within 200 feet) of a golf course are estimated to experience the largest effect ($13,916), although the impact drops quickly as distance from the golf course increases. These results are consistent with Do and Grudnitski (1995).

V. CONCLUSIONS

Empirical results indicate that open spaces in the city of Portland, within Multnomah County, have a statistically significant effect on a home's sale price although the effect varies by open space type and with the distance from the home to the open space. Natural area parks are estimated, on average, to have the largest statistically significant effect on a home's sale price. Golf courses, specialty parks/facilities, and urban parks are also found to have a positive statistically significant effect on a home's sale price. The zonal approach provides further insights. In addition to having the largest average effect on a home's sale price, proximity to natural area parks are found to have a positive and statistically significant effect on homes that are up to 1,500 feet from these areas. Though other open space types also have a positive and statistically significant effect on a home's

1. The marginal implicit price of the jth attribute is calculated as follows:

$$(\partial p/\partial x_j)\left\{(1/\lambda)\left[\lambda\left(\alpha + \sum_{j=1}^{j}\beta_j\overline{X}_j\right) + 1\right]^{\frac{1-\lambda}{\lambda}-1}\right\}\lambda\beta_j,$$

where $\overline{X}_j$ is the mean of attribute j, α is the intercept, and β_j is the estimated coefficient for attribute j.

2. For clarity of presentation, the results for cemeteries, which are not statistically significant, are not reported. Full results are available from the authors.

sale price, the magnitude and "reach" of natural area parks is unique.

Evidence that proximity to an open space will decrease a home's sale price is not found for the study area—all open space types are estimated to have a positive statistically significant effect for homes that are adjacent (within 200 feet) of the open space. However, the estimated effect of being adjacent to an urban park, where negative externalities are usually perceived to be a problem, is the smallest of the open space types.

New acquisitions purchased with funds raised under a $135.6 million ballot measure to preserve open spaces in the Portland metropolitan area are classified primarily as natural areas. The target size for natural areas within Portland's urban growth boundary is a minimum of 400 acres—larger than what is estimated to maximize a home's sale price in our model, but a size that has a large effect on a home's sale price. From the viewpoint of biological diversity, however, "bigger is better" for urban natural area parks. If residents within at least 1,500 feet of these newly preserved natural areas did not anticipate their preservation, we should expect the sale price of homes in proximity to these areas to increase. To the extent that assessed values reflect market values, we should anticipate assessed values and, depending on the tax structure, property tax revenues to also increase. This raises the interesting possibility that Metro's preservation of these natural areas may be partially self-financing. The difficulty remains in disentangling the effect of open space preservation from other changes in the market, for example, increases in population, changing preferences, and so on. The annual cost associated with maintaining these areas is also difficult to estimate and will likely vary from site to site.

The results of this analysis provide important but limited insight into the total benefits of preserving open spaces because the technique employed captures benefits as transmitted through the housing market. Benefits that have a strong public good element are unlikely to be captured using this technique. Results, however limited, suggest that large private benefits for the preservation of these areas exist.

REFERENCES

Bolitzer, B., and N. R. Netusil. "The Impact of Open Spaces on Property Values in Portland, Oregon." *Journal of Environmental Management*, 59(3), 2000, 185–93.

Correll, M. R., J. H. Lillydahl, and L. D. Singell. "The Effects of Greenbelts on Residential Property Values: Some Findings on the Political Economy of Open Space." *Land Economics*, 54(2), 1978, 207–17.

Cropper, M. L., L. B. Deck, and K. E. McConnell. "On the Choice of Functional Form for Hedonic Price Functions." *Review of Economics and Statistics*, 70(4), 1988, 668–75.

Do, A. Q., and G. Grudnitski. "Golf Courses and Residential House Prices: An Empirical Examination." *Journal of Real Estate Finance and Economics*, 10(3), 1995, 261–70.

Frech H. E. III, and R. N. Lafferty. "The Effect of the California Coastal Commission on Housing Prices." *Journal of Urban Economics*, 16(1), 1984, 105–23.

Freeman, A. M. III. *The Measurement of Environmental and Resource Values: Theory and Methods*. Baltimore, MD: Johns Hopkins University Press, 1993.

Kulshreshtha, S. N., and J. A. Gillies. "Economic Evaluation of Aesthetic Amenities: A Case Study of River View." *Water Resources Bulletin*, 29(2), 1993, 257–438.

Li, M. M., and H. J. Brown. "Micro-Neighborhood Externalities and Hedonic Housing Prices." *Land Economics*, 56(2), 1980, 25–141.

Mahan, B. L., S. Polasky, and R. M. Adams. "Valuing Urban Wetlands: A Property Price Approach." *Land Economics*, 76(1), 2000, 100–113.

Pritchard, A. "Greenbacks, Greenspace." *Nature Conservancy Magazine*, September/October 2000, 6.

Rosenberger, R. S., and R. G. Walsh. "Nonmarket Valuation of Western Valley Ranchland Using Contingent Valuation." *Journal of Agricultural and Resource Economics*, 22(2), 1997, 296–309.

Streiner, C. F., and J. B. Loomis. "Estimating the Benefits of Urban Stream Restoration Using the Hedonic Price Method." *Rivers*, 5(4), 1995, 267–78.

Weicher, J. C., and R. H. Zerbst. "The Externalities of Neighborhood Parks: An Empirical Investigation." *Land Economics*, 49(1), 1973, 99–105.

Journal of Environmental Management (2000) **59**, 185–193
doi:10.1006/jema.2000.0351, available online at http://www.idealibrary.com on IDEAL®

The impact of open spaces on property values in Portland, Oregon

B. Bolitzer† and N. R. Netusil‡*

Open spaces such as public parks, natural areas and golf courses may have an influence on the sale price of homes in close proximity to those resources. The net effect of open-space proximity is theoretically uncertain because the positive externalities associated with proximity such as a view or nearby recreation facility might be outweighed by negative externalities, for example, traffic congestion and noise. The impact of open-space proximity and type is examined empirically using a data set that includes the sales price for homes in Portland, Oregon, a major metropolitan area in the United States, geographic information system derived data on each home's proximity to an open-space and open-space type, and neighborhood and home characteristics. Results show that proximity to an open-space and open-space type can have a statistically significant effect on a home's sale price. These estimates provide an important step in quantifying the overall benefit from preserving open spaces in an urban environment.

Keywords: open spaces, hedonics, economics.

Introduction

Open spaces, such as public parks, natural areas and golf courses provide numerous amenities for nearby residents including recreation opportunities and attractive views. Residents who live in close proximity to these resources, however, may also experience disamenities such as traffic congestion and noise. Our study uses statistical techniques to examine the net effect of open space proximity on a home's sale price. It is based on a data set that combines information on home sales in Portland, OR, a major metropolitan area in the USA, with home, neighborhood and open-space characteristics.

Portland is widely regarded as one of the best-planned and most livable areas in the USA (Sunset, 1999). In 1979, an urban growth boundary (UGB) that is managed by Metro, the directly elected regional government, was drawn around the Portland metropolitan area in an effort to contain sprawl. Large population inflows in the late 1980s and throughout the 1990s resulted in the development of almost all available land within Portland's UGB, raising serious concerns about the decline of land that had 'unofficially' served as open space (The Economist, 1997; Christ, 1995).

In an effort to determine the amount of open space in public ownership, and how much land in the Portland metropolitan area was undeveloped, Metro undertook a land inventory in 1989. Metro's study found that approximately 8% of the survey area (9200 acres or approximately 3700 hectares) could be classified as publicly owned open spaces, more than half of which was located in one park. This information formed the basis for a US$135·6 million regional bond measure in 1995 that commissioned Metro to purchase 6000 additional acres of open spaces. To date, approximately 4000 acres have been acquired.

The impact of these recent purchases on the surrounding neighborhoods is uncertain, but can be informed by examining the relationship between home values and existing open spaces. In addition, the results of this study can guide other local and state governments, as well as the federal government, in their effort to preserve open spaces—a movement that is gaining national attention. In 1998, voters in 26 states considered a total

* *Corresponding author*

† *Department of Economics University of California, Los Angeles CA 90095-1477, USA*

‡ *Reed College 3203 SE Woodstock Blvd Portland, OR 97202-8199, USA*

Received 1 June 1998; accepted 19 June 2000

0301–4797/00/070185+09 $35.00/0

of 148 ballot measures that raised funds for conserving open spaces (Pritchard, 1999). In total, 84% of these measures were approved raising more than US$5 billion.

Results from our analysis indicate that distance from a home to an open space and the type of open space can have a statistically significant effect on a home's sale price. Importantly, these estimates reflect a fraction of the benefit from preserving open spaces. Benefits that have a strong 'public good' element, for example, improvements in water quality resulting from open-space preservation, are unlikely to affect a home's sale price and are, therefore, not reflected in this study's results.

The following section reviews relevant literature and the theory of hedonics. This is followed by a description of the data used and the policy implications of this research.

Model

The hedonic pricing technique (Freeman, 1993) views the price of a home as reflecting its structural, environmental and neighborhood attributes. Invoking several assumptions about the housing market, including the requirement that the housing market is in equilibrium and the study area represents one market for housing services, the marginal value for a small change in an attribute can be estimated from the hedonic price function.

Several studies have investigated the impact of different open-space types on a home's sale price or assessed value. Weicher and Zerbst (1973) investigated parks in Columbus, OH and Correll *et al.* (1978) studied greenbelts in Boulder, CO. Do and Grudnitski (1995) examine the effect of golf courses on residential house prices in San Diego, CA, concluding that golf courses have a positive and statistically significant effect on adjacent homes. Several studies (Lupi *et al.*, 1991; Doss and Taff, 1996) have looked at the effect of different types of wetlands on a home's value; one recent study investigated this question for homes in Portland, OR (Mahan, 1997).

The sale price of a home can be represented by Equation (1), where P_i is the price of the ith home, S_i is a vector of structural characteristics, Q_i is a vector of environmental characteristics and N_i represents a vector of neighborhood characteristics. For this analysis, we subdivide N_i into a vector of open space characteristics, G_i and a vector of other neighborhood characteristics, ON_i:

$$P_i = P(S_i, Q_i, G_i, ON_i) \tag{1}$$

Assuming that individuals maximize utility subject to a budget constraint gives the first-order conditions for the choice of open space characteristic g_i:

$$\frac{\frac{\partial U}{\partial g_j}}{\frac{\partial U}{\partial X}} = \frac{\partial P_i}{\partial g_j}$$

where X represents a composite commodity. The partial derivative of the hedonic price function with respect to g_i is interpreted as the marginal price of characteristic g_i that is, holding all else equal, the cost of having a marginal increase in that characteristic.

It is uncertain, *a priori*, whether the marginal implicit price of open space characteristics such as proximity and type are positive or negative. For example, the residents of a home located next to a public park receive benefits from their proximity to the park, but they may also experience noise and congestion. A home located a few blocks away from the park receives some benefits from proximity, but may not encounter any negative externalities. The effect of open-space characteristics on a home's sale price must be empirically determined.

The functional form used to estimate the hedonic price function can not be determined from economic theory. Cropper *et al.* (1988) suggest that in models with missing or proxy variables, simpler functional forms (linear, semi-log, double-log) and more complex forms (linear Box-Cox) perform best. Here, we present estimates for the effect of open-space type and proximity to open space on a home's sale price using the linear and semi-log functional forms.

