United States Department of Agriculture

Forest Service

Pacific Northwest Research Station

Research Note
PNW-RN-548
June 2005

Predicted Future Forest- and Farmland Development in Western Oregon With and Without Land Use Zoning in Effect

Jeffrey D. Kline[1]

Abstract

Oregon's Land Use Planning Program is often cited as an exemplary approach to protecting forest and farm lands from development. In November 2004, Oregon voters approved a ballot measure—Measure 37—to require the state to compensate landowners for any property value losses resulting from land use regulations, including those adopted under the program. Because compensation is viewed by many land use planners and policymakers in the state as virtually impossible because of the potential expense involved, the passage of Measure 37 has placed the continued enforcement of land use regulations into question. A key question for land use planners and policymakers in Oregon, and other states aspiring to implement land use planning programs like Oregon's, is what effect potential lapses in zoning enforcement might have on forest- and farmland development. This research note uses an existing spatial land use model created for western Oregon to predict future development of forest and agricultural lands for two scenarios: (1) one assuming that land use zones adopted under Oregon's Land Use Planning Program remain unaffected by Measure 37, and (2) one assuming that land use zones are made completely unenforceable by Measure 37. Although neither scenario probably is likely, the predictions suggest a set of bounds defining a range of new development possibilities enabled by pending changes in zoning enforcement resulting from Measure 37. The predictions suggest that a hypothetical lapse of land

[1]**Jeffrey D. Kline** is a research forester, Forestry Sciences Laboratory, 3200 SW Jefferson Way, Corvallis, OR 97331.

use zoning enforcement beginning in 2004 would result in greater numbers of new buildings on forest and agricultural lands in western Oregon through 2024, more than would have occurred with pre-Measure 37 zoning enforcement. Several caveats are noted in the "Conclusions."

Keywords: Forest-land conservation, Oregon land use law, wildland-urban interface, zoning.

Introduction

Oregon's Land Use Planning Program is often cited in both professional and popular media as an exemplary approach to protecting forest and farm lands from development (for example, Nelson 1992, Egan 1996). Despite this acclaim, in November 2004, Oregon voters approved a ballot measure—Measure 37—to require the state to compensate landowners for any property value losses resulting from land use and forestry regulations, including land use regulations adopted under the program. Although Oregon's governor has stated a commitment to compensating landowners to maintain existing land use and forestry regulations, many land use planners and policymakers in the state feel that compensating landowners is virtually impossible owing to a widespread lack of funds among local governments (Oppenheimer 2004a). For example, many local government officials have said that they probably will waive planning rules, because they lack the funds to pay property loss claims (Oppenheimer 2004a). Given such sentiments, Measure 37 has placed the continued enforcement of existing land use zoning into question. Also in question is the fate of 9.9 million acres of nonfederal forest and agricultural lands that fall under land use zoning regulations adopted under the program. Oregon's population and the personal incomes of its residents have been growing in recent years, resulting in increased demands for land in residential and other developed uses. Major changes in land use zoning enforcement throughout the state could have important implications for the supply of land available for forestry and agriculture.

The USDA Forest Service, Pacific Northwest Research Station has examined past forest- and farmland development patterns from 1974 to 1994, and evaluated the conservation effects of forest and agricultural zoning and urban growth boundaries mandated by Oregon's Land Use Planning Program (Kline 2005). The analysis uses a spatial land use model created for western Oregon (Kline 2003) to estimate past distributions of forest and agricultural lands among building density classes, both with and without land use zoning in effect. In this paper, the land use model is used to predict potential future development for two scenarios: (1) one assuming that land use zones adopted under Oregon's Land Use Planning Program remain unaffected by Measure 37, and (2) one assuming that land use zones are made unenforceable by Measure 37. Although neither scenario probably is likely, the predictions suggest a set of bounds that define a range of new forest- and farmland development possibilities potentially enabled by pending changes to zoning enforcement resulting from Measure 37.

Oregon's Land Use Law and Measure 37

During the 1950s and 1960s, unprecedented population growth in western Oregon raised concern about the loss of forest and farmland to development. Existing legislation already authorized local governments to manage urban growth; however, residential development of forest and farmland outside of incorporated cities often remained unplanned and unregulated (Gustafson and others 1982). In response, Oregon's legislature enacted the Land Conservation and Development Act in 1973. Often referred to in Oregon as "the land use law," it required all cities and counties to prepare comprehensive land use plans consistent with several statewide goals, and it established the Land Conservation and Development Commission to oversee the program (Abbott and others 1994, Knaap and Nelson 1992). The program has been cited as a pioneer in U.S. land use policy for its statewide scope (Gustafson and others 1982), has won national acclaim by the American Planning Association (DLCD 1997), and has served as a model for statewide planning in other states (Abbott and others 1994).

