Draft Final Report

The Oregon Land Use Program: An Assessment of Selected Goals

Prepared by
The Institute for Natural Resources
Oregon State University

for the
Oregon Department of Land Conservation and Development

August 2008

Oregon State University
Portland State University
University of Oregon
U.S. Forest Service

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Disclaimer

Executive Summary

In 2008, the Department of Land Conservation and Development (DLCD) asked the Institute for Natural Resources (INR) to assess whether the Oregon Land Use Program, as designed, is helping the state meet its land use goals. More specifically, this intensive but highly time-limited research effort set out to answer the primary questions "Has the Oregon Land Use Program been effective in:

- fostering citizen participation in land use planning (Goal 1)?;
- preserving farm and forest lands for farm and forest use (Goals 3 and 4)?;
- managing growth (Goal 14)?; and,
- protecting and developing estuarine areas, as appropriate (Goal 16)?"

Since the State of Oregon does not have an institutionalized evaluation framework designed to measure the effectiveness of the land use program, each Goal Assessment Team refined its primary question by developing secondary questions that either (1) addressed elements of each goal, as currently written, and/or (2) were based on academic theory or literature that set criteria for effectiveness. Each team also examined existing state agency key performance measures (KPMs) to see how, and if, they might serve as proxies for evaluating the effectiveness of a particular goal.

To allow for cohesion across the goal assessments/reviews, each Goal Assessment Team followed a written protocol. The draft protocol included background on the review topic and laid out review objectives and methods, including details about the search strategy, plans for study summaries, and the narrative synthesis. Within each chapter of this report, the authors address the effectiveness of their studied goal, provide information on advantages and disadvantages of data sources, discuss existing data gaps, and make recommendations for narrowing those gaps.

The study does not answer questions about whether or how the system could be made less rigid and more responsive to regional and local needs. Nor does it make recommendations for land use policy changes. The study does, however, suggest that while recommended changes deserve full consideration, they need to be made with careful deliberation regarding how those changes might affect the state's ability to maintain a system that, based on intensive, objective analysis, generally meets its goals.

Review Findings

Overall, the study suggests Oregon's current land use system is sound.

Chapter 1: Goal 1, Citizen Involvement

The Goal 1 Assessment Team conducted an institutional review due to the lack of quantitative evidence to assess the effectiveness of Goal 1. The team focused on the goal's implementation at the local level (city and county). In addition to reviewing various documents, researchers interviewed citizen involvement specialists and surveyed county and city planning directors. Three conclusions stood out: (1) despite the expressed importance of, and support for, citizen involvement, the reality has fallen short of goal objectives; (2) actual participation does not necessarily flow from increased opportunities for participation; and, (3) research participants indicated that a citizen participation evaluation program will need to recognize the variety of existing planning processes and establish metrics that reflect that variety.

Though there is a lack of easily available quantitative data from primary sources suitable for an external evaluation of Goal 1, the authors suggest that there are a variety of measures that could be used to evaluate citizen involvement. Based on the suggestions of research participants, the authors created a logic model that reflects four premises: (1) *citizen involvement is still a priority for the state of Oregon and its communities*; (2) *it can be better*; (3) *we currently have no objective way to know how effective it is*; and, (4) *the perspectives of planning professionals and citizenry are equally important.*

Chapter 2: Goal 3: Agricultural Lands

The Goal 3 Assessment Team conducted a review of literature and data, informed in part by consultation with experts from state agencies and academic institutions. As part of the review, the team identified recurring themes, questions and concerns raised in the literature, including the extent to which *high quality* farmlands have been preserved; the impact that *parcelization* of land zoned for exclusive farm use and the rise of *hobby farming* has had on maintaining farmland for farm use; and, the extent to which *local governments* have complied with policies governing non-farm dwellings on resource lands. The Goal 3 assessment does not quantify the goal's overall effectiveness; rather, it summarizes evidence and draws tentative conclusions based on principles of effective farmland protection strategies.

The review of existing data and literature suggests the Oregon's land use planning system has been successful in preserving agricultural lands for agricultural uses when judged against several of the criteria used for evaluation. More specifically, the researchers found that:

- A review of the literature reveals an overall consensus that Oregon's land use program has been effective in preserving the agricultural land base;
- There is a very limited number of peer-reviewed articles linking soil quality specifics with Oregon's land use planning program;
- There has been little recent examination of hobby farming in Oregon, although the Oregon Board of Agriculture keeps track of this sector in annual reports drawing on the USDA Census of Agriculture; and,
- A common concern in the literature, regarding local government compliance, has to do with patterns and impacts related to the permitting of farm and non-farm dwellings on resource lands.