Data

The Portland metropolitan area, shown in Figure 1, encompasses parts of Multnomah, Clackamas, and Washington counties. The north-west quadrant of Portland is divided

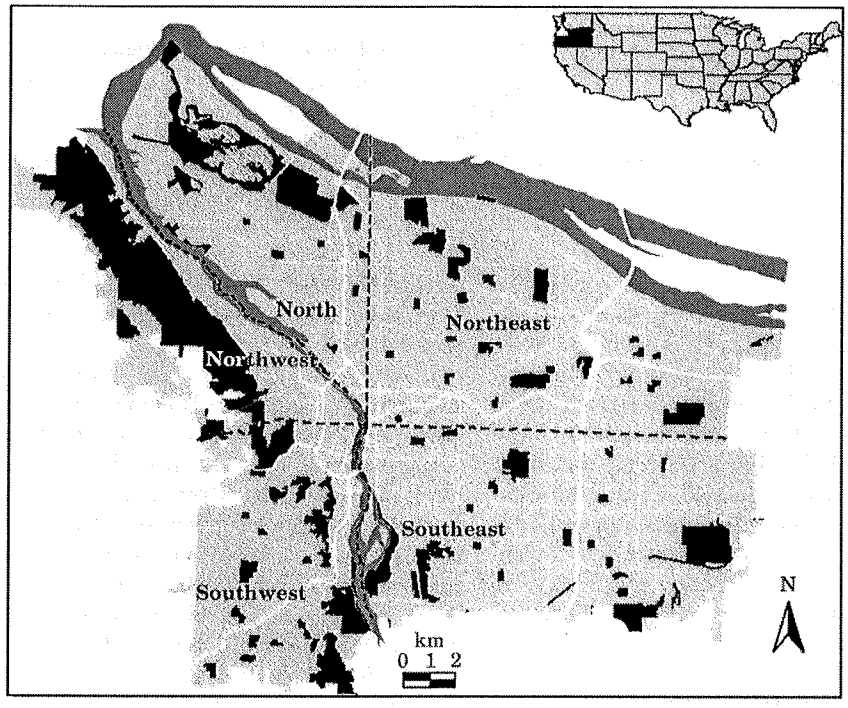


Figure 1. City of Portland, Oregon with major rivers and open spaces. Open spaces, ■; major rivers, ▩; City-quadrant boundaries, (- - - - -).

by the Willamette River, which flows north into the Columbia River. Streets east of the Willamette River are labeled 'north' while those west of the river are labeled 'northwest'. The eastside of Portland (N, NE and SE) was settled much earlier than the westside (NW and SW) and has a much lower income profile. The study area covers approximately 92 500 acres (37 400 hectares) and is highly urbanized. Open spaces, which are shown in black, reflect those areas catalogued in Metro's 1989 Natural Areas Inventory. These include all publicly owned open spaces and those privately owned open spaces that exceed 10 acres (4 hectares).

The data used in this analysis were derived from two sources. Information on home sales including the month and year of sale, home characteristics, and neighborhood characteristics, were obtained from MetroScan, a private company that collects and markets real estate data gathered from county assessors' offices. Information on open spaces, the distance from each house to the central business district (CBD) and neighborhood characteristics were obtained from Metro.

During 1990–1992 a total of 24 290 single-family homes were sold in Multnomah County with 17 953 home sales occurring within the city of Portland. For the statistical analysis it is important that these observations represent a 'true' market transaction, but of the 17 953 observations, 175 had a recorded sale price of US$1—clearly not an arms-length transaction. The data set was restricted to include only homes that sold for at least their assessed land value. Regressions were run using both the restricted and unrestricted samples with the restricted sales price data set having a much higher R^2 than the unrestricted data set.

The sample was further restricted to exclude observations that clearly reflected recording errors. After accounting for these restrictions and deletions, the final data set contained 16 402 observations. Nominal sales prices were adjusted to 1990 dollars using a price index constructed from the monthly median sales prices of single-family homes in the study area. Descriptive statistics for the final data set are given in Table 1. A correlation matrix of the home characteristics is given in Table 2. The degree of linear relationship between the explanatory variables is strongest between total square feet and bathrooms (r=0·5050). The correlation

Table 1. Descriptive statistics for home characteristics

Variable	Mean	Standard deviation	Minimum	Maximum
Real sale price (1990 dollars)	66 000	49 128	3846	949 553
Age (years)	51·61	24·81	0	119
Bathrooms	1·29	0·54	1	8
Distance to central Business District (feet)	19 170	9508	0	54 909
Lot acreage	0·16	0·14	0·01	6·32
Total square footage	1395·86	581·66	304	13 311

between the interactive quadrant and distance to central business district variables (ECBD, NCBD, NECBD, NWCBD, SECBD, and SWCBD) is positive, but small for four of the five quadrants. The correlation coefficient for NECBD and distance to open space is negative, but small, implying that as distance from the central business district increases for homes located in the NE quadrant of Portland, the distance to an open space decreases.

Information on each home's proximity to an open space, open-space type and distance from the house to the central business district were obtained using Metro's geographic information system (GIS) database. Distance to an open space and the central business district were measured 'as the crow flies'. Table 3 summarizes the different types and characteristics of open spaces located within 1500 feet of homes that were sold between January 1, 1990 and December 31, 1992. A search radius of 1500 feet was selected after consulting with park specialists at Metro. A block is 200 feet, so the search radius from a home sale is 7·5 blocks (0·28 miles or 457·2 meters). Five homes were within 1500 feet of two open spaces. Reasoning that the open space closest to the home has the largest influence on a home's sale price, the open space located furthest from the home was deleted from the data set. Private parks are owned by organizations such as the Trust for Public Land; golf courses and cemeteries include sites that are privately and publicly owned.

Public Parks make up the majority of open spaces in this study. In addition, both the largest (567·80 acres) and smallest (0·20 acres) open spaces were classified as public parks. Golf courses are, on average, the largest type of open space in the study area.

Table 4 presents descriptive statistics of home characteristics by open-space type. Approximately one third of the homes sold in the study area do not have any open space within 1500 feet. The majority (88%) of homes that have an open space within 1500 feet are located near a public park.

Since proximity to an open space is expected to influence the marginal implicit price nonlinearly due to the positive and negative externalities from living near an open space (Li and Brown, 1980; Frech and Lafferty, 1984), the distance from a home to the nearest open space was classified into one of 6 zones: homes 100 feet or less from an open space, between 101–400 feet, 401–700 feet, 701–1000 feet, 1001–1300 feet, 1301–1500 feet and more than 1500 feet from an open space. The coefficients on these variables represent the net influence of proximity to an open space and are anticipated to increase up to a point as distance from an open space increases and then to decline. Similar variables were created to investigate whether the effect of open space varies by type, that is, holding all other factors constant, whether proximity to a cemetery has the same effect on a home's sale price as proximity to a golf course or public park.

Empirical results

Three models were estimated to investigate the relationship between the sale price of homes in the study area and open spaces within 1500 feet of a home. In Model A, the effect of any type of open space within 1500 feet of a home is estimated. Model B refines the analysis by distinguishing between the four open-space types; Model C focuses on the effect of distance from an open space by introducing six dummy variables. Each model is estimated using a linear and a semi-log functional form.

Characteristics used in the models include: age of the house, number of bathrooms and fireplaces, lot acreage (plot size), total square footage of the house, nuisance (traffic)

Table 2. Correlation of home and open-space variables

Variable	Age	Bathrooms	Fireplaces	Lot	Total feet	E-CBD	N-CBD	NE-CBD	NW-CBD	SE-CBD	SW-CBD
Bathrooms	−0·3844										
Fireplaces	−0·2916	0·3493									
Lot acreage	−0·1962	0·2009	0·2018								
Total square feet	−0·0461	0·5050	0·4412	0·2208							
ECBD	−0·007	−0·0098	0·0144	−0·0019	0·0010						
NCBD	0·0846	−0·1072	−0·1290	−0·0752	−0·1093	−0·0172					
NECBD	0·0826	−0·0605	0·0374	−0·0664	0·0112	−0·0310	−0·2139				
NWCBD	−0·0113	0·1237	0·0868	0·0428	0·1772	−0·0059	−0·0404	−0·0730			
SECBD	0·0490	−0·1013	−0·1381	−0·0405	−0·1300	−0·0307	−0·2117	−0·3826	−0·0722		
SWCBD	−0·2871	0·2737	0·2047	0·2137	0·1874	−0·0193	−0·1331	−0·2406	−0·0454	−0·2381	
Distance to open space	−0·0070	−0·0024	0·0073	0·0029	−0·0039	0·0289	0·0712	−0·1117	0·0039	0·0300	0·1099

Table 3. Open-space frequency and descriptive statistics

Open-space type	Number of open space-type in study area	Mean size of open space (acres)	Standard deviation (acres)	Maximum (acres)	Minimum (acres)
Public park	193	20·73	50·78	567·80	0·20
Private park	2	3·74	7·99	38·60	2·00
Cemetery	15	10·92	15·59	58·90	0·90
Golf course	8	116·00	70·70	231·50	7·8

Table 4. Mean and standard deviation of home characteristics by open-space type

Open-space type	Number of homes	Real sale price (1990 dollars)	Age (years)	Lot acreage	Distance to CBD (feet)	Distance to open space (feet)
No open space	6005	62 323	52·31	0·16	18 344	
		(41 155)	(25·42)	(0·16)	(9690)	
Public park	9318	68 484	51·11	0·16	19 594	904
		(54 945)	(24·67)	(0·14)	(9375)	(389)
Private park	21	60 227	32·14	0·23	19 442	867
		(24 600)	(17·13)	(0·06)	(8647)	(377)
Cemetery	662	60 691	53·38	0·15	19 525	913
		(30 658)	(25·50)	(0·10)	(8316)	(382)
Golf course	505	70 641	49·94	0·17	20 748	897
		(38 551)	(18·69)	(0·12)	(10 482)	(381)

variables, a location variable, and the size of the closest open space. Several methods for capturing neighborhood characteristics were investigated and it was determined that the best variable combined the distance to the central business district with the quadrant (north, south-east, north-east, south-west, north-west) in which the house was located. Nuisance dummy variables, reflecting street traffic near the house, are included in the model. The coefficients on these variables should be interpreted as the effect on a home's sale price from experiencing average or heavy street traffic relative to light street traffic.

Results from Models A1 (linear functional form) and A2 (semi-log functional form) in which an 'open space' dummy variable was created to reflect the presence of any open space within 1500 feet of a home are presented in Table 5. The model results were very stable across functional forms; only one variable, SE-CBD changed significance between models. Each model had a high R^2 and F-statistic; reported t-statistics are corrected for heteroskedasticity. All values are reported in 1990 dollars.

The open space dummy variable was positive, as expected, and statistically significant in both models. For the linear model, the open-space coefficient implies that a home located within 1500 feet of any open space sells for US$2105 more than a home located more than 1500 feet from an open space. Open space size is also an important factor. In the linear model, each additional acre of open space is estimated to increase a home's sale price by US$28·33. A home located within 1500 feet of a 20-acre open space, the mean size of public parks in the study area, is estimated to sell for approximately US$2670 more, holding all other factors constant, than a home that is more than 1500 feet from any open space.

In the semi-log model the existence of an open space within 1500 feet of a house is estimated to increase a home's sale price by 1·43%. As in the linear model, the size of the open space has a positive and statistically significant influence on a home's sale price. Using the mean real sale price for homes in the data set, a home within 1500 feet of a 20-acre open space is estimated to sell for US$1247 more, holding all else constant, than a home that is more than 1500 feet from an open space.

The other parameter signs were consistent with expectations. We expected, *a priori*, that home characteristics such as bathrooms, fireplaces, house total square footage, and lot acreage would, all else constant, increase a

Table 5. Effect of open space within 1500 feet of a home

	Model A1: linear		Model A2: semi-log model	
Variable name	Parameter estimate	t-statistic	Parameter estimate	t-statistic
Open space	2105·38*	4·22	0·0143*	2·47
Open-space size	28·33*	3·95	0·00 046*	7·24
Fire	9455·13*	14·46	0·1622*	25·53
Age	−81·02*	−4·36	−0·00 229*	−12·24
Bathrooms	8964·60*	6·12	0·069*	5·57
Lot acreage	33 605*	5·89	0·148*	6·35
Total square feet	42·64*	18·89	0·00 044*	21·17
Average traffic	−929·85	−0·81	−0·0089	−0·78
Heavy traffic	−6481·40*	−5·76	−0·0884*	−6·35
NE-CBD	−0·23*	−8·10	−1·05 E-6*	−3·37
SE-CBD	−0·14*	−5·16	−1·25 E-7	−0·399
SW-CBD	0·86*	14·58	1·16 E-5*	26·72
NW-CBD	1·84*	10·26	1·58 E-5*	13·84
N-CBD	−0·79*	−17·86	−1·67 E-5*	−32·62
Intercept	−15 361*	−6·33	4·61*	49·89
R^2	0·6212		R^2	0·6346
F-statistic (1 516 386)	462·50		*F*-statistic (1 516 386)	1147·93

*P=0·01.

Table 6. Effect of open-space type

	Model B1: linear model		Model B2: semi-log model	
Variable name	Parameter estimate	t-statistics	Parameter estimate	t-statistics
Public Park	2262·20*	4·41	0·0128**	2·18
Private Park	−2505·60	−0·61	−0·018	−0·266
Cemetery	−5·38	−0·007	0·019	1·56
Golf Course	3399·72***	1·70	0·0597*	2·69
Open-space size	25·93*	3·18	0·00 039*	5·66
R^2	0·6213		R^2	0·6348
F-statistic (1 816 383)	387·12		*F*-statistic (1 816 383)	957·14

*P=0·01; **P=0·05; ***P=0·10.

home's sale price. In addition, traffic noise and certain locations (south-east, north-east, and north Portland) were expected to have a negative effect on a home's sale price.