Goals of the program include the orderly and efficient transition of rural lands to urban uses; the protection of forests and agricultural lands; and the protection and conservation of natural resources, scenic and historical areas, and open spaces, which "promote a healthy environment and natural landscape" (DLCD 2004c: 1). To advance these goals, cities and counties are required to focus new development inside urban growth boundaries and to restrict development outside of urban growth boundaries by zoning those lands for exclusive farm or forest use, or as exception areas (Pease 1994). Exception areas are unincorporated rural areas where low-density residential, commercial, and industrial uses prevail, and where development is allowed, pending approval by local authorities (Einsweiler and Howe 1994). The land use law does not prevent development of forest and farmlands, but rather restricts the rates, locations, and densities at which development can take place. Some development within forest- and farm-use zones can be approved by local authorities, but must be reported to the Land Conservation and Development Commission (LCDC 1996a, 1996b). Criteria defining such development differ across counties but generally include minimum parcel sizes and limits on the number of new dwelling permits issued. Construction of personal residences by commercial farmers and forest owners is allowed. By 1986, land use plans had been acknowledged by the Land Conservation and Development Commission for all 36 counties and 241 cities in the state (Knaap 1994).

Since its inception, Oregon's Land use Planning Program has created tension between its advocates, who see land use planning as necessary to the long-term conservation of forest and farm lands, and its detractors who argue that land use regulations unduly burden private landowners (Oppenheimer 2004b, 2004c). Measure 37 is only the most recent outcome of that tension. A previous ballot measure—Measure 7—was approved by voters in 2000 and also called for compensating private landowners for property value losses, but was overturned by the Oregon Supreme Court on a technicality (DLCD 2004a). Approved by 60 percent of the voters in 2004, Measure 37 would provide private landowners "just compensation" when a land use regulation enacted after the current owner or a family member became the owner of the property, reduces the fair market value of the property by restricting its use (DLCD 2004b). Compensation requirements would apply as well to the forestry regulations under Oregon's Forest Practices Act, as well as local land use regulations not directly related to the state's land use planning program. In lieu of compensation, Measure 37 would allow governments to remove, modify, or not apply the regulation (DLCD 2004b). Measure 37 was sponsored by a property rights group—Oregonians in Action—and received significant financial backing by the timber industry (Mayer 2004). Proponents argue that property owners carry an unfair share of the burden for land use regulations that benefit society as a whole. The potential implications of Measure 37 for land use planning in Oregon, as well as in other states aspiring to implement similar programs, have received national media attention (for example, Barringer 2004, Kelly 2004).

The potential implications of Measure 37 for the future of forestry and land use regulations are not known for certain. A question among land use planners and policymakers is how Measure 37 compensation requirements might affect future forest- and farmland development by reducing the enforcement of existing land use zoning mandated by Oregon's Land Use Planning Program. To provide some information addressing this question, a spatial land use model created in previous research conducted by the Pacific Northwest Research Station (Kline 2003) was used to predict future forest- and farmland development beginning in 2004 through 2024, with and without land use zoning in effect. Neither scenario in its extreme—zoning remaining unchanged by Measure 37 or zoning made completely unenforceable—is likely. Measure 37 probably will have at least some effect on zoning enforcement, but can only affect those lands still under the same family ownership since land use and forestry regulations were implemented. However, the predictions estimated with and without land use zoning in effect can suggest a set of bounds that help to characterize the range of future development that might occur.

Building Density Model and Predictions

Historical building density data spanning 1974 to 2000 were compiled for western Oregon through the cooperative effort of the Oregon Department of Forestry and the USDA Forest Service's Forest Inventory and Analysis Program, Pacific Northwest Research Station (Azuma and others 2002). The data consist of photopoint observations of building counts on nonfederal land, observed from aerial photographs taken in 1974, 1982, 1994, and 2000. The building counts describe the number of buildings of any size or type within 80-acre circles surrounding pinpricks on the aerial photographs. The data cover the 19 counties in western Oregon—west of the crest of the Cascade Range (fig. 1)—and include nearly 24,000 photopoints, providing almost 72,000 observations of building counts varying in space and time, both before and after land use zones adopted under Oregon's Land Use Planning Program were fully implemented.

In previous analyses, the building density data were used to develop spatial land use models describing changes in building densities in western Oregon from 1974 to 1994 (Kline 2003, Kline and others 2003). The previous analyses did not use data gathered from aerial photographs taken in 2000, because the data were not yet available when the models were developed. The models account for historical changes in building densities occurring between subsequent building density observations as a function of the potential commuting distance of land to various cities, existing building densities, slope, elevation, and land use zoning. One version of the model, described in Kline (2005), was used to estimate forest- and farmland development with and without land use zoning in effect, to evaluate the forest- and farmland conservation effects of Oregon's Land Use Planning Program by 1994. The present analysis uses this same model to predict potential future forest- and farmland development from 2004 to 2024, with and without land use zoning in effect.