- There is also evidence that program adjustments and amendments since 1973 have improved the performance of the program.

Chapter 3: Goal 4, Forest Lands

A summary of published studies pertaining to Goal 4 suggests that Oregon's land use planning program has had a small but measurable effect in reducing the loss of forest land to developed uses since it was implemented. The small magnitude of this effect owes largely to the relative isolation of a significant proportion of forest land from locations where development has been most prevalent. Studies that have been most successful at evaluating land use planning effects have been those that attempt to control for other factors that also influence rates and patterns of forest land development, including population growth, topography, and physical access to roads. Although no studies have attempted to examine the resulting effects of land use planning in maintaining Oregon's forest economy, other research has suggested that development may be having less impact on commercial forestry than other factors such as changes in national and international market forces and the shift of domestic timber productions to the U.S. south.

Chapter 4: Goal 14, Urbanization

The authors of Chapter 4 conducted a literature review to evaluate the effective of Goal 14 in seven areas—urban form, infrastructure and public service delivery costs, land values, housing prices, transportation, social equity and economic growth. An interesting feature of the review was that several studies found unanticipated and positive impacts (e.g., downtown revitalization and a decrease in residential segregation by race) as well as one potentially negative impact (e.g.., vulnerability to natural disasters) from urban growth boundaries (UGBs). There is a large and sometimes conflicting literature on Oregon's urban growth boundaries and their performance as a method for containing urban sprawl and creating more livable communities. This lack of uniformity in evaluation approach makes summarizing the literature and its findings a challenge. As such, the authors present "bottom line" findings:

- Judging only on the criterion of population density (as an indicator of more compact urban form), most studies find positive impacts (that is, increasing or more slowly decreasing population densities) either for the UGBs under study or for the type of growth management implemented by the State of Oregon. The literature does raise continued concern about the performance of the Bend UGB in achieving higher densities and compact urban form.
- To the extent that the UGB has been shown to increase density and limit land consumption per capita, we can—by extrapolation—attribute such positive outcomes to the UGB.
- UGBs have been shown to impact land markets. Two factors can affect land values in relation to the UGB and these can change over time: tightness of UGB/amount of developable land within the UGB and perception of the UGB's permanence/duration by market actors.
- In the academic literature, the UGB has not been clearly associated with housing price increases.
- There is very little literature on the transportation impacts of UGBs. Initial research on non-motorized transportation modes (walking and biking) has positively

associated strong urban containment (the Oregon classification) with higher levels of physical activity and more walking and biking to work.
- Strong urban containment as practiced in Oregon is shown to have positive impacts on reducing residential segregation by race.
- Urban containment (as embodied in UGBs) has been shown to have a positive impact on economic performance measured by higher percentages of real estate investment, growth in personal income, and proportion of retail activity captured by a central city and its CBD.

Chapter 5: Goal 16, Estuarine Resources

Given the highly prescriptive and detailed inventory, planning, and implementation requirements of Goal 16, answering the primary question necessitated asking a more detailed set of secondary questions regarding the specific elements of the Goal. The Goal 16 Assessment Team covers a subset of 11 areas of inquiry for its secondary questions, including: estuary classification; estuary inventories; estuarine management unit designations; water-dependent shoreland zoning; permits for significant estuarine alterations; estuarine water quality; estuarine habitat mitigation; dredged material disposal planning; single-purpose docks and piers; estuarine restoration; and, state agency coordination and policy consistency.

Through a literature and an institutional review, the Goal 16 assessment team found that the Oregon Land Use Program has been effective in protecting and developing estuarine areas (as appropriate to Goal 16 requirements) and has been effective in many of the 11 specified areas of inquiry, with qualifications related to data availability or accuracy.

Due to Goal 16, intensive development has been limited to estuaries where it was already concentrated, important estuarine habitats have been identified and protected through zoning, and opportunities for water-dependent and other needed development have been provided with increasing flexibility. The authors suggest, however, that there are significant opportunities for improving the monitoring of estuary plan implementation, for both local plan amendments and land use actions, and for state agency decisions on regulatory permits.