A second group of models was estimated to investigate the effect of different types of open spaces on a home's sale price. Parameter estimates using a linear (Model B1) and semi-log (Model B2) model are presented in Table 6. Parameter estimates for home and neighborhood characteristics are not presented since they are almost identical to the estimates in Table 5.

The public park and golf course coefficients were statistically significant in both the linear and semi-log models. In the linear model, having a public park within 1500 feet of a home was estimated to increase a home's sale price by US$2262 while proximity to a golf course increased a home's sale price by approximately US$3400. Private parks and cemeteries were found to have no statistically significant effect on a home's sale price for either functional form. Using the mean sale price for homes in the study, the semi-log model coefficients translate into an increase in a home's sale price of US$845 for public parks and US$3940 for public golf courses.

Open space size is statistically significant in both models. Using the mean size of public parks (20 acres) and golf courses (116 acres) in the sample, the effect of being near a

Table 7. Effect of distance to open space

	Model C1: linear			Model C2: semi-log model	
Variable name	Parameter estimate	t-statistics		Parameter estimate	t-statistics
Distance 100	5023·38	1·21		0·052	1·40
Distance 101 to 400	1705·10**	1·92		0·0409*	4·16
Distance 401 to 700	3575·91*	3·84		0·0296*	3·10
Distance 701 to 1000	3189·06*	4·51		0·0228*	2·81
Distance 1001 to 1300	2546·86*	3·66		0·0218*	2·80
Distance 1301 to 1500	2108·75**	2·65		0·0151***	1·71
R^2	0·6201		R^2	0·6323	
F-statistic (1 716 493)	957·14		*F*-statistic (1 716 493)	999·03	

*P=0·01; **P=0·05; ***P=0·10.

Table 8. Impact of open-space proximity for the semi-log model

Variable name	Estimated impact on a home's sale price (1990 dollars)
Distance 100	3522·80
Distance 101 to 400	2755·36*
Distance 401 to 700	1982·80*
Distance 701 to 1000	1522·09*
Distance 1001 to 1300	1454·59*
Distance 1301 to 1500	1004·16***

*P=0·01; ***P=0·10.

20 acre public park is estimated to equal US$2780 in the linear and US$1360 in the semi-log model. The effect on the sale price of a home located with 1500 feet of a 116 acre golf course is estimated to equal US$6408 in the linear and US$6926 in the semi-log model.

An F-test was conducted to determine whether the estimated coefficients for open-space type are statistically different from each other. The null hypothesis of equal value was rejected for the linear model (P=0·0078), but it could not be rejected for semi-log model (P=0·4916).

Proximity to open spaces may represent a positive or negative externality. Models C1 (linear) and C2 (semi-log) were developed to examine the effect of distance to an open space on a home's sale price. Since the traffic variables used in Models A and B can pick up the negative effect of proximity to an open space, these variables were not included in Model C; the size of the open space was also dropped from this model. Six dummy variables were created to capture proximity effects. Coefficients on these variables are interpreted as the increase in a home's sale price from being located in that open-space zone relative to being more than 1500 feet from an open space. The distance 100 dummy variable was designed to capture homes that are very close (one-half block) to an open space. We anticipate that these homes will incur negative externalities such as noise due to proximity.

The distance 100 feet coefficient was the only coefficient that was not statistically significant in either model. This may reflect a small sample size (66 observations) or a netting out of negative and positive externalities. In both models, the increase and then decline in the distance coefficients was expected.

Using the mean sale price, the distance variables in the semi-log model are estimated to increase a home's sale price by the amounts shown in Table 8.

The estimated effects in the semi-log model show a larger impact than the linear model on a home's sale price in the distance 101–400 range, but for distances greater than 400 feet, the semi-log model shows a much smaller effect than the linear model.

An F-test was conducted to determine whether the estimated coefficients for the impact of distance from an open space on a home's sale price are statistically different from each other. The null hypothesis of equal value by distance could not be rejected for either the linear model (P=0·7852) or the semi-log model (P=0·7791).

Conclusions and policy implications

In the USA, local, state, and federal government agencies are working to preserve open

spaces. These new acquisitions will likely be classified as public parks that were shown, for the Portland, OR study area, to have a positive and statistically significant effect on a home's sale price. The estimated impact of open space proximity varies with the functional form (linear or semi-log) used to model the relationship. Although there is no theoretical guidance on which functional form to prefer, the restriction in the linear model that the relationship between an explanatory variable and the dependent variable is constant leads us to prefer the results from the semi-log specification.

An interesting implication of the empirical results is that property tax revenues to local governments could increase due to the creation of certain types of open spaces. One possible use of these additional funds is to offset the cost of purchasing, developing and maintaining open spaces. The degree of open space self-financing, however, depends on many factors including the size of the open space, the number of homes in proximity to the open space, open-space amenities, and the local property tax structure.

Empirical evidence that the negative externalities associated with open space adjacency dominate the positive externalities is not found in the study area. Homes that are within one-half block of any type of open space are estimated, on average, to experience the largest positive effect on their sale price. This effect, however, is not statistically significant. Additional information on the specific amenities of the open spaces in the study area, for example, the existence of hiking trails, swimming pools, tennis courts, etc. would permit a more detailed investigation of this question.

The results of this study provide an important step in quantifying the total benefits from preserving open spaces in an urban environment. The reported estimates, however, reflect only the benefits captured by changes in the sales price of homes. Computing the total benefits from preserving open spaces, and the distribution of these benefits across residents, remain important areas for future research.

Acknowledgements

The authors thank Dave Drescher for his help with the GIS data, Minott Kerr for his help with ArcView, and TransAmerica Corporation for its donation of Metroscan disks. Jeff Parker, Steven Yen, Molly Espey, participants in the 1998 W-133 meetings, and two anonymous referees provided useful comments on this paper.

References

Christ, J. (1995). Newcomers are nice, but open space is missed. *The Oregonian* **October 12**, A6.

Correll, M. R., Lillydahl, J. H. and Singell, L. D. (1978). The effects of greenbelts on residential property values: some findings on the political economy of open space. *Land Economics* **2**, 207–217.

Cropper, M. L., Deck, L. B. and McConnell, K. E. (1988). On the choice of functional form for hedonic price functions. *The Review of Economics and Statistics* **70**, 668–675.

Do, A. Q. and Grudnitski, G. (1995). Golf courses and residential house prices: an empirical examination. *Journal of Real Estate Finance and Economics* **10**, 261–270.

Doss, C. R. and Taff, S. J. (1996). The influence of wetland type and wetland proximity on residential property values. *Journal of Agricultural and Resource Economics* **21**, 120–129.

Frech III, H. E. and Lafferty, R. N. (1984). The effect of the California coastal commission on housing prices. *Journal of Urban Economics* **16**, 105–123.

Freeman III, A. M. (1993). *The Measurement of Environmental and Resource Values*. Washington D.C.: Resources for the Future.

Li, M. M. and Brown, H. J. (1980). Micro-neighborhood externalities and hedonic housing prices. *Land Economics* **56**, 125–141.

Lupi Jr, F., Graham-Tomasi, T. and Taff, S. J. (1991). A *hedonic approach to urban wetland valuation*. Staff paper P91-8. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, MN.

Mahan, B. L. (1997). *Valuing Urban Wetlands: A Property Pricing Approach*. IWR Report 97-R-1 U.S. Army Corp of Engineers Institute for Water Resources, Alexandria, Virginia and U.S. Army Corp of Engineers Waterways experiment Station, Vicksburg, MS.

The Economist (1997). *Paradise Dimmed. City Planning* **344**, 21.

Pritchard, A. (1999). Greenbacks, greenspace. *Nature Conservancy Magazine* **September/October**, 6.

Sunset (1999). *The West's Best Cities*. **203**, 82.

Weicher, J. and Zerbst, R. (1973). The externalities of neighborhood parks: an empirical investigation. *Land Economics* **49**, 99–105.

The Effect of Environmental Zoning and Amenities on Property Values: Portland, Oregon

Noelwah R. Netusil

ABSTRACT. *This study uses the hedonic-price-method to examine how environmental zoning and amenities are related to the price of single-family residential properties sold between 1999 and 2001 in Portland, Oregon. The impact of environmental zoning is found to vary with the type of environmental zoning and the property's location. Amenities are found to influence a property's sale price with the effect varying by amenity type and proximity. The net effect on a property's sales price is dependent on the type of environmental zoning, location in the study area, amenities on the property, and amenities in the surrounding neighborhood.* (JEL R14, R52)

I. INTRODUCTION

In 1974, Oregon adopted statewide goals that provide guidance on how cities and counties should plan land-use. Statewide Planning Goal 5 requires all local governments "to adopt programs that will protect natural resources and conserve scenic, historic and open space resources for present and future generations" (Oregon Department of Land Conservation and Development 1996).

The Portland City Council complied with Goal 5 by adopting environmental overlay zones to protect environmentally sensitive areas such as wetlands, riparian corridors, and upland forests (City of Portland, Oregon Bureau of Planning 2001a, 2003). Goal 5 plans were adopted for different areas of the city; the first plan was adopted in 1988 and the last in 1997. The process for establishing environmental zones is described in the Goal 5 administrative rules (Oregon Department of Land Conservation and Development 2004). These rules require landowner notification and opportunities for citizen involvement in the Goal 5 process. Statewide land use planning Goal 1 also emphasizes the importance of developing a program for citizen participation in the planning process. Portland's Goal 5 process involved public notices for Planning Commission and City Council hearings in addition to notification for affected property owners (Burns 2004).

Portland currently has two levels of environmental zoning covering a total of 19,170 acres—approximately 20% of land within the city limits—the environmental protection overlay zone (p-zone) and the environmental conservation overlay zone (c-zone) (Jortner 2002). Homes on lots affected by environmental zoning may be located entirely or partly within the overlay zone or on portions of the lot completely unaffected by environmental zones.

Properties with a p-zone face the most stringent restrictions since, with a few exceptions, new development is allowed only when there is a demonstrated "public need and benefit."[1] Structures and other development such as driveways, patios, and landscaping located on a lot with a p-zone can remain and be maintained although certain changes to structures, such as increasing the footprint or adding a deck, or changes to vegetation such as the removal of certain trees, are prohibited. The c-zone allows development if alternatives have been considered. In addition, when devel-

Land Economics • May 2005 • 81 (2): 227–246
ISSN 0023-7639; E-ISSN 1543-8325

The author is a professor of economics at Reed College. This research was supported by a grant from the City of Portland Oregon Bureau of Planning, and a Summer Scholarship Grant and Paid Leave Award from Reed College. I am grateful to Rich Adams, Sudip Chattopadhyay, and two anonymous referees for comments on an earlier version of this paper. Sarah Klain and Tim Findley provided research assistance. Any remaining errors are those of the author.

[1] For the purpose of this paper the term property refers to a home and the land on which it is located.

opment occurs, it must be undertaken so as to avoid or mitigate adverse impacts on natural resources such as streams and wetlands, streamside/riparian areas, and upland wildlife habitat (City of Portland, Oregon Bureau of Planning 2001b).

Theoretically, the effect of environmental zoning on a property's sale price is uncertain. While limiting the ability to expand a home's footprint, changing how a lot can be subdivided, or whether vegetation that is blocking a desirable view may be removed may decrease a property's sale price (the "development" effect), recent research in Portland, Oregon (Lutzenhiser and Netusil 2001; Mahan, Polasky, and Adams 2000) concludes that proximity to amenities such as wetlands, natural areas, and streams, many of which are already protected by existing environmental overlay zones, may increase a property's sale price (the "amenity" effect).[2]

This project will use the hedonic-price method to examine how (1) environmental zoning, and (2) proximity to environmental amenities such as tree canopy, wetlands, rivers, lakes, streams, and open spaces are related to the sale price of single-family residential properties sold between 1999 and 2001 in the part of the city of Portland, Oregon, that is located in Multnomah County. This study also investigates how amenities located on privately owned properties, and in the neighborhood surrounding these properties, are related to a property's sale price.

As with all hedonic studies, the benefits that will be captured are solely private benefits, that is, benefits that are transmitted through the price of a marketed good. Ecosystem services such as improved water quality, reduced erosion, reduced flooding, and increased biodiversity, as well as nonuse values, will not be captured using this technique.