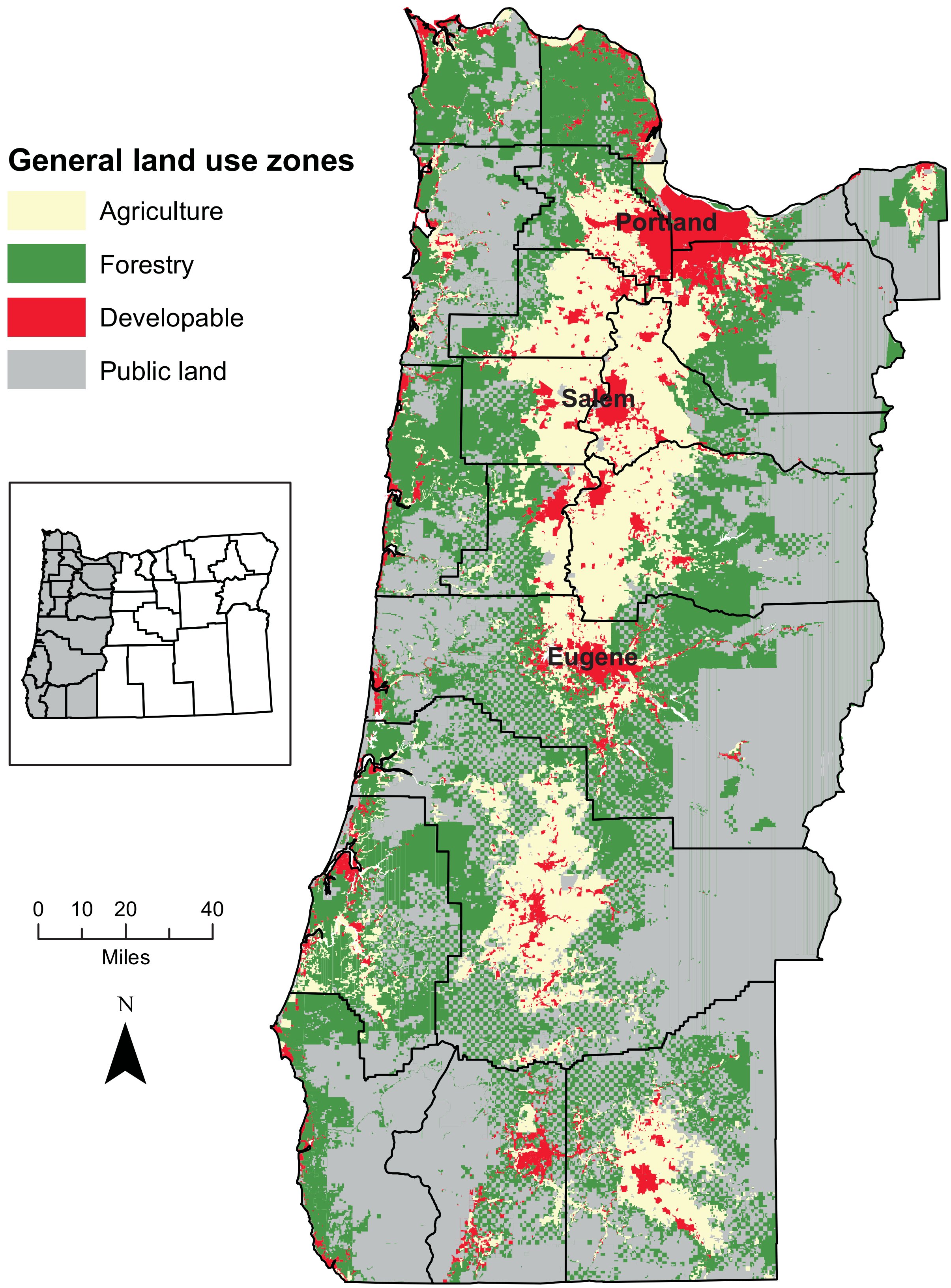

Figure 1—Western Oregon study region and generalized land use zones, 2004. The "developable" zone includes land inside urban growth boundaries, rural residential zones, and other zones where development generally can occur.