Data Needs and Gaps

Another aspect of the project was to identify research gaps and needs. As expected, the data needs and gaps vary across each of the studied goals.

Goal 1
- There is a lack of easily available quantitative data from primary sources suitable for an external evaluation of Goal 1.
- The state and local governments need to develop some form of programmatic evaluation that gathers data on agreed upon performance measures in a defined time period. The evaluation measures would gauge both quantity (such as opportunities to participate, level of citizen turnout for key planning events) as well as quality (e.g., the extent to which citizen perspectives are acknowledged and considered in planning, and the level of understanding about land use system

among various community groups). Likewise, the measures would disaggregate involvement by type of planning process (e.g., short term-land use decisions or long-term comprehensive planning processes).

Goal 3

- There are many ways in which analysts might improve on efforts to assess the performance of Oregon's land use planning program in terms of preserving farmland for farming. These include: tracking farmland loss; tracking the "quality" of farmland loss; utilizing spatial data analysis to track development trends; analyzing performance of the means income test; assessing causes, extent and patterns of "impermanence syndrome"; and analyzing linkages between land and water resource management.
- There are three actions that DLCD should prioritize: (1) more analyses using NRI data should be supported (2) geocoding new dwelling approvals in each county should be required; and (3) the DLCD and legislature should support better tracking of soil quality in areas undergoing or being considered for development.

Goal 4

- The most significant confounding factors involved in examining the influence of land use planning on rates and patterns of forest land development are: (1) describing historical development rates and patterns with and without zoning, and (2) controlling for other factors besides zoning that also influence development.
- Although data describing topographic variables can be found at fine spatial scales, data describing socioeconomic factors such as population and income growth, and other factors affecting land use change are generally not available at spatial scales below the US Census block group.
- Spatially heterogeneous data describing the potential returns to various land uses, such as forestry or agricultural income, are also difficult to come by.
- Future empirical analysis might best focus on addressing forest landowner decision-making regarding forest land development. Moreover, data addressing how forest landowners make decisions in response to regulations, including land use regulations, could be useful.

Goal 14

- In the literature reviewed, few major complaints were made about data availability or data needs. Analysts did differ, however, as to which data were most appropriate for the land use and land conversion analyses.
- Assembling GIS and remote sensing-derived data at the parcel level by a state agency could potentially overcome these problems; this would only be possible, however, with a well-funded and sophisticated GIS system that includes data"ground truthing". .

Goal 16

- Data and information needed to answer Goal 16 questions is excellent for those related to initial planning efforts.
- Data on estuarine water quality, for example, are very good.
- Data and information about how well those estuary plans are being implemented is fair to poor.

- Recommendations for resolving data gaps include a number of technical suggestions such as updating databases and maps, improving tracking, improving coordination among appropriate state entities and tailoring queries of the Land Administration System to produce reports that would better provide answers to the research questions.

Evidence suggests that the land use system is meeting Oregon's land use goals—at least the goals evaluated. At the same time, various correlations are weak or difficult to make; and in one case, there is no readily usable data. Problems include lack of data, lack of appropriate databases, scale issues, and difficulty controlling and/or interpreting additional factors that influence goal success.

To overcome these problems, Oregon needs to develop a goals-specific, integrated system for data gathering, tracking, and reporting. Oregon may also want to develop a modified benchmarking program for its land use system. The distinguishing feature of benchmarking is its comparative element—entities seek best-practice examples to increase performance in their own process or program. Appraising aspects of other states' land use strategies could provide information for improvements or provide compelling evidence that Oregon is, indeed, the exemplar for land use planning that maintains a range of desirable amenities and advantages.

Table of Contents

Introduction

Background

Prior to passage of Senate Bill 100 in 1973, Oregon had had a fifty-year history of formal land use planning. Planning responsibilities until the late 1960s were the domain of cities and counties with no overarching state goals or comprehensive planning requirements. Oregon's rapid population growth in the 1960s, with its associated suburban sprawl and threats to the agricultural base in the Willamette Valley, alarmed the general public as well as Governor Tom McCall and members of the legislature. The perceived need for more protective and coordinated planning sparked a campaign for planning reform, well-supported by Willamette Valley agricultural interests. A Willamette dairy farmer and state senator, Hector McPherson, is credited with leading the campaign to garner support for tighter land use laws resulting in passage of Senate Bill 100 (Howe, Abbot, and Adler, 2004; Abbott, Howe, and Adler, 1994).