[2] Environmental zoning may decrease the supply of buildable land which could cause upward pressure on the sale price of homes. Any reduction in supply would likely be offset by an expansion in Portland's urban growth boundary, which is required, by state law, to allow for 20 years worth of growth.

II. HEDONIC-PRICE FUNCTION

The statistical technique used in this study, the hedonic-price method, relates a property's sale price to its structural *(S)*, neighborhood *(N)*, environmental *(E)*, and regulatory attributes *(R)*. This technique is based on the theory that the present value of a property's attributes are capitalized into its sale price and that a change in an attribute will be reflected by a change in a property's sale price.

Assuming that housing choices are the result of utility-maximizing decisions and that prices clear the market, the price of the i^{th} property location (P_{hi}) is represented by equation [1].

$$P_{hi} = P_h(S_i, N_i, E_i, R_i). \qquad [1]$$

It is generally agreed that the relationship between the price and attributes of a house is nonlinear since many housing attributes cannot be repackaged (Freeman 1993).

Researchers have used a variety of functional forms to estimate the hedonic-price function including: linear, quadratic, double-log, semi-log, and Box-Cox transformations (Freeman 1993). The results presented for this study were estimated using a semi-log and double-log functional form. The semi-log equation has the following specification:

$$\ln P_{hi} = \beta_0 + \sum_{j=1}^{J} \beta_j S_{ij} + \sum_{k=1}^{K} \beta_k N_{ik} + \sum_{m=1}^{M} \beta_m E_{im} + \sum_{q=1}^{Q} \beta_q R_{iq} + u_i, \qquad [2]$$

where $\ln P_{hi}$ is the natural log of the sale price for property i, S_{ij} represents the j^{th} structural attribute of property i, N_{ik} is the k^{th} neighborhood attribute of property i, E_{im} measures the m^{th} environmental attribute for property i, and R_{iq} is the q^{th} regulatory attribute for property i. A property specific error term (u_i) is also included. The double-log function is similar except that natural logs were taken of three variables: lot square footage, building square footage, and age of structure.

The partial derivative of the hedonic-price function with respect to any argu-

ment is the marginal implicit price of that characteristic, that is, the additional amount that must be paid for the property to achieve the higher level of the characteristic while holding all other factors constant.

Omitted variable bias is a concern since all hedonic-price functions are, to an extent, misspecified (Butler 1982). While every attempt has been made to specify a complete equation, data is not available for variables such as view and quality of structure. Estimated coefficients will be biased if these omitted variables are correlated with included variables.

III. LITERATURE

Numerous studies have used the hedonic-price method to estimate the relationship between a property's sale price and the amenity types used in this study.

Benson et al. (1998) estimate the value of ocean, lake, and mountain views for single-family residential properties in Bellingham, Washington. A simple specification of a view variable provides an estimated increase in a property's sale price of 25.6%. A more detailed classification of view gives estimates ranging from 60% for a high-quality ocean view to 8.2% for a poor partial ocean view. Kulshresththa and Gillies (1993) estimate that a view of the South Saskatchewan River increases the sale price of a property in Saskatoon, on average, by $11.48 per square foot.

The value of an urban forest is estimated by Tyrvainen and Miettinen (2000) using the hedonic-price method and in Tyrvainen and Vaananen (1998) using a contingent valuation study. Tyrvainen and Miettinen (2000) conclude that a one kilometer increase in the distance to the nearest forested area leads to an average 5.9% decrease in the market price of a property. A forest view is estimated to increase a property's sale price, on average, by 4.9%. A study conducted by Anderson and Cordell (1985) in Athens, Georgia, found a 3% to 5% increase in the sale price of properties with trees in their front yards.

Doss and Taff (1996) and Mahan, Polasky, and Adams (2000) provide detailed estimates on the relationship between property values and wetland proximity and type. The Mahan, Polasky, and Adams study, conducted in Portland, Oregon, provides coefficient estimates for six wetland types. Proximity to three wetland types was found to have a negative and statistically significant relationship to a property's sale price while proximity to one wetland type was found to be statistically significant and positive. The authors also include distance variables for streams, rivers, lakes, and parks. Proximity to streams and lakes is found to have a positive statistically significant effect, that is, living closer to these areas increases a property's sale price. The coefficients on distance to the nearest park and river were not statistically significant.

The influence of riparian buffers on a property's sale price is investigated in a study conducted in the Mohawk watershed in western Oregon by Mooney and Eisgruber (2001). The authors estimate that a 50-foot treed riparian buffer will decrease the value of the mean property in their data set by approximately 3%. This result is attributed to a diminished river view. The authors estimate that stream frontage increases property values by 7%.

Studies on the effect of open spaces include Do and Grudnitski's (1995) examination of golf courses in San Diego, California, and Lutzenhiser and Netusil's (2001) research on natural areas, urban parks, specialty parks, cemeteries, and golf courses in Portland, Oregon. Both studies find a significant and large effect from proximity to golf courses. Lutzenhiser and Netusil conclude that properties located within 200 feet of a golf course experience the largest increase in sale price of all open space types in the study, but this effect drops off quickly as distance from the golf course increases. Natural areas and specialty parks were estimated to have a statistically significant and positive effect on the sale price of properties located up to 1,500 feet (the maximum distance in the study) from these open spaces.

Research on proximity to urban parks shows mixed results. Espey and Owusu-Edusei (2001) estimate a 14% decline for

properties located within 300 feet of a small neighborhood park in Greenville, South Carolina, while Lutzenhiser and Netusil (2001) find a statistically significant positive effect for properties located up to 600 feet from an urban park in Portland, Oregon.

While these studies have estimated how proximity to an amenity or disamenity is related to a property's sale price, few empirical studies separately identify and estimate the development and amenity effects from zoning (Maser, Riker, and Rosett 1977; Mark and Goldberg 1986; Grieson and White 1989; Spalatro and Provencher 2001).

Spalatro and Provencher (2001) examine the effect of minimum frontage zoning for lakefront properties in northern Wisconsin. While zoning preserves amenities by restricting development (amenity effect) it also restricts the subdivision of properties (development effect). The authors estimate an increase in the average price of lakefront properties from the amenity effect of 21.5% and a negligible economic loss from the development effect. The authors' findings for the development effect are consistent with other studies.

IV. STUDY AREA

The city of Portland, Oregon, encompasses approximately 92,850 acres of land. The study area includes the part of the city of Portland located in Multnomah County, an area of approximately 92,150 acres. Approximately 9,395 acres in the study area are in a c-zone and 9,776 acres are in a p-zone (Odenthal 2002); almost 75% of the land in p-zones is publicly held (City of Portland, Oregon Bureau of Planning 2001b).

The city is divided into five quadrants. The Northwest quadrant of Portland is divided by the Willamette River, which flows north into the Columbia River. Streets east of the Willamette are labeled "North," while those west of the river are labeled "Northwest" (Figure 1). The study area has more than 4,500 wetlands and deepwater habitats (Mahan, Polasky and Adams 2000) and approximately 15,000 acres of public and private open space (Odenthal 2003a).

It is estimated that when Portland was first settled there were approximately 200 streams. Many of the smaller streams "have been piped or 'culverted' and paved over, obstructing fish passage and, in some cases, entirely eliminating aquatic and riparian habitat" (City Club of Portland 1999, 14). Listings of Willamette River steelhead and Chinook as threatened under the Endangered Species Act (NMFS 2002) highlight the connection between Portland's urban environment and the water quality and healthy spawning and rearing habitat that is needed for salmonid survival.

Johnson Creek, Tryon Creek, Fanno Creek, and the Columbia Slough drain Portland's major watersheds, which are tributaries to the Willamette River (Figure 1). These creeks and the Columbia Slough currently violate one or more water quality standards while, "other smaller tributaries within the watershed, although not currently identified as water quality limited, generally show some impacts to water quality" (City of Portland, Oregon Bureau of Environmental Services 2000, 2–6). Major sources of pollution in the study area include construction activities, vehicular traffic, leaking sewers, fertilizers and pesticides.

V. DATA SET

The data set contains sale price, property, location, zoning, and amenity information for 30,014 arms-length single-family residential property sales in the study area from 1999 through 2001. Sales in Southeast Portland constituted 39.92% of all transactions, 31.98% were in Northeast Portland, 12.92% in Southwest Portland, and 12.63% in North Portland. Northwest Portland had the fewest sales with 2.55%. Definitions of the explanatory variables used in this analysis are provided in Table 1.

Sale price and structural information were obtained from the Multnomah County Assessor (2002). Sale prices were adjusted to 2000 dollars using the Consumer Price Index—All Urban Consumers (U.S. Bureau of Labor Statistics 2002). Because the market-determined sale price is preferred

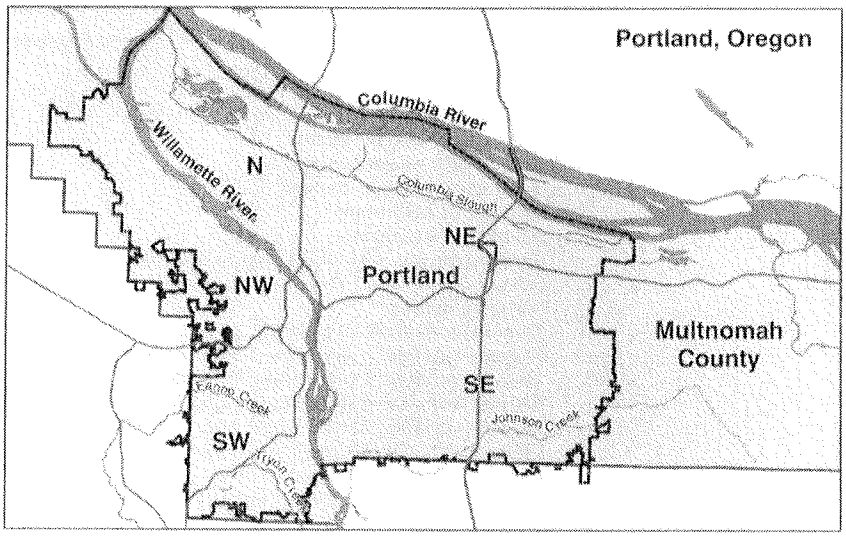


FIGURE 1
MAP OF STUDY AREA

(Freeman 1993), properties that sold for less than their assessed land value were eliminated under the assumption that these transactions were not at arms-length. To eliminate undeveloped lots recorded as single-family residential property sales, properties that sold for less than the assessed improvement value were dropped. Observations with missing information, recording errors, and duplicate records were also removed from the data set.[3] Summary statistics for the real sale price (in 2000 dollars) for properties in the study area, the real sale price (in 2000 dollars) for properties located in each quadrant in the study area, and structural attributes are provided in Table 2.

The relationship between a property's location and its sale price is captured through a quadrant dummy variable and an interactive variable based on the property's quadrant and the distance from the property to the central business district. A topographic variable was designed to capture features such as ravines, buttes, hills, bluffs, and associated views; this variable equals one if any part of the property has a slope of 25% or greater.

Regulatory variables for each property include the base zoning (single-family residential, commercial, industrial, etc.), the existence and type of environmental zoning on the property for each quadrant in the study area, and a variable that combines environmental zoning and whether the lot is considered to be oversized (City of Portland, Oregon Bureau of Planning 2002).[4] Summary statistics for properties located in environmental zones are provided in Table 3. Of the 30,014 properties in the data set, 1,026 properties, representing 3.42% of the transactions, were affected, at least partially, by environmental overlay zones.

Table 4 provides information on the distribution of properties with a p-zone, both a p-zone and a c-zone, and with only a c-zone for each quadrant in the study area. No properties located in North Portland in the data set had a p-zone or both a p-zone and c-zone designation.

[3] Information about the steps used to clean the data set is available from the author.

[4] A property is classified as an oversized lot if the lot size is 1.9 times the maximum allowable zoning density.