The key explanatory variable for predicting future land use changes by using the model is a gravity index describing prevailing development pressures on forest and farm lands as a function of their proximity to western Oregon cities of various sizes. The gravity index is computed as the sum of the populations of cities within a 60-minute commute, weighted by the estimated driving time to each city. Predictions of future development are computed by using projected future city populations based on published population projections for individual counties (Oregon Department of Administrative Services, Office of Economic Analysis 1997). Other model explanatory variables, including existing building densities, slope, and elevation, factor into the model predictions. The potential effects of changes in land use zoning enforcement resulting from Measure 37 are evaluated by using the zoning variables included in the land use model that describe the three major land use zones: (1) forest, (2) agriculture, and (3) urban growth boundary or other developable area. Complete details regarding the spatial land use model used to estimate the predictions can be found in Kline (2005). The predictions suggest the rates and locations of likely future forest- and farmland development, based on past development rates and patterns as revealed by empirical analysis of the historical building density data.

Predicted building counts were computed for each photopoint observation of forest and agricultural land for 2004, 2014, and 2024, with and without land use zoning in effect. Estimated building counts were grouped into three building density classes: fewer than 16 buildings per square mile, between 16 and 64 buildings per square mile, and more than 64 buildings per square mile. The percentages of observations falling within each building density class were multiplied by reported year-2000 acreages of forest, agriculture, and mixed-forest-and-agriculture land (Azuma and others 2002) to project estimated area totals for 2004, 2014, and 2024. These area totals were computed regardless of how lands were zoned in 2000—lands assigned to urban growth boundaries and other developable zones were included as forest and agricultural lands as long as they were reported as being predominantly in forest or agricultural use in 2000.

The 0-to-16-buildings-per-square-mile density class describes relatively undeveloped lands consistent with average minimum parcel sizes of 40 acres per building (house). The 16-to-64-buildings-per-square-mile density class describes low-density developed lands consistent with average parcels sizes ranging from 10 to 40 acres. The greater-than-64-buildings-per-square-mile density class describes relatively developed lands consistent with maximum average parcel sizes of 10 acres. The building density predictions with and without land use zoning in effect essentially describe future development outcomes when (1) future development occurs in the rates and patterns that have prevailed under zoning mandated by Oregon's Land Use Planning Program, and (2) future development occurs in the rates and patterns that prevailed before land use zones mandated by Oregon's Land Use Planning Program were implemented.

Predicted Forest- and Farmland Development With and Without Zoning in Effect

Land use data for 2000 (Azuma and others 2002) indicate that western Oregon comprised about 9.9 million acres containing nonfederal forest (7.2 million), agricultural (1.9 million), and mixed forest and agricultural land (0.8 million). Building density estimates computed for 2004 suggest that 96 percent of forest lands fell into the undeveloped class, 3 percent fell into the low-density developed class, and 1 percent fell into the developed class (table 1). Building density estimates suggest that agricultural lands were relatively more developed, with 60.9 percent falling into the undeveloped class, 30.1 percent falling into the low-density developed class, and 9 percent falling into the developed class. Mixed forest and agricultural lands were more developed than forest lands but less developed than agricultural lands, with 77.2 percent falling into the undeveloped class, 18.1 percent falling into the low-density developed class, and 4.7 percent falling into the developed class (table 1).

Table 1—Estimated distribution of western Oregon forest and agricultural lands among building density classes in 2004 with land use zoning in effect

		Number of buildings per square mile [a]		
Dominant land use	**Total [b]**	**0 to 16 (undeveloped)**	**17 to 64 (low density)**	**>64 (developed)**
		Acres		
Forest	7,197,000	6,909,839	216,630	70,531
Agriculture	1,924,000	1,172,486	578,931	172,583
Mixed	774,000	597,141	140,404	36,455
Total	9,895,000	8,679,466	935,965	279,569
		Percent		
Forest	100.0	96.0	3.0	1.0
Agriculture	100.0	60.9	30.1	9.0
Mixed	100.0	77.2	18.1	4.7
Total	100.0	87.7	9.5	2.8

[a] Based on estimated building counts computed by using empirical land use model reported in Kline (2005).

[b] Predominant land use categories reported for 2000 in Azuma and others (2002: 2).

Building density estimates computed for 2014 suggest that with statewide land use zoning in effect, 208,713 acres (2.9 percent) of forest land would fall into the low-density developed class; 567,003 acres (29.5 percent) for agricultural land, and 134,289 acres (17.3 percent) for mixed forest and agricultural land (table 2).