Following on the heels of earlier legislation increasing requirements for comprehensive planning and zoning, Senate Bill 100 created a joint state-local planning structure and the nation's first statewide planning system. Legislation also created the Land Conservation and Development Commission, a state entity with the authority to require local plan conformance with state statewide goals. The original bill envisioned more stringent state land use control; however, political bargaining to achieve support limited the state's authority (Knaap, 1994). Despite a more limited function, the state's leading role has been an ongoing source of tension.

Although Oregon's planning system had significant legislative and citizen support, it has been the target of multiple ballot initiatives, almost from its beginning. Referendums consistently "…argued about *how* to plan, not whether to plan…" (Abbot et al., 2003:390). Among the biggest complaints regarding the planning system are that it is too prescriptive, that it is inflexible and therefore unfair, and that it does not reflect a changed economic and social environment since its adoption 35 years ago (Howe, Abbot, and Adler, 2004; Abbot, Adler, and Howe, 2003). Howe (1994), suggesting an in-depth dialogue among practitioners, policy makers, interest groups and academics to develop an appropriate research agenda, noted:

> *The Oregon program, while innovative, does not have a mechanism for critically engaging new ideas. As a result, many people become frustrated with what seems to be overwhelming system inertia…[T]here is something to be learned through thoughtful questioning, analysis, reflection, and interpretation. At that point, the door is opened for creative concepts that could allow the program to more fully realize its potential (p.281).*

Objective information about how the current system has or has not achieved its goals, arrived at through systematic evaluation, and recommendations on data needs will help inform recommendations for plan modifications. The Big Look Task Force's efforts and this report can 'open the door for creative concepts' to help Oregon's unique land use planning system remain effective and accountable in the face of significant challenges in the years ahead.

Project Purpose

In 2008, the Department of Land Conservation and Development (DLCD) asked the Institute for Natural Resources (INR) to conduct an in-depth assessment of selected Oregon land use goals, asking the general research question, "Is the Oregon land use system, as designed, helping the state meet its land use goals?" More specifically, the primary question(s) were "Has the Oregon Land Use Program been effective in:

- fostering citizen participation in land use planning (Goal 1)?;
- preserving farm and forest lands for farm and forest use (Goals 3 and 4)?;
- managing growth (Goal 14)?; and,
- protecting and developing estuarine areas, as appropriate (Goal 16)?"

It is important to distinguish this assessment from that being carried out by the Oregon Task Force on Land Use Planning, created in 2005 by Senate Bill 82. Otherwise known as the Big Look Task Force (Big Look), it is responsible for reviewing the Oregon Statewide Planning Program, specifically evaluating:

- Oregon's land use planning program in terms of meeting the current and future needs of Oregonians in all parts of the state
- Respective roles and responsibilities of state and local governments in land use planning
- Land use issues inside and outside urban growth boundaries and at the interface

The Big Look produced its *Part One Evaluation Report* in June 2007 followed by its *Preliminary Findings and Recommendations* in July 2007. It also published its "Choices for Oregon's Future" Stakeholder Group Briefing Document, containing preliminary recommendations and soliciting public feedback, in June 2008. Its final report, due February 1, 2009, will provide recommendations to the Legislature for updating the state land use program (The Big Look Task Force on Oregon Land Use Planning, July 2007).

Purpose of this Report

The purpose of this document is to report on the findings for each of the specified goals. The Institute for Natural Resources' report complements the Big Look Task Force efforts. The report does not make recommendations for land use policy changes. It does, however, systematically review existing evidence regarding certain of Oregon's land use goals and recommend a data gathering structure to fill in information gaps on the goals covered in

this study. Recommendations can be used as a template to develop an evaluation system for all of the goals.

This project utilizes researchers with expertise in Oregon's land use plan and policies, and each of the studied goals; however this creates a potential for bias in the review of existing studies (one of the key deliverables of this project). Every effort was made to establish a protocol that minimized the effects, such as developing criteria for exclusion or inclusion of an existing study in this review (see Appendix A for the protocol, and Appendices B-F for the list of documents reviewed) and having a peer review process.