TABLE 1

NAMES AND DEFINITIONS OF EXPLANATORY VARIABLES

Variable Name	Description
	Property Variables
LOTSF	Lot square footage
LOTSF2	Lot square footage squared
BLDGSF	Total house square footage
GARSF	Total garage square footage
BATHROOMS	Number of bathrooms
FIREPLACES	Number of fireplaces
AGE	Year house was sold minus year house was built
OVERSIZELOT	Dummy variable = 1 if the lot size is 1.9 times the maximum allowable zoning density.
ARCH1	*Dummy variable: 1 story house*
ARCH2	Dummy variable: 1 story house with basement
ARCH3	Dummy variable: 1 story house with finished attic
ARCH4	Dummy variable: 1 story house with finished attic and basement
ARCH5	Dummy variable: 1 story house with unfinished attic
ARCH6	Dummy variable: 1 story house with unfinished attic and basement
ARCH7	Dummy variable: 1 1/2 story house
ARCH8	Dummy variable: 1 1/2 story house with basement
ARCH9	Dummy variable: 2 story house
ARCH10	Dummy variable: 2 story house with basement
	Location Variables
North, Northeast, Northwest, Southeast, Southwest	Quadrant dummy variables, North is the excluded variable
NCBD, NECBD, NWCBD, SECBD, SWCBD	Interactive variable: quadrant multiplied by the distance to the central business district
	Zoning Variables
RURAL	Dummy variable = 1 if the property is zoned residential farm/forest (RF) or limited density single-dwelling residential (R20)
LOWRES	Dummy variable = 1 if the property is zoned high density single-dwelling residential (R5), medium density single-dwelling (R7), or limited density single-dwelling residential (R10)
MEDRES	Dummy variable = 1 if the property is zoned low density multi-dwelling residential (R2), townhouse multi-dwelling residential (R3), or attached residential (R2.5)
HIGHRES	Dummy variable = 1 if the property is zoned high density multi-dwelling residential (RH), central residential (RX), medium density multi-dwelling residential (R1), or institutional campus (IR)
LIGHTCOM	Dummy variable = 1 if the property is zoned storefront commercial (CS), mixed commercial/residential (CM), neighborhood commercial 1 (CN1), neighborhood commercial 2 (CN2), office commercial 1 (CO1), or office commercial 2 (CO2)
HEAVYCOM	*Dummy variable = 1 if the property is zoned general commercial (GC), or central commercial (CX)*
LIGHTIND	Dummy variable = 1 if the property is zoned general industrial 1 (IG1), or general employment 1 (EG1)
HEAVYIND	Dummy variable = 1 of the property is zoned general industrial 2 (IG2), general employment 2 (EG2), heavy industrial (IH), or central employment (EX)
OS	Dummy variable = 1 if the property is zoned open space (OS)
PZONE*Quadrant	Dummy variable = 1 if property is only in a p-zone, broken down by quadrant (quadrants include NW, NE, SE, SW)
PCZONE*Quadrant	Dummy variable = 1 if property is in a c-zone and p-zone, broken down by quadrant (quadrants include NW, NE, SE, SW)
CZONE*Quadrant	Dummy variable = 1 if property is only in a c-zone, broken down by quadrant (quadrants include N, NW, NE, SE, SW)
LOT_PZONE	Interactive variable, lot size*p-zone
LOT_PCZONE	Interactive variable, lot size*pe-zone
LOT_CZONE	Interactive variable, lot size*e-zone
EZONEOVERLOT	Dummy variable = 1 if a property is in an e-zone and on an oversized lot

(*Continued*)

TABLE 1 (CONTINUED)

Variable Name	Description
EZONEREGLOT	Dummy variable = 1 if a property is in an e-zone, but not on a oversized lot
NEZONEOVERLOT	Dummy variable = 1 if the property is not in an e-zone, but is on a oversized lot
NOEZONEREGLOT	*Dummy variable = 1 if the property is not in an e-zone and not on a oversized lot*
	Area A: Property Amenity Variables
SLOPE	Dummy variable = 1 if the property is sloped
PRVTREE	Dummy variable = 1 if the property has tree canopy
PRVWET	Dummy variable = 1 if a wetland is located on the property
PRSTRM_N	Dummy variable = 1 if a stream is located on the property and the property is in the North quadrant
PRSTRM_NE	Dummy variable = 1 if a stream is located on the property and the property is in the Northeast quadrant
PRSTRM_NW	Dummy variable = 1 if a stream is located on the property and the property is in the Northwest quadrant
PRSTRM_SE	Dummy variable = 1 if a stream is located on the property and the property is in the Southeast quadrant
PRSTRM_SW	Dummy variable = 1 if a stream is located on the property and the property is in the Southwest quadrant
SLOPE&STREAM	Interactive variable = 1 if the property is sloped and has a stream
TREE&STREAM	Interactive variable = 1 if the property has a stream and tree canopy
	Area B: Amenity Variables on Properties Located within 200 Feet of the Lot
B_SLOPE	Dummy variable = 1 if the area within 200 feet of the property has a slope of 25% or greater
B_TREE	Dummy variable = 1 if the area within 200 feet of the property has tree canopy
B_WET	Dummy variable = 1 if the area within 200 feet of the property has a wetland
B_RIVER	Dummy variable = 1 if the area within 200 feet of the property has a river
B_NATURAL	Dummy variable = 1 if the area within 200 feet of the property has a natural area
B_SPECIALTY	Dummy variable = 1 if the area within 200 feet of the property has a specialty park
B_TRAIL	Dummy variable = 1 if the area within 200 feet of the property has a trail
B_URBAN	Dummy variable = 1 if the area within 200 feet of the property has an urban park
B_GOLF	Dummy variable = 1 if the area within 200 feet of the property has a golf course
B_CEMETERY	Dummy variable = 1 if the area within 200 feet of the property has a cemetery
B_PRVSTRM	Dummy variable = 1 if the area within 200 feet of the property has a stream on private property
B_PUBSTRM	Dummy variable = 1 if the area within 200 feet of the property has a stream on public property
	Area C: Amenity Variables on Properties Located within 200 Feet and 1/4 Mile of the Lot
C_...	Same Variables as area B
	Area D: Amenity Variables on Properties Located within 1/4 Mile and 1/2 Mile of the L
D_...	Same variables as area B
MONTH	Trend variable for month and year the property was sold (1, 2,...36)

Note: The excluded variables are in italics.

TABLE 2
SUMMARY STATISTICS FOR REAL SALE PRICE, STRUCTURAL VARIABLES, AND NEIGHBORHOOD VARIABLES

Variable Name	Mean	Standard Deviation	Minimum	Maximum
REALSALE (study area)	175,121	108,525	22,680	2,783,203
REALSALE (N Portland)	124,818	44,438	31,836	675,318
REALSALE (NE Portland)	168,894	80,931	36,649	1,045,943
REALSALE (NW Portland)	443,766	202,860	69,892	2,048,781
REALSALE (SE Portland)	152,679	63,753	22,680	871,287
REALSALE (SW Portland)	255,965	165,666	50,904	2,783,203
LOTSF	7,034	6,929	961	324,469
BLDGSF	1,503	691	288	14,720
GARSF	245	205	0	1,800
BATHROOMS	1.49	0.66	0.5	9
FIREPLACES	0.83	0.71	0	8
AGE	59	27	0	155

Dummy variables were created to indicate if a property is sloped, has tree canopy, a wetland, or a stream. Dummy variables were also created to capture amenities such as tree canopy, wetlands, rivers, natural area parks, specialty parks, trails, urban parks, golf courses, and streams on adjacent properties or in the surrounding neighborhood. Definitions of the amenity types are provided in Table 5.

Neighborhood amenity variables include adjacent properties defined as the area within 1 block (200 feet) of the property (Area B) the immediate neighborhood, defined as the area between 200 feet and 1/4 mile of the property (Area C), and the larger neighborhood, defined as the area between 1/4 mile and 1/2 mile of the property (Area D).[5] Table 6 contains information on the number of properties with amenities on the lot (Area A), the number of properties with amenities at different neighborhood levels, and the number of properties with an amenity on the lot or within 1/2 mile of the property (the union of Areas A, B, C, and D).

VI. RESULTS

Two models are estimated to explore the relationship between the sale price of properties in the study area, environmental regulations, and amenities. The first model includes interactive variables to reflect, for each quadrant in the study area, the presence of a p-zone, both a p-zone and c-zone, or just a c-zone on a property. Model 1 is estimated using a semi-log and double-log functional form. The double-log model is preferred and is the functional form used in Model 2. In Model 2, the environmental zoning dummy variables are replaced with an interactive variable that combines the lot size with environmental zoning for each quadrant in the study area and variables that capture the effect of environmental zoning on oversized lots. The regressors explain 75% of the variation of the dependent variable in both models.

Model 1

Since the functional form of a hedonic equation is uncertain (Freeman 1993; Cropper, Deck, and McConnell 1988), Model 1 was estimated using a semi-log and double-log functional form. While the magnitude, sign, and significance of the estimated coefficients are similar for most variables, the magnitude and significance of some environmental zoning coefficients differs. This is attributable to the small number of observations for some environmental zoning categories (PZONE_NE, PCZONE_NE) and

[5] Public rights-of-way and associated amenities were allocated to private property.

TABLE 3
SUMMARY STATISTICS FOR HOMES LOCATED IN E-ZONES

	P-Zone Only	P-Zone and C-Zone	C-Zone Only
Number of observations	107	250	669
Percentage of all home sales	0.36	0.83	2.23
Mean percentage of property in e-zone (standard deviation)	27.18 (20.69)	66.08 (24.56)	46.94 (32.61)
Median	21.09	67.69	42.29
Minimum percentage of property in e-zone	0.24	7.12	0.15
Maximum percentage of property in e-zone	96.25	100	100

to property characteristics, such as lot square footage, that are skewed for some environmental zoning categories. For example, the mean and median lot size of properties in Northwest Portland with both a p-zone and c-zone is 51,936 and 15,083 square feet, respectfully. The double-log model is preferred since it provides a better fit than the semi-log model; results described in this paper for Models 1 and 2 are based on the double-log model.

The estimated coefficients for the property and location variables conform to intuition and the results from other studies.[6]

TABLE 4
E-ZONES AND QUADRANT

E-Zone and Quadrant	Number of Observations
PZONE_NE	1
PZONE_NW	27
PZONE_SE	33
PZONE_SW	46
PCZONE_NE	4
PCZONE_NW	45
PCZONE_SE	49
PCZONE_SW	152
CZONE_N	33
CZONE_NE	52
CZONE_NW	108
CZONE_SE	70
CZONE_SW	406

[6] McMillen and McDonald (1991) and Pogodzinski and Sass (1994) discuss the effect of endogeneity on coefficients when land use zoning is endogenous. If base zoning is endogenous, then the estimated coefficients will be biased. Environmental zoning is applied to exogenous land characteristics, so the estimated coefficients will not be biased.

The three variables that capture lot size, natural log of lot square footage, natural log of building square footage, and oversized lot, are significant at the 1% level. The dummy variable OVERSIZELOT, which equals 1, if the lot size is 1.9 times the maximum allowable zoning density, indicates that properties on oversized lots sell for 3.25% less than properties that are not on an oversized lot.

Model 1 — Development Effect

In Model 1, the "development effect" from environmental zoning is captured by a series of dummy variables that represent the presence of a p-zone, both a p-zone and c-zone, or just a c-zone on the property for each quadrant in the study area.[7]

The p-zone coefficient for Northwest Portland is statistically significant and negative at the 5% level. The estimated coefficient implies that, holding all other factors constant, a property with a p-zone designation in Northwest Portland is estimated to sell, on average, for 8.47% less than properties with no environmental zoning. The coefficients for properties with a p-zone in Southwest and Southeast are not statistically significant; the coefficient for Northeast is significant and positive.

The estimated coefficients for properties with both a p-zone and a c-zone in Northeast and Southeast Portland are significantly positive. The estimated coeffi-

[7] None of the properties located in North Portland have a p-zone or a p-zone and c-zone designation.

TABLE 5
AMENITY TYPES

Open Space Type	Definition	Source
Slope	Land with a slope that is equal to or greater than 25%	Metro Data Resource Center 2002a
Tree canopy	At least one acre of continuous closed canopy	Metro Data Resource Center 2002a
Wetland	National wetland inventory	Metro Data Resource Center 2002a
River	River and water body data layer from the Metro RLIS, which includes major rivers and water bodies, creeks, and lakes.	Metro Data Resource Center 2002a
Natural area	More than 50% of the park is preserved in native and/or natural vegetation. Park use is balanced between preservation of natural habitat and natural resource based recreation (e.g., hiking, wildlife viewing, boating, camping). This definition includes parcels managed for habitat protection only, with no public access or improvements (Waiwaiole 1999).	Metro Data Resource Center 2002b
Specialty park	Primarily one use at the park and everything in the park is related to the specialty category (e.g., boat ramp facilities). (Waiwaiole 1999).	Metro Data Resource Center 2002b
Trail	Refers to non-road based multi-modal trail which is basically a linear park and may accommodate pedestrian, bicycle, skating, and equestrian uses (Waiwiole 1999).	Metro Data Resource Center 2002b
Urban park	More than 50% of the park is manicured or landscaped and developed for non-natural resource-dependent recreation (e.g., swimming pools, ball fields, sports courts) (Waiwaiole 1999).	Metro Data Resource Center 2002b
Golf course	Privately and publicly owned golf courses	Metro Data Resource Center 2002b
Cemetery	Privately and publicly owned cemeteries	Metro Data Resource Center 2002b
Private stream	Streams that flow through land that is privately owned	Metro Data Resource Center 2002a
Public stream	Streams that flow through land that is publicly owned	Metro Data Resource Center 2002a

cients for properties in Southwest and Northwest Portland are negative, but neither coefficient is statistically significant.