Table 2—Predicted distribution of western Oregon forest and agricultural lands among building density classes in 2014 with and without land use zoning in effect

		Number of buildings per square mile [a]		
Dominant land use	**Total [b]**	**0 to 16 (undeveloped)**	**17 to 64 (low density)**	**>64 (developed)**
With land use zoning, 2014		*Acres*		
Forest	7,197,000	6,908,400	208,713	79,887
Agriculture	1,924,000	1,169,984	567,003	187,013
Mixed	774,000	595,748	134,289	43,963
Total	9,895,000	8,674,132	910,005	310,863
Without land use zoning, 2014		*Acres*		
Forest	7,197,000	6,809,082	279,963	107,955
Agriculture	1,924,000	883,885	752,477	287,638
Mixed	774,000	556,893	152,555	64,552
Total	9,895,000	8,249,860	1,184,995	460,145
Absolute area difference [c]		*Acres*		
Forest	—	-99,318	71,250	28,068
Agriculture	—	-286,099	185,474	100,625
Mixed	—	-38,855	18,266	20,589
Total	—	-424,272	274,990	149,282
Absolute difference as a percentage of total area within land use category		*Percent*		
Forest	—	-1.4	1.0	0.4
Agriculture	—	-14.9	9.7	5.2
Mixed	—	-5.0	2.4	2.6
Total	—	-4.3	2.8	1.5

[a] Based on estimated building counts computed by using empirical land use model reported in Kline (2005).
[b] Predominant land use categories reported for 2000 in Azuma and others (2002: 12).
[c] Acres within class without zoning in effect minus acres within class with zoning in effect.

Estimates for 2014 also suggest that 79,887 acres (1.1 percent) of forest land would fall into the developed class; 187,013 acres (9.7 percent) of agricultural land, and 43,963 acres (5.7 percent) of mixed forest and agricultural land. Building density estimates computed assuming that land use zoning is not in effect suggest that by 2014, 279,963 acres (3.9 percent) of forest land would fall into the low-density developed class; 752,477 acres (39.1 percent) of agricultural land, and 152,555 acres (19.7 percent) of mixed forest and agricultural land (table 2). Estimates also suggest that without land use zoning in effect, 107,955 acres (1.5 percent) of forest land would fall into the developed class; 287,638 acres (15 percent) of agricultural land, and 64,552 acres (8.3 percent) of mixed forest and agricultural land.

Differences between the predicted distributions of forest and farmlands among building density classes suggest that without zoning by 2014, 71,250 acres (1 percent) of additional forest land would fall into the low-density developed class, and 28,068 acres (0.4 percent) would fall into the developed class. Predictions for agricultural land suggest that by 2014, 185,474 acres (9.7 percent) of additional agricultural land would fall into the low-density developed class, and 100,625 acres (5.2 percent) would fall into the developed class. For mixed forest and agricultural land, predictions suggest that by 2014, 18,266 acres (2.4 percent) of additional mixed forest and agricultural land would fall into the low-density developed class, and 20,589 acres (2.6 percent) would fall into the developed class (table 2).

Similarly, building density estimates computed for 2024 suggest that with statewide land use zoning in effect, 200,796 acres (2.8 percent) of forest land would fall into the low-density developed class; 546,224 acres (28.4 percent) of agricultural land, and 128,252 acres (16.6 percent) of mixed forest and agricultural land (table 3, fig. 2). Estimates for 2024 also suggest that 89,963 acres (1.2 percent) of forest land would fall into the developed class; 209,716 acres (10.9 percent) of agricultural land, and 51,006 acres (6.6 percent) of mixed forest and agricultural land. Building density estimates computed assuming that land use zoning is not in effect suggest that by 2024, 468,525 acres (6.5 percent) of forest land would fall into the low-density developed class; 934,102 acres (48.6 percent) of agricultural land, and 201,704 acres (26.1 percent) of mixed forest and agricultural land (table 3, fig. 2). Estimates also suggest that without land use zoning in effect, 136,743 acres (1.9 percent) of forest land would fall into the developed class; 492,544 acres (25.6 percent) for agricultural land, and 88,933 acres (11.5 percent) for mixed forest and agricultural land.

Differences between the predicted distributions of forest and farmlands among building density classes suggest that without zoning by 2024, 267,729 acres (3.7 percent) of additional forest land would fall into the low-density developed class, and 46,780 acres (0.7 percent) would fall into the developed class. Predictions for agricultural land suggest that by 2024, 387,878 acres (20.2 percent) of additional agricultural land would fall into the low-density developed class, and 282,828 acres (14.7 percent) would fall into the developed class. For mixed forest and agricultural land, predictions suggest that by 2024, 73,452 acres (9.5 percent) of additional mixed forest and agricultural land would fall into the low-density developed class, and 37,927 acres (4.9 percent) would fall into the developed class (table 3).