Project Approach

The intent of this project was to help develop an objective foundation for understanding the performance of the land use program in meeting its core objectives—the Statewide Planning Goals and Guidelines. Given the project's 10-week timeframe, we identified (1) a project management structure that allowed us to begin work quickly while gaining the insights of key Oregon University System faculty, and (2) an assessment/review process that enabled us to answer the primary questions by conducting an extensive review of existing studies, identifying and evaluating existing data (where data was sufficient), and/or conducting goal-specific institutional reviews—analysis of changes in the institutions and/or rules that have had a key influence on how a specific goal is implemented.

Management Structure

The project team consisted of a *Project Manager* who oversaw the project team and the production of the key deliverables; a *Research Associate* who worked with each Goal Assessment Team to help them access documents; *Goal Assessment Teams*, comprised of OUS faculty with expertise in land use planning and the specific land use goal topic, and graduate student researchers who conducted the assessments; and *Expert Reviewers/Advisors* who critically reviewed each chapter. INR engaged research teams across three Oregon universities—Portland State University, Oregon State University, and the University of Oregon—and from the U.S. Forest Service.

Assessment/Review Process

Based on a systematic review process that the Institute for Natural Resources piloted for the Oregon Department of Forestry[1], the assessment/review process for this project consisted of:

- Question refinement;
- Recruiting academic experts and assistants to serve as goal-specific assessment teams;
- Recruiting experts to serve as goal-specific chapter reviewers;
- Developing the review protocol and search strategy;

[1] See Behan, J. 2008. *Systematic Review Pilot Project: Final Report*. Institute for Natural Resources. Corvallis, Oregon. February. This report discusses the various opportunities and challenges of applying systematic evidence reviews, as defined in the medical field, to natural resources.

- Finding, filtering, and evaluating documents;
- Finding and filtering agency key performance measures and existing data;
- Collating the findings and writing the assessment;
- Vetting the goal-specific assessments/reviews with the reviewers; and,
- Addressing Reviewer/Advisor comments and producing a draft final assessment.

Though this project did not undertake a traditional systematic evidence review, the project team recognized the value in having a standardized protocol that all Goal Assessment Teams utilized to assess/review each goal. Peer reviewing the Goal Assessment Teams' work was also seen as an invaluable piece. Descriptions of the review process are described below.

Question refinement. The primary question for this project, "*Has the land use program been effective at…?*", was posed by the Department of Land Conservation and Development; however, the State of Oregon does not have an institutionalized evaluation framework designed to measure the effectiveness of the Land Use Program. To address this question, each Goal Assessment Team refined its goal-specific primary question, by developing secondary questions that either (1) addressed elements of each goal, as currently written, and/or (2) were based on academic theory or literature that set criteria for effectiveness. They also examined existing state agency key performance measures (KPMs) to see how, and if, they might serve as proxies for evaluating the effectiveness of a particular goal.

Goal assessment teams and goal chapter reviewers. As stated in Behan (2008) "A defensible systematic review hinges on qualified reviewers—ideally, academic scientists in the field under which the review question falls who do not have a vested interest in review outcomes..." (p. 4). INR was able to engage academic teams across three Oregon universities—Portland State University, Oregon State University, and the University of Oregon—and the U.S. Forest Service to serve on this project.

Protocol and search strategy. This project was separated into five projects, one for each goal. To allow for cohesion across the goal assessments/reviews, each Goal Assessment Team followed a written protocol (Appendix A). The draft protocol included background on the review topic and laid out review objectives and methods, including details about the search strategy, plans for study summaries, and the narrative synthesis. The draft protocol was given to the project team at its first meeting as part of the meeting's briefing document. The protocol was then reviewed and revised based on the team's discussion.

Finding and filtering documents. Using general search terms such as *Oregon AND land use*, an initial search of eight reference databases produced anywhere from zero to 296 publications. A "coarse filter" that excluded documents published prior to 1973, book reviews, and/or publications that did not deal directly with land use planning or policy, reduced the list to approximately 119. The project team was provided this initial list of publications soon after the first project team

meeting. Each Goal Assessment Team then conducted their goal-specific document searches.

Finding and filtering agency key performance measures and existing data. Since the State of Oregon does not have an institutionalized framework for evaluating the effectiveness of the Oregon Land Use Program, DLCD requested that we examine the agency key performance measures (KPM). Agency KPMs are required to be linked to Oregon Benchmarks. Oregon Benchmarks measure progress toward Oregon's strategic vision, *Oregon Shines*, and are organized into seven categories—economy, education, civic engagement, social support, public safety, community development and environment (Oregon Progress Board, 2008). Each Goal Assessment Team reviewed the KPMs for relevance to their goal assessment/review.