If sale prices are affected by the amount of the property with an environmental zone, then the estimated coefficients for properties with both a p-zone and c-zone should be the largest in magnitude since the average coverage is highest for properties with this designation. The hypotheses that the coefficients for the p-zone only and both p-zone and c-zone variables are equivalent for properties located in Southwest, Northwest, and Northeast Portland could not be rejected. This hypothesis was rejected for properties in Southeast Portland at the 10% level.

The third environmental zoning category, c-zone only, is statistically significant and positive for properties located in North Portland at the 1% level and is significant and negative at the 1% level for properties in Southwest Portland. Properties with a c-zone only designation in North Portland are estimated to sell for 35.26% more than properties without any environmental zoning. A c-zone designation is estimated to reduce the sale price of properties located in Southwest Portland by 2.60%. The estimated coefficients for properties in North-

TABLE 6
NUMBER OF PROPERTIES IN THE STUDY AREA WITH AMENITIES

Amenities	Area A Properties with Amenities	Area B Within 200 Feet of the Property	Area C Within 200 Feet to 1/4 Mile of the Property	Area D Within 1/4 Mile to 1/2 Mile of the Property	Properties with Amenities on the Lot or within 1/2 Mile
Slope	1,349	3,037	10,203	17,237	17,446
Tree canopy	2,431	6,207	20,660	28,463	28,699
Wetland	10	36	1,349	5,510	5,651
River		34	350	1,369	1,369
Natural area		700	4,015	8,066	8,419
Specialty park		552	7,335	16,396	17,920
Trail		97	1,398	3,906	3,981
Urban park		1,317	14,340	24,248	25,446
Golf course		111	1,117	2,956	2,959
Cemetery		136	1,406	3,740	3,926
Private stream	197	859	5,243	8,279	8,336
Public stream		157	3,126	6,442	6,552

west, Southeast, and Northeast Portland are negative, but not statistically significant.

F-tests were conducted to examine whether environmental zoning effects are equal across quadrants in the study area. The null hypothesis of an equal effect is rejected for properties with a p-zone at the 1% level (F (3, 29,920) = 7.84), for properties with both a p-zone and c-zone designation at the 1% level (F (3, 29,990) = 11.22), and for c-zone only properties at the 1% level (F (4, 29,990) = 4.38). These results may be attributable to differences across quadrants in how environmental zoning affects the development of properties, homebuyers' perceptions of environmental zoning, and omitted variables, such as view.

Model 1—Amenities on the Property

Because environmental zoning is a consequence of an amenity located on the property, it is important to consider how amenities on the property, and in the surrounding neighborhood, are related to a property's sale price.

Amenities on a property include slope, tree canopy, wetlands, and streams. Three interactive variables were created to explore how the presence of a stream is related to a property's sale price. The first set of interactive variables combine the presence of a stream with the property's quadrant in the study area. The second interactive variable, SLOPE&STREAM, captures sloped properties that also have a stream. This variable is expected to be negative since a property with these characteristics may have less land available for development. The third interactive variable is TREE&STREAM. Vegetation is an important factor for healthy streams, so this variable may serve as an indicator of stream quality.

The coefficients for properties with a stream in North Portland and the interactive variables SLOPE&STREAM and TREE&STREAM are statistically significant. A steeply sloped property (over 25% slope) with a stream is estimated to sell for 15.76% less than a property without these characteristics. The presence of trees and a stream is estimated to increase a property's sale price by 12.89%. An *F*-test was conducted to test the hypothesis that the coefficients on the stream variables are equal across quadrants. This hypothesis could not be rejected (F (4, 29,974) = 1.36; Prob > F = 0.245) indicating that the effect of a stream on a property's sale price does not vary across the study area.

TABLE 7
REGRESSION RESULTS—MODEL 1, ROBUST STANDARD ERRORS IN PARENTHESES

	Semi-Log	Log-Log
Property Variables		
Lot Square Footage	7.30e−06***	
	(7.61e−07)	
Lot Square Footage^2	−1.66e−11***	
	(3.65e−12)	
Natural Log Lot Square Footage		0.09017***
		(0.00615)
Building Square Footage	2.69e−04***	
	(9.71e−06)	
Natural Log Building Square Footage		0.46496***
		(0.00641)
Garage Square Footage	1.60e−04***	1.55e−04***
	(7.62e−06)	(7.51e−06)
Bathrooms	0.06691***	0.07288***
	(0.00483)	(0.00321)
Fireplaces	0.05755***	0.05264***
	(0.00331)	(0.00245)
Age	−0.00097***	
	(0.00009)	
Natural Log Age		−7.12e−03***
		(6.68e−04)
OVERSIZELOT	−0.03511***	−0.03301***
	(0.00718)	(0.00681)
ARCH1: 1 story house	*Excluded*	*Excluded*
ARCH2: 1 story house with basement	0.03192***	0.00757**
	(0.00432)	(0.00377)
ARCH3: 1 story house with finished attic	−0.02642***	−0.07598***
	(0.00935)	(0.00887)
ARCH4: 1 story house with finished attic and basement	0.13744***	0.06637***
	(0.00667)	(0.00492)
ARCH5: 1 story house with unfinished attic	−0.00484	−0.03073
	(0.02517)	(0.02667)
ARCH6: 1 story house with unfinished attic and basement	0.15828***	0.11116***
	(0.00913)	(0.00865)
ARCH7: 1 1/2 story house	0.03610	−0.02913
	(0.02226)	(0.02230)
ARCH8: 1 1/2 story house with basement	0.17142***	0.09464***
	(0.01137)	(0.00944)
ARCH9: 2 story house	0.09970***	0.05547***
	(0.00656)	(0.00681)
ARCH10: 2 story house with basement	0.24883***	0.20855***
	(0.01058)	(0.00794)
Location Variables		
North	*Excluded*	*Excluded*
Northeast	0.29248***	0.31078***
	(0.01674)	(0.01657)
Northwest	0.68630***	0.69186***
	(0.02692)	(0.02649)
Southeast	0.31421***	0.33641***
	(0.01593)	(0.01577)
Southwest	0.54096***	0.57580***
	(0.02149)	(0.02149)

(*Continued*)

TABLE 7 (CONTINUED)

	Semi-Log	Log-Log
NCBD	−3.97e−06***	−3.50e−06***
	(5.81e−07)	(5.77e−07)
NECBD	−1.00e−05***	−1.09e−05***
	(3.47e−07)	(3.42e−07)
NWCBD	−1.69e−05***	−1.45e−05***
	(1.16e−06)	(1.15e−06)
SECBD	−9.40e−06***	−1.03e−05***
	(2.44e−07)	(2.36e−07)
SWCBD	−1.79e−05***	−1.97e−05***
	(6.58e−07)	(6.67e−07)
Zoning Variables		
RURAL	1.36532***	.20370***
	(.04875)	(.04813)
LOWRES	.14794***	.14258***
	(.03351)	(.03410)
MEDRES	.10173***	0.09604***
	(.03375)	(0.03424)
HIGHRES	.08936***	0.08431**
	(.03441)	(0.03489)
LIGHTCOM	0.05199	0.04648
	(0.03746)	(0.03803)
HEAVYCOM	−0.01296	−0.00598
	(0.03763)	(0.03809)
LIGHTIND	−0.11561	−0.10800
	(0.08105)	(0.07874)
HEAVYIND	*Excluded*	*Excluded*
OS	0.21552**	0.26450***
	(0.09716)	(0.09712)
PZONE_NE	0.01849	0.16379***
	(0.04836)	(0.04137)
PZONE_NW	−0.09704**	−0.08850**
	(0.04808)	(0.04050)
PZONE_SE	0.00610	0.02630
	(0.03170)	(0.02714)
PZONE_SW	−0.02371	−0.04368
	(0.03066)	(0.03583)
PCZONE_NE	0.11898***	0.23427***
	(0.03655)	(0.04077)
PCZONE_NW	−0.08372**	−0.01140
	(0.04157)	(0.04047)
PCZONE_SE	0.06403	0.11572**
	(0.05005)	(0.05049)
PCZONE_SW	−0.02441	−0.01919
	(0.02601)	(0.02584)
CZONE_N	0.29568***	0.30204***
	(0.08467)	(0.08179)
CZONE_NE	−0.05759	−0.05622
	(0.06016)	(0.05955)
CZONE_NW	−0.02884	−0.02929
	(0.02867)	(0.02692)

(*Continued*)

TABLE 7 (CONTINUED)

	Semi-Log	Log-Log
CZONE_SE	0.01199	−0.00187
	(0.03265)	(0.03258)
CZONE_SW	−0.02721**	−0.02637**
	(0.01317)	(0.01343)
Amenities on Property		
SLOPE	−0.00006	0.02113**
	(0.01021)	(0.01032)
PRVTREE	−0.00612	−0.00684
	(0.00710)	(0.00707)
PRVWET	−0.04093	0.01187
	(0.07942)	(0.06692)
PRSTRM_N	−0.21357*	−0.22110*
	(0.11210)	(0.11819)
PRSTRM_NE	0.03781	0.02208
	(0.06973)	(0.07148)
PRSTRM_NW	0.00438	−0.01825
	(0.09127)	(0.09061)
PRSTRM_SE	−0.20535**	−0.14823
	(0.09376)	(0.10685)
PRSTRM_SW	−0.03703	−0.04693
	(0.05246)	(0.06128)
TREE&STREAM	0.07999	0.12128*
	(0.05822)	(0.06788)
SLOPE&STREAM	−0.14406***	−0.17152***
	(0.04416)	(0.04568)
Area B: Amenities on Properties Located within 200 Feet of the Lot		
B_SLOPE	0.03590***	0.04140***
	(0.00712)	(0.00715)
B_TREE	0.02347***	0.01987***
	(0.00471)	(0.00463)
B_WETLAND	0.00464	−0.03263
	(0.04370)	(0.04254)
B_RIVER	0.37344***	0.43437***
	(0.07613)	(0.06594)
B_NATURAL	−0.00271	−0.01195
	(0.01205)	(0.01192)
B_SPECIALTY	0.00200	0.00513
	(0.01053)	(0.01076)
B_TRAIL	−0.06007**	−0.05702**
	(0.02771)	(0.02755)
B_URBAN	0.00643	0.00819
	(0.00634)	(0.00636)
B_GOLF	0.00681	0.01122
	(0.02604)	(0.02486)
B_CEMETERY	−0.02934	−0.03171
	(0.02644)	(0.02579)
B_PRVSTREAM	−0.03355***	−0.02843***
	(0.01064)	(0.01075)
B_PUBSTREAM	−0.00276	−0.00277
	(0.02131)	(0.02225)
Area C: Amenities on Properties Located within 200 Feet to 1/4 Mile		
C_SLOPE	0.02629***	0.03695***
	(0.00439)	(0.00346)

(*Continued*)

TABLE 7 (CONTINUED)

	Semi-Log	Log–Log
C_TREE	0.01165***	0.01123***
	(0.00345)	(0.00343)
C_WETLAND	−0.01119	−0.01578*
	(0.00825)	(0.00822)
C_RIVER	−0.03803**	−0.04707***
	(0.01652)	(0.01683)
C_NATURAL	−0.00801	0.00085
	(0.00556)	(0.00546)
C_SPECIALTY	0.00128	0.00047
	(0.00345)	(0.00343)
C_TRAIL	−0.01974**	−0.01196
	(0.00845)	(0.00834)
C_URBAN	−0.01213***	−0.01362***
	(0.00298)	(0.00297)
C_GOLF	0.03309***	0.03378***
	(0.00913)	(0.00916)
C_CEMETERY	−0.01821**	−0.01099
	(0.00746)	(0.00733)
C_PRVSTREAM	−0.01469*	−0.01235
	(0.00839)	(0.00795)
C_PUBSTREAM	0.00571	−0.00731
	(0.00666)	(0.00669)
Area D: Amenities Located within 1/4 to 1/2 Mile		
D_SLOPE	0.03673***	0.02521***
	(0.00346)	(0.00436)
D_TREE	0.00449	0.00433
	(0.00612)	(0.00612)
D_WETLAND	−0.04310***	−0.03947***
	(0.00507)	(0.00495)
D_RIVER	0.05972***	0.04305***
	(0.00897)	(0.00884)
D_NATURAL	−0.02376***	−0.02246***
	(0.00403)	(0.00401)
D_SPECIALTY	−0.01425***	−0.01111***
	(0.00300)	(0.00298)
D_TRAIL	0.02062***	0.02047***
	(0.00574)	(0.00564)
D_URBAN	−0.01528***	−0.01672***
	(0.00396)	(0.00399)
D_GOLF	0.06862***	0.07096***
	(0.00607)	(0.00606)
D_CEMETERY	−0.01760***	−0.01507***
	(0.00478)	(0.00473)
D_PRVSTREAM	0.01615**	0.01828***
	(0.00711)	(0.00688)
D_PUBSTREAM	0.00584	0.00198
	(0.00723)	(0.00712)
MONTH	0.00030**	0.00027**
	(0.00012)	(0.00012)
Constant	11.08226***	7.39061***
	(0.03646)	(0.06758)
Observations	30,014	30,014
R-squared	0.7490	0.7522

Note: The excluded variables are in italics.
*Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Model 1—Amenities in the Neighborhood

Neighborhood amenity variables include slope, tree canopy, wetlands, river, natural area, specialty park, trail, urban park, golf course, cemetery, privately owned streams, and publicly owned streams. Dummy variables were created for each amenity located within 200 feet of the property (Area B), within 200 feet to 1/4 mile of the property (Area C), and within 1/4 mile to 1/2 mile of the property (Area D).