Table 3—Predicted distribution of western Oregon forest and agricultural lands among building density classes in 2024 with and without land use zoning in effect

		Buildings per square mile [a]		
Dominant land use	**Total [b]**	**0 to 16 (undeveloped)**	**17 to 64 (low density)**	**>64 (developed)**
With land use zoning, 2024		*Acres*		
Forest	7,197,000	6,906,241	200,796	89,863
Agriculture	1,924,000	1,168,060	546,224	209,716
Mixed	774,000	594,742	128,252	51,006
Total	9,895,000	8,669,043	875,272	350,685
Without land use zoning, 2024		*Acres*		
Forest	7,197,000	6,591,732	468,525	136,743
Agriculture	1,924,000	497,354	934,102	492,544
Mixed	774,000	483,363	201,704	88,933
Total	9,895,000	7,572,449	1,604,331	718,220
Absolute area difference [c]		*Acres*		
Forest	—	-314,509	267,729	46,780
Agriculture	—	-670,706	387,878	282,828
Mixed	—	-111,379	73,452	37,927
Total	—	-1,096,594	729,059	367,535
Absolute difference as a percentage of total area within land use category		*Percent*		
Forest	—	-4.4	3.7	0.7
Agriculture	—	-34.9	20.2	14.7
Mixed	—	-14.4	9.5	4.9
Total	—	-11.1	7.4	3.7

[a] Based on estimated building counts computed by using empirical land use model reported in Kline (2005).
[b] Predominant land use categories reported for 2000 in Azuma and others (2002: 12).
[c] Acres within class without zoning in effect minus acres within class with zoning in effect.

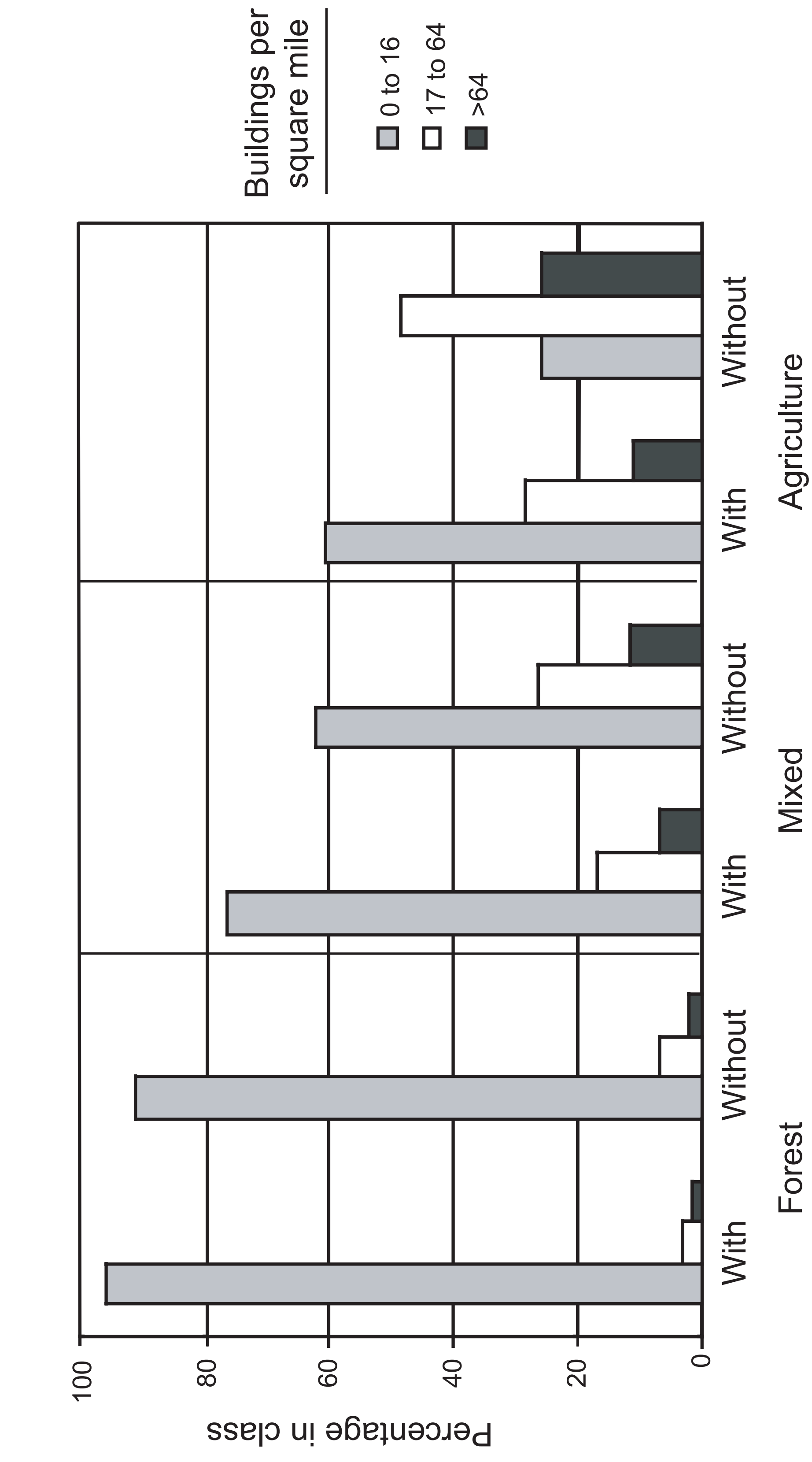

Figure 2—Predicted distributions of forest and farmlands among building density classes in 2024 with and without zoning in effect, beginning in 2004.