Collating findings and peer reviewing the assessment/review. Each Goal Assessment Team reviewed and summarized the studies, and used a set of criteria (see Appendix A) to judge the relevance of each study to answer the primary and secondary questions laid out in the project. Each Goal Assessment Team was given professional discretion regarding how they presented their findings. The only requirement was that each addressed the document review and/or institutional review, existing data, and data gaps. Peer reviewers were given three to five days to comment on the draft chapters. The teams were then given seven days to respond to the comments.

Organization of the Report

This report is structured in chapters, each reflecting the professional expertise of its authors. Within each chapter, the authors address the effectiveness of their studied goal and provide information on advantages and disadvantages of data sources, existing data gaps, and recommendations for narrowing those gaps. The appendices provide the background documentation (primarily the list of reviewed documents) making the assessment/review process more transparent.

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Chapter 1
Citizen Involvement

Ellen Bassett and George Zaninovich

Goal 1 Planning Guideline

To develop a citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.

I. Introduction

The Oregon Land Use Program's intent to be a bottom-up approach to ensure that Oregon's communities, farms, forestlands, rivers and coastal areas met the needs and objectives of the state's citizenry is reflected in its first goal being dedicated to citizen participation. Goal 1 directs the locality to "adopt and publicize a program for citizen involvement that clearly defines the procedures by which the general public will be involved in the on-going land-use planning process." Broad political and social support for engaging citizens in the land use program focused on assuring that Oregon continued to be a place people loved and wanted to live.

At the state level, a Citizen Involvement Advisory Committee (CIAC) is charged with advising the Land Conservation and Development Commission (LCDC) and local governments on citizen involvement matters. At the local level, each county and city must establish an institutional body that is charged with preparing and adopting a comprehensive plan. A committee for citizen involvement (CCI), which assists the governing body with meeting Goal 1, must be designated in every county's citizen involvement program. The CCI can take on many different forms but is most commonly fulfilled by the local Planning Commission.

Citizen involvement is a tool to enhance political viability, greater understanding of, and buy-in to the land use program. It allows people to participate, creates a sense of ownership of their community's land use planning and therefore leads to more broadly supported outcomes. It also represents a philosophical approach to decision-making in Oregon's communities. Goal 1 was formulated because there was wide agreement that people should be included in the comprehensive planning for their city or county, notified about pending land use decisions, and provided a clear mechanism for comment.

We conducted an institutional review approach to assessing Goal 1due to a lack of documents and data (existing data is primarily qualitative) addressing the efficacy of the goal. Our analysis focuses on the implementation of Goal 1 at the county and city levels, and not on the main citizen involvement structures (LCDC and CIAC) at the state level. In undertaking a literature review, an institutional review, and other qualitative approaches to analysis, we looked for information that a) gave insight into the overall effectiveness of

citizen involvement, and b) could help determine a potential future methodology for evaluating effectiveness. While this approach deviates from methods used for the review of other goals, we believe it is the best way to address the primary question—"*Has the Oregon Land Use Program been effective in fostering citizen involvement in land use planning?*"

Historical Context

The inception of the Oregon land use program, with its central provisions for forest and farmland protection, is often linked to increased local, regional and national awareness of environmental issues during the 1960's and 1970's. In particular, key environmental crises (the Santa Barbara Oil Slick, the burning of the Cuyahoga River in Cleveland and the specter of the toxic DDT in women's breast milk) led to a wide-spread awareness of and concern with environmental degradation. Citizen involvement as a foundation of land use planning in Oregon is also a by-product of a changing public consciousness. The late-1960's and early1970's were a time of intense social tumult. People were on the streets and sitting in classrooms making their collective voice heard on issues including the draft, the war in Vietnam and the repression of civil rights of minorities, women, and gays. Citizens and community groups demanded the right to participate in policy and decision-making; this right became a central feature of the National Environmental Policy Act (NEPA) and other key federal environmental laws.

In 1974, one year after the state legislature passed Senate Bill 100[2], Arnold Cogan, the first DLCD Director, led a massive citizen involvement effort to define the statewide planning goals. The team he assembled traveled to 35 cities with one central objective: to find out what was important to Oregonians for their place of residence and the state as a whole. Mobilizing the citizenry was not easy: invitations went to over 100,000 Oregonians urging them to show up and be heard. This effort was successful as meetings in small towns would sometimes have hundreds of participants.