The variable SLOPE is positive and statistically significant at the 1% level for areas B, C, and D. This variable, designed to capture features such as ravines, buttes, hills, bluffs, and associated views, equals one if any part of a property has a slope of 25% or greater. A property with a sloped area within 200 feet is estimated to sell, on average, for 4.23% more than a property without a sloped area, 3.76% more for a sloped area within 200 feet to 1/4 mile, and 2.55% more for a sloped area within 1/4 mile to 1/2 mile of the property.

The tree canopy (TREE) coefficient is positive and significant for area B and C; the coefficient is positive, but insignificant, for area D. The estimated coefficient for area B indicates that a property's sale price is estimated to increase by 2.01% if the area within 200 feet of the property has tree canopy and increase by 1.13% if the tree canopy is within 200 feet to 1/4 mile of the property.

The estimated coefficient on the wetland variable (WET) is negative for Area B, and negative and significant for Areas C and D. This may be a result of the type of wetland located near residential properties in the study area (Mahan, Polasky, and Adams 2000) or a result of omitted variable bias since approximately 85% of the land classified as wetlands in the study area is located in North and Northeast Portland on land with a mix of industrial and open space zoning (Odenthal 2003b).

The dummy variable representing the presence of a river, major creek, or lake (RIVER) is expected to have a positive coefficient. The estimated coefficient for the presence of a river within 200 feet of a property is large in magnitude (54.40%) and statistically significant. The variable becomes negative and significant for area C, and then positive and significant for area D.

Neighborhood open spaces are captured by six variables: NATURAL, SPECIALTY, TRAIL, URBAN, GOLF, and CEMETERY. The only significant coefficient is the trail variable. A trail within 200 feet of a property is estimated to decrease its sale price by 5.54%. The trail variable may be capturing the negative externalities associated with noise and congestion resulting from proximity to a trail, but it may also be capturing a home's proximity to an industrial area since some trails in the study area were created from railroad rights-of-way. The majority of trails, as a park type for this study, are on open space, industrial or employment-zoned lands.

The coefficient for urban parks in Area C, 200 feet to 1/4 mile from a property, is significant and negative. The coefficient for golf course is significant and positive with an estimated effect of 3.34%.

All of the open space variables in Area D are statistically significant at the 1% level. The coefficient on the golf course variable remains positive with an estimated impact of 7.35%. The coefficient on TRAIL switches signs and becomes significantly positive with an estimated effect of 2.07%. This change in sign may reflect the benefit of being within walking distance of a trail (1/4 to 1/2 mile), but far enough from the trail to not experience noise and congestion. The coefficients on specialty parks, urban parks, cemeteries and natural areas are significantly negative. The estimated effects, however, are small ranging from –2.22% for natural areas to –1.12% for specialty parks.

Model 1—Stream Variables

Dummy variables were created to capture whether streams located on adjacent properties and in the immediate and larger neighborhood flowed through privately or publicly owned land. The private stream coefficients are significant at the 1% level for Areas B and D. The public stream variables are not statistically significant. The

location of a private stream within 200 feet of a property is estimated to decrease a property's sale price by 2.80%. A property's sale price is estimated to increase by 1.84% if it is located within 1/4 to 1/2 mile of a stream located on private property.

Model 2

In Model 2, the environmental zoning variables are replaced with interactive variables that combine the lot size with environmental zoning for each quadrant in the study area, and with variables that capture the effect of environmental zoning on oversized lots. The lot size variables are used to test whether an additional square foot of land has an impact on properties located in an environmental zone and whether that effect varies by quadrant. The oversized lot variables are used to test whether homes located on oversized lots in an environmental zone sell for a different amount than homes on an oversized lot, but not in an environmental zone.

The estimated coefficients for the structural, location and neighborhood amenity coefficients for Model 2 are consistent with Model 1. The results presented in Table 8 include the oversized lot variables, lot square footage, and environmental zoning interacted with lot size variables.[8]

The coefficient on lot square footage is expected to increase a home's sale price, but at a diminishing rate. The estimated coefficient for the natural log of lot square footage (LN_LOTSF) has the expected sign and is statistically significant. Twelve of the thirteen interactive variables that capture lot square footage for the three environmental zone categories are positive indicating that an increase in the square footage of a lot with environmental zoning will increase a property's sale price more than a property without environmental zoning. The magnitude of these coefficients, however, is small. *F*-tests were conducted to determine if the estimated coefficients are equal for each environmental zoning type. The hypothesis was rejected for p-zone (F (3, 29918 = 7.06)) and p-zone and c-zone ((F (3, 29918) = 30.83), but could not be rejected for c-zone ((F (4, 29918) = 1.87).

The OVERSIZELOT variable in Model 1 was replaced with three interactive variables EZONEOVERLOT, EZONEREGLOT, NOEZONEOVERLOT. A total of 7,159 properties in the data set have an oversized lot and 214 of these properties are located in an environmental zone.

The coefficients on these variables are significant and negative—results that are consistent with Model 1. Properties that are in an e-zone and are oversized are estimated to sell for 14.12% less than properties that are not oversized and not in an environmental zone (the excluded category). Properties that are in an environmental zone, but not oversized, are estimated to sell for 6.32% less than the excluded category. Properties that are not in an environmental zone, but are oversized are estimated to sell for 3.02% less than the excluded category.

An *F*-test was conducted to test whether the coefficients for properties with an e-zone and an oversized lot (EZONEOVERLOT) and properties with no e-zone and an oversized lot (NOEZONEOVERLOT) are equal to each other. The null hypothesis of equivalence was rejected (F (1, 29,918) = 14.76). This means that the estimated coefficients for oversized lots with an e-zone and oversized lots without an e-zone are statistically different *from each other*. Further research is required to determine if this effect varies by type of environmental zoning and by location in the study area.

VII. CONCLUSIONS AND FUTURE RESEARCH

The hedonic-price method was used to investigate how environmental zoning and amenities are related to a property's sale price. Of the 30,014 arms-length, single-family residential property sales that occurred in the study area between 1999 and 2001, 1,028 properties, or approximately 3.42% of the transactions, were for properties with an environmental zone.

[8] The log-log specification provides a better fit than the semi-log specification. Complete results are available from the author.

TABLE 8
PRIMARY REGRESSION RESULTS—MODEL 2

	Estimated Coefficients and Robust Standard Error
EZONEOVERLOT	−0.15227***
	(0.03138)
EZONEREGLOT	−0.06527***
	(0.01414)
NOEZONEOVERLOT	−0.03071***
	(0.00687)
LN_LOTSF	0.08172***
	(0.00610)
LOT_PZONE_NE	7.99e−06***
	(1.47e−06)
LOT_PZONE_NW	3.48e−07
	(3.33e−06)
LOT_PZONE_SE	9.77e−07
	(7.03e−07)
LOT_PZONE_SW	4.49e−06
	(3.37e−06)
LOTPCZONE_NE	2.91e−05***
	(3.12e−06)
LOTPCZONE_NW	−2.81e−05***
	(3.13e−06)
LOTPCZONE_SE	3.10e−06***
	(6.57e−07)
LOTPCZONE_SW	5.39e−06***
	(1.27e−06)
LOTCZONE_N	2.15e−05**
	(9.63e−06)
LOTCZONE_NE	7.83e−08
	(3.38e−06)
LOTCZONE_NW	3.96e−06**
	(1.70e−06)
LOTCZONE_SE	4.26e−06**
	(1.85e−06)
LOTCZONE_SW	5.81e−06***
	(1.18e−06)
Observations	30,014
R-squared	0.7528

*Significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

The development effect of environmental zoning was found to vary by the type of environmental zone and the property's location. In Model 1, the hypothesis that environmental zoning has an equal impact on the sale price of properties located in different quadrants in the study area was rejected for each type of environmental zone. These results may arise from differences across quadrants in how environmental zoning affects the development of properties, homebuyers' perception of environmental zoning, and omitted variables such as view.

In Model 2, the hypothesis that the coefficient for homes located on an oversized lot with an environmental zone equals the coefficient for homes on oversized lots without an environmental zone was rejected. Future research on the development effect should focus on (1) refining the environmental zoning variables by including information on whether the house is included in the environmental overlay zone, and (2) estimating the percentage of the area within 1/4-mile and 1/2 mile of each property that is in an environmental zone.

The amenity effect includes both on-property amenities and amenities located within a property's neighborhood. On-property amenities include slope, tree canopy, wetlands, and streams. The slope variable, which serves as a proxy for view, is positive and statistically significant. Trees located on a property were not significant, but this may reflect a problem with the data since the tree canopy variable only includes trees that are part of a one-acre, or larger, closed canopy. The statistically significant, positive, and large coefficient for the tree and stream variable suggests the importance of vegetation for properties with streams in the study area. Future research should focus on an indicator of vegetation at the property-level since other studies have found this to be an important factor in a property's sale price (Anderson and Cordell 1985; Tyrvainen and Miettinen 2000; Tyrvainen and Vaananen 1998) and because vegetation is related to water quality, another important determinant of a property's sale price (Leggett and Bockstael 2000; Streiner and Loomis 1995).

The study also examines amenities in a property's neighborhood such as streams, wetlands, upland forests, and steep slopes that are protected by Portland's environmental overlay zones. All of the estimated slope coefficients in Model 1 and two of the three tree canopy variables are estimated to have a significant and positive effect on property values. The variables that are negative and significant include private streams within 200 feet of a property and two of three wetland variables. This may reflect the degraded state of many water bodies in the study area.

The net effect of environmental zoning will vary by location and amenity type. For example, properties in Southwest Portland with a c-zone designation are estimated to sell for 2.60% less than properties without any environmental zoning. The presence of tree canopy, an amenity protected by environmental zoning that is common in Southwest Portland, within 200 feet and between 200 feet and 1/4 mile of a property is estimated to increase a property's sale price by 3.14%. The estimated net effect is positive, but small (0.54% or $1,382 evaluated at the mean sale price of properties in Southwest Portland). Other examples would arrive at different estimates.

The focus of this study has been on the private benefits and costs to homeowners. The benefits to society from preserving trees, wetlands, streams, and the species that depend on these resources should also be acknowledged when evaluating the overall effect of environmental overlay zones. These benefits include ecosystem services, that is, the benefits that society receives from a healthy ecosystem such as flood control, clean water, fisheries, and climate regulation and existence and bequest value from species, such as the Willamette River steelhead and Chinook that are listed as threatened under the Endangered Species Act.

References

Anderson, L. M., and H. K. Cordell. 1985. "Residential Property Values Improved by Landscaping with Trees." *Southern Journal of Applied Forestry* 9 (3): 162–66.

Benson, E. D., J. L. Hansen, A. L. Schwartz, Jr., and G. T. Smersh. 1998. "Pricing Residential Amenities: The Value of a View." *Journal of Real Estate Finance and Economics* 16 (1): 55–73.