Conclusions, Caveats, and Policy Implications

Predictions of future forest- and farmland development suggest that a hypothetical lapse of land use zoning enforcement under Oregon's Land Use Planning Program beginning in 2004 would result in greater numbers of additional new buildings on forest and agricultural lands in western Oregon through 2024, over and above what would occur if zoning enforcement remained unchanged. Because it is conceivable, if not likely, that Measure 37 will have at least some effect in weakening zoning enforcement in the state, land use planners and policymakers can probably expect some greater rates of development in the (post-Measure 37) future than in the recent (pre-Measure 37) past.

There are a few caveats to note. First, as already stated, neither scenario—land use zoning remaining unaffected by Measure 37 or zoning made completely unenforceable—is likely. Measure 37 probably will have at least some effect on zoning enforcement but can only affect those lands still under the same family ownership since land use and forestry regulations were implemented. The predictions are intended only to suggest a set of bounds defining a range of future development possibilities potentially resulting from Measure 37. Second, the predictions cannot describe future forest- and farmland development with absolute certainty. Rather, the predictions simply project past development rates and patterns, and their relationships to various explanatory variables, into the future based on expectations about population growth in western Oregon. Third, the analysis has only considered the potential land use and development implications of Oregon's Land Use Planning Program. Not addressed are other program goals, including improved transportation and natural hazard mitigation, among others. Finally, the analysis is not intended to suggest the degree to which land use zones initially adopted under Oregon's Land Use Planning Program should or should not be enforced. Rather, the analysis is intended to provide potentially useful information to land use planners and policymakers who may be seeking ways to evaluate and anticipate the potential implications of Measure 37 on forest- and farmland development in western Oregon.

A major objective of land use zoning adopted under Oregon's Land Use Planning Program has been the conservation of forest and farmlands. The long-term success of zoning, however, often is limited by persistent tension between society's desire for relatively low-cost conservation efforts and our national commitment to upholding certain private property rights. How do we weigh the pursuit of land use policies for the benefit of society with the costs those policies may sometimes impose on private landowners? The answer lies in the degree to which we entitle particular rights to private property ownership. Judicial courts in the United States have generally upheld the power of government jurisdictions to regulate or restrict particular land uses on private property. However, defining the precise degree to which private land uses can be regulated or restricted has always involved a balancing of the interests of society with the interests of private landowners. The tension arises from persistent disagreement among the citizenry about precisely where the balance lies.

Zoning, whether implemented on a state level as in Oregon, or on regional or local levels as in numerous jurisdictions through the United States, can be implemented and enforced at relatively low cost (from a government perspective) when compared to most other land use conservation policies. However, as land values increase (owing to increased demand for land in residential and other developed uses), the potential costs borne by private landowners also can increase, sometimes resulting in political pressure to change existing zoning laws. For this reason, land use zoning often is viewed as only a first-line defense against rapid loss of forest- and farmland development. Second-line policies and programs address the potential costs of conservation borne by private landowners through compensation. Preferential taxation policies, for example, reduce property taxes on forest and farmland, and thus reduce the opportunity costs of holding land in forest and farm use. More direct (and expensive) land conservation policies include purchasing development rights, easements, and land in fee. The history of state-level attempts to conserve forest and farmland suggests that most states tend to evolve in their approaches to conservation, often ultimately resorting to a variety of policy instruments to gain the particular advantages of each.

Acknowledgments

I thank Ralph Alig, Kevin Birch, Jim Cathcart, Jim Johnson, and Gary Lettman for helpful comments.

Metric Equivalents

When you know:	Multiply by:	To find:
Acres	0.405	Hectares

References

Abbott, C.; Howe, D.; Adler, S. 1994. Introduction. In: Abbott, C.; Howe, D.; Adler, S., eds. Planning the Oregon way. Corvallis, OR: Oregon State University Press: 1-2.

Azuma, D.L.; Birch, K.R.; Herstrom, A.A.; Kline, J.D.; Lettman, G.J. 2002. Land use change on non-federal land in western Oregon, 1973-2000. Salem, OR: Oregon Department of Forestry. 48 p.

Barringer, F. 2004. Property rights law may alter Oregon landscape. The New York Times. November 26; Sect. A (col. 3).

Department of Land Conservation and Development [DLCD]. 1997. Shaping Oregon's future: biennial report for 1995-97 from Oregon's Department of Land Conservation and Development to the Sixty-Ninth Legislative Assembly. Salem, OR.

Department of Land Conservation and Development [DLCD]. 2004a. History of the program. Salem, OR. http://www.oregon.gov/LCD/history.shtml. (March 25, 2005).

Department of Land Conservation and Development [DLCD]. 2004b. Measure 37 information. Salem, OR. http://www.oregon.gov/LCD/measure37.shtml. (March 25, 2005).

Department of Land Conservation and Development [DLCD]. 2004c. Oregon's statewide planning goals and guidelines. Salem, OR. http://www.oregon.gov/LCD/goals.shtml. (March 25, 2005).

Egan, T. 1996. Drawing a hard line against urban sprawl. The New York Times. December 30; Sect. A (col. 2).

Einsweiler, R.C.; Howe, D.A. 1994. Managing "the land between": a rural development paradigm. In: Abbott, C.; Howe, D.; Adler, S., eds. Planning the Oregon way. Corvallis, OR: Oregon State University Press: 245-274.

Gustafson, G.C.; Daniels, T.L.; Shirack, R.P. 1982. The Oregon Land Use Act: implications for farmland and open space protection. Journal of the American Planning Association. 48(3): 365-373.

Kelly, D. 2004. Oregonians hold their ground. Los Angeles Times. November 14; Sect. A (col. 1).

Kline, J.D. 2003. Characterizing land use change in multidisciplinary landscape-level analyses. Agricultural and Resource Economics Review. 32(1): 103-115.

Kline, J.D. [In press]. Forest and farmland conservation effects of Oregon's (USA) land use planning program. Environmental Management.

Kline, J.D.; Azuma, D.L.; Moses, A. 2003. Modeling the spatially dynamic distribution of humans in the Oregon (USA) Coast Range. Landscape Ecology. 18(4): 347-361.

Knaap, G. 1994. Land use politics in Oregon. In: Abbott, C.; Howe, D.; Adler, S., eds. Planning the Oregon way. Corvallis, OR: Oregon State University Press: 3-24

Knaap, G.; Nelson, A.C. 1992. The regulated landscape: lessons on state land use planning from Oregon. Cambridge, MA: Lincoln Institute of Land Policy. 243 p.

Land Conservation and Development Committee [LCDC]. 1996a. Exclusive farm use report, 1994-1995. Salem, OR.

Land Conservation and Development Committee [LCDC]. 1996b. Forest use report, 1994-1995. Salem, OR.

Mayer, J. 2004. Measure 37: property compensation. Portland Oregonian. October 7; http://www.oregonlive.com/printer/printer.ssf?/base/news/109715030427560.xml. (March 25, 2005).

Nelson, A.C. 1992. Preserving prime farmland in the face of urbanization: lessons from Oregon. Journal of the American Planning Association. 58(4): 467-488.

Oppenheimer, L. 2004a. Governor: pay for land rules. Portland Oregonian. November 17; http://www.oregonlive.com/printer/printer.ssf?/base/news/1100696287146760.xml. (March 25, 2005).

Oppenheimer, L. 2004b. Initiative reprises land battle. Portland Oregonian. September 20; http://www.oregonlive.com/printer/printer.ssf?/base/news/1095681480156700.xml. (March 25, 2005).

Oppenheimer, L. 2004c. The people: landowners take sides on Measure 37. Port land Oregonian. October 7; http://www.oregonlive.com/printer/printer.ssf?/base/news/109715027827560.xml. (March 25, 2005).

Oregon Department of Administrative Services, Office of Economic Analysis. 1997. Long-term population and employment forecasts for Oregon: state and total populations. Salem, OR.

Pease, J.R. 1994. Oregon rural land use: policy and practices. In: Abbott, C.; Howe, D.; Adler, S., eds. Planning the Oregon way. Corvallis, OR: Oregon State University Press: 163-188.

Pacific Northwest Research Station

Web site	http://www.fs.fed.us/pnw
Telephone	(503) 808-2592
Publication requests	(503) 808-2138
FAX	(503) 808-2130
E-mail	pnw_pnwpubs@fs.fed.us
Mailing address	Publications Distribution Pacific Northwest Research Station P.O. Box 3890 Portland, OR 97208-3890

U.S. Department of Agriculture
Pacific Northwest Research Station
333 SW First Avenue
P.O. Box 3890
Portland, OR 97208-3890