Burns, A. 2004. Telephone conversation, March 16, 2004.

Butler, R. V. 1982. "The Specification of Hedonic Indexes for Urban Housing." *Land Economics* 58 (Feb.): 96–108.

City Club of Portland. 1999. "Endangered Fish Species in Portland." *City Club of Portland Bulletin* 81 (July 30).

City of Portland, Oregon Bureau of Environmental Services. 2000. "Integrated Watershed Plan Baseline Report." Environmental Services, City of Portland, Clean River Works.

City of Portland, Oregon Bureau of Planning. 2001a. "Healthy Portland Streams: A River Renaissance Project—Discussion Draft: Economic, Social, Environmental and Energy Analysis and Recommendations."

———. 2001b. "Healthy Portland Streams: a River Renaissance Project—Summary of Discussion Draft Proposal."

———. 2002. "Environmental Overlay Zones."

———. 2003. "Environmental Overlay Zoning Fact Sheet."

Cropper, M. L., L. B. Deck, and K. E. McConnell. 1988. "On the Choice of Functional Form for Hedonic-price Functions." *The Review of Economics and Statistics* 70 (4): 668–75.

Do, A. Q., and G. Grudnitski. 1995. "Golf Courses and Residential House Prices: An Empirical Investigation." *Journal of Real Estate Finance and Economics* 10 (3): 261–70.

Doss, C. R., and S. J. Taff. 1996. "The Influence of Wetland Type and Wetland Proximity on Residential Property Values." *Journal of Agricultural and Resource Economics* 21 (1): 120–29.

Espey, M., and K. Owusu-Edusei. 2001. "Neighborhood Parks and Residential Property Values in Greenville, South Carolina." *Journal of Agricultural and Applied Economics* 33 (3): 487–92.

Freeman, A. M. 1993. *The Measurement of Environmental and Resource Values: Theories and Methods.* Washington, D.C.: Resources for the Future.

Grieson, R. E., and J. R. White. 1989. "The Existence and Capitalization of Neighborhood Externalities: A Reassessment." *Journal of Urban Economics* 25 (Jan.): 68–76.

Jortner, R. 2002. E-mail communication, December 26, 2002.

Kulshreshtha, S. N., and J. A. Gillies. 1993. "Economic Evaluation of Aesthetic Amenities: A Case Study of River View." *Water Resources Bulletin* 29 (2): 257–66.

Leggett, C. G., and N. E. Bockstael. 2000. "Evidence of the Effects of Water Quality on Residential Land Prices." *Journal of Environmental Economics and Management* 39 (2): 121–44.

Lutzenhiser, M., and N. R. Netusil. 2001. "The Effect of Open Spaces on a Home's Sale Price." *Contemporary Economic Policy* 19 (July): 291–98.

Mahan, B. L., S. Polasky, R. M. Adams. 2000. "Valuing Urban Wetlands: A Property Price Approach." *Land Economics* 76 (Feb.): 100–113.

Mark, J. H., and M. A. Goldberg. 1986. "A Study of the Impacts of Zoning on Housing Values over Time." *Journal of Urban Economics* 20 (Nov.): 257–73.

Maser, S. M., W. H. Riker, and R. N. Rosett. 1997. "The Effects of Zoning and Externalities on the Price of Land: An Empirical Analysis of Monroe County, New York." *Journal of Law and Economics* 16 (Apr.): 111–32.

McMillen, D. P., and J. F. McDonald. 1991. "Urban Land Value Functions with Endogenous Zoning." *Journal of Urban Economics* 29 (1): 14–27.

Metro Data Resource Center. 2002a. RLISLite: Data for Mapping and Analysis.

———. 2002b. RLIS: Public and Private Open Space.

Mooney, S., and L. M. Eisgruber. 2001. "The Influence of Riparian Protection Measures on Residential Property Values: The Case of the Oregon Plan for Salmon and Watersheds." *Journal of Real Estate Finance and Economics* 22 (2/3): 273–86.

Multnomah County Assessor. 2002. Multnomah County Assessment and Taxation property records, January 1997 to June 2002.

National Marine Fisheries Service. 2002. "Endangered Species Act Status Reviews and Listing Information." Site last updated July 11, 2002. (accessed January 6, 2003).

Odenthal, G. 2002. E-mail message. December 26, 2002.

———. 2003b. E-mail message. January 9, 2003.

———. 2003a. Phone communication. January 6, 2003.

Oregon Department of Land Conservation and Development. 1996. "Oregon's Statewide Planning Goals and Guidelines, Goal 5: Natural Resources Scenic and Historic Areas, and Open Spaces."

———. 2004. "Oregon Administrative Rules." (February 13).

Pogodzinski, J. M., and T. R. Sass. 1994. "The Theory and Estimation of Endogenous Zoning." *Regional Science and Urban Economics* 24: 601–30.

Spalatro, F., and B. Provencher. 2001. "An Analysis of Minimum Frontage Zoning to Preserve Lakefront Amenities." *Land Economics* 77 (Nov.): 469–81.

Streiner, C. F., and J. Loomis. 1995. "Estimating the Benefits of Urban Stream Restoration Using the Hedonic-price Method." *Rivers* 5 (4): 267–78.

Tyrvainen, L., and H. Vaananen. 1998. "The Economic Value of Urban Forest Amenities: An Application of the Contingent Valuation Method." *Landscape and Urban Planning* 43 (Dec.): 105–18.

Tyrvainen, L., and A. Miettinen. 2000. "Property Prices and Urban Forest Amenities." *Journal of Environmental Economics and Management* 39 (2): 205–23.

U.S. Bureau of Labor Statistics. 2002. Consumer Price Index—All Urban Consumers Series, Seasonally Adjusted, U.S. city average (Base Period: 1982–84 = 100).

Waiwaiole, Lia. 1999. E-mail message. August 3, 1999.

184522

COLUMBIA CORRIDOR
ASSOCIATION

9 February 2011

AUDITOR 02/11/11 AM11:45
Emailed
Council 2/11
lw

Portland City Council
1221 SW Fourth Ave., Room 140
Portland, OR 97204

Dear Portland City Council:

The Columbia Corridor is home to 2,000 businesses employing 60,000 individuals. This industrial sanctuary is also home to the Columbia Slough and a long list of valuable natural spaces. We have a keen interest in enhancing natural space with minimal negative impact on our economy and the jobs located near our city's core.

The Columbia Corridor Association (CCA) appreciates the hard work staff has done to consolidate, rationalize and simplify the provisions in the Portland City Code that address trees. Staff has listened carefully to comments from members of the Tree Stakeholder Committee and has made many improvements to the earliest drafts in response to the comments. We support the proposed customer service improvements, including the Community Tree Manual.

We understand that in response to *Gunderson v. City of Portland*, (LUBA No. 2010-039, January 21, 2011)), which addresses impacts to the city's industrial lands inventory, the city has decided, pending further study, to exempt industrial land from the landscaping requirements stated in the proposed code amendments. CCA shares the concerns of other groups representing industrial land owners that tree-related requirements may have the unintended effect of making industrially zoned land unavailable for industrial use. We will continue to follow with interest the city's follow-up work on this issue.

We also suggest linkage between Title 11 and the new Comprehensive Natural Resource Plan (CNRP) chapter adopted as part of the North Reach River Plan. The CNRP will cover future development, mitigation, and resource enhancement activities, supporting site planning and management. It has been uncontroversial and is critical for the Multnomah County Drainage District to in its management of the Columbia Slough.

CCA recommends approval of the new tree code ordinance, with the understanding that it will include exemption of industrial properties. The new code is welcome in many respects, not the least of which is the acknowledgement of the value of trees in the city.

Respectfully submitted,

Corky Collier
Executive Director

P.O. Box 55651 · Portland, OR 97238 · 503-287-8686 · Fax 503-287-0223 · columbiacorridor.org

184522

Parsons, Susan

From: Jortner, Roberta (Planning)
Sent: Monday, February 07, 2011 7:14 PM
To: Parsons, Susan
Subject: FW: Citywide Tree Project

In case you hadn't seen this.

Roberta

From: Barbara Quinn [mailto:barbaraquinn@clarion-design.com]
Sent: Wednesday, February 02, 2011 7:50 PM
To: Adams, Mayor; Commissioner Fritz; Commissioner Saltzman; Leonard, Randy; Commissioner Fish
Cc: Jortner, Roberta (Planning)
Subject: Citywide Tree Project

Dear Mayor Adams and commissioners Fritz, Leonard, Saltzman and Fish,

In regard to the proposed Citywide Tree Project—
There should be special provisions for native trees, particularly Oregon oak and Pacific madrone, which offer the highest wildlife habitat & food value, yet are exceedingly slow growing. Preserving these trees actually gives the city more value because they support low-cost restoration of native animals and birds. They should be protected at lesser trunk size since both are notoriously difficult to grow and thus, difficult to replace.

Also, simply requiring smaller replacement when trees are illegally damaged during development does not seem like enough of a deterrent. Trees that are damaged and subsequently die within the 3 year span, should be counted as an "illegal tree removal," rather than simply replaced with a new tree (Vol. 3, ch. 11.70, page 145 top). Otherwise, more valuable, larger, older trees would simply be replaced by more convenient, smaller, younger and less valuable trees.

With these changes I urge you to support the proposed Citywide Tree Project as an important way to protect and enhance Portland's trees as a valuable resource.
Thank you,
Barbara Quinn

Emailed to Council 2/4

Parsons, Susan

From: Second Nature Garden Design [sngd@comcast.net]
Sent: Thursday, February 03, 2011 2:19 PM
To: Parsons, Susan
Subject: Comments re: Citywide Tree Project
Attachments: image001.jpg

184522

Dear Portland City Council Members:

I urge you to push forward the Citywide Tree Project, with some important changes.

First, I strongly suggest that the proposed regulation to require permits to remove healthy 12-inch or larger diameter trees on private property be changed to 6-inch diameter. Here's why: Depending on the species, eleven or even 7-inch diameter trees are substantial and may be well on their way to providing the mature, wide canopies essential to a healthy urban ecosystem. If we allow any tree less than 12 inches to be removed, it will be extremely difficult to get to the desired tree density. As the older, huge trees (that would be protected under this regulation) die out, we would be left with very few large trees to take their place. Exceptions should be made for property owners who want to replace trees that remain small at maturity with trees that will become very large at maturity and offer myriad benefits to the environment—for example, replacing a small, non-native, ornamental 20-foot tree, with a native tree that grows to 70 feet tall and 50 feet wide. Permit applications should also be posted publicly prior to a public comment period.

I have personally witnessed several situations within a mile of my home in Northeast Portland in which many healthy, mature native conifers – no doubt heavily relied upon by native wildlife – were removed by homeowners, for no good reason other than to let more sun into their backyard. In one case, the homeowners reside most the year in California! But even if the trees removed had been smaller – say, 10 inches in diameter – their removal would have been just as unnecessary and equally unjustifiable.

Second, I'd like to see much more emphasis on native trees, especially conifers. Native species are absolutely crucial for wildlife because they evolved together. Native fauna is highly dependent on native plants that provide food, shelter and breeding habitat. If we claim we want to help dwindling native birds flourish in our city, we must provide for their needs. Conifers are especially important and can be lifesavers after deciduous trees have dropped their leaves. In addition to providing an important source of seeds and insects and serving as excellent nesting and roosting sites for many birds, they are essential for the survival of myriad invertebrates and small mammals.

Finally, one of the worst things we can do for wildlife is to be to too tidy outdoors. Snags (dead, decaying trees) should and can be safely retained, as they provide tremendous value to wildlife with immense amounts of food, as well as nesting and perching sites. People removing trees should be encouraged to leave down wood (logs left on the ground) that also provide shelter and food for many small animals as it slowly returns nutrients to the soil.

Because trees have a positive effect on everyone – humans and wildlife, alike – they ought not be regarded as personal possessions. Instead, trees should be fiercely protected and considered green infrastructure that provide essential services. Unlike infrastructure such as sewers and roads, trees offer much more but cannot be repaired or quickly replaced. Therefore, it is imperative that trees on public *and private land* be revered and protected to the greatest extent possible.

Thank you for considering my comments.

Sincerely,

Eileen Stark
Biologist and landscape designer

184522

Eileen Stark
Second Nature Garden Design
3820 NE Wistaria Dr.
Portland, OR 97212
503-467-8545
www.sngdesign.net

.....

"Our ecological knowledge demands that we give up our lawns." --Diana Balmori, landscape architect and author