Following this first wave of meetings, Cogan's team compiled the information and returned to the same 35 cities with draft goals for further discussion and refinement. Technical advisory committees were formed to help craft more specific goal language and to better understand the consequences of goal implementation. This was followed by two rounds of public hearings to examine successive drafts of goals and guidelines produced by LCDC staff. It was an exhausting process, but one that was central to the initial success of the program as unaffiliated citizens, industry groups, environmental activists, property rights groups and other organizations were asked to participate. The process gave participants first-hand access to the new state agency and an opportunity to think about land use in the context of the state as a whole instead of just their backyards. It generated goodwill between LCDC staff and local officials and helped people identify with the fledgling program and its objectives because they had played a role in defining the goals.

Citizen involvement became Goal 1 because it was a process goal, and process success was seen as integral to any future program achievements. As a consequence, Oregon's

[2] S.B. 100 is the enacting legislation of Oregon's land use program passed in 1973 that created the Land Conservation and Development Commission (LCDC) and the Department of Land Conservation and Development (DLCD).

land use program is a time capsule of a sort—encompassing Oregonians' newly organized and formalized interest in their surroundings (environmentalism) with the belief that they had a right to be heard (citizen involvement). Furthermore, while citizen involvement in the early-to-mid 1970s was focused primarily on the formulation of comprehensive plans, today there are a diversity of planning efforts such as urban renewal plans, transportation plans, etc. that rely on citizen involvement. In analyzing Goal 1 effectiveness, we considered Goal 1 as it relates to various planning processes, not just comprehensive plan formulation and review.

II. Methods

Primary Question

Has the Oregon Land Use Program been effective in fostering citizen involvement in land use planning?

Secondary Questions

1) Understanding Local Government Compliance with the Goal

    - How have local governments structured citizen involvement in land use planning? That is, what mechanisms (e.g., independent committees, planning commissions, neighborhood associations) have been employed? Has citizen involvement in land use planning changed over time? If so, how and why?

2) Understanding Performance of Citizen Involvement in Land Use Planning in Oregon in general and in specific localities

    - How have the adopted mechanisms for citizen involvement performed over time? Specifically in relation to the language of the goal, has citizen involvement provided frequent and adequate opportunities for diverse groups of citizens to be involved in all stages of local land use planning and decision-making? What do key informants and former and/or current participants see as chief strengths and weaknesses of the system? What metrics/measurements or data sources do they use in their evaluation?

To answer these secondary questions, we compiled qualitative data through a literature review, institutional review, semi-structured interviews with Oregon's citizen involvement experts, and a survey of county and city planning directors. The focus on primary data and qualitative methods was necessary due to a lack of any substantive quantitative data and published literature on Goal 1.

Literature Review

Three distinct literatures were examined: social science and legal research published in peer reviewed scholarly journals; research reports produced by foundations and/or think tanks; and state agency reports. The literature was identified using database services

available at the university libraries at Portland State University, University of Oregon and Oregon State University. The indexes used were: JSTOR, Sage Premier, Urban Studies-Sage Full Text, PAIS, ICPSR, Web of Science and SocINDEX. In addition, a Google Scholar search and Google web search supplemented the review. These search engines were used to identify literature from foundations and think tanks.

Searches were conducted with multiple terms in several iterations. In an effort to exclude non-Oregon related research, the first search was "Oregon" plus another search term. These secondary search terms were: community involvement, community participation, public involvement, public participation, participatory planning, community decision-making, public outreach, Goal 1 and Goal One. There were many partial matches in the web search and only the first 100 matches per search term were examined in the review. Finally, key individuals with knowledge of the Oregon land use system provided difficult to obtain documents, such as consultants' reports and student projects.

Institutional Review: Archival Analysis/Document Review

Since the literature review did not raise significant studies addressing the primary research question, it was determined that an institutional review—a more in-depth analysis of changes in the rules and/or institutions that have had a key influence on how a goal is implemented—was necessary. This included reviewing the Citizen Involvement Programs (CIPs) that were originally submitted to LCDC by all 36 counties and 25 cities. These reports are kept in archives at DLCD.

The following questions were the basis of the institutional/primary document review:

- In accordance with Goal 1 requirements, is a plan filed with DLCD?
- When was it filed?
- Is there an updated plan on file?
- What is the mechanism for conducting citizen involvement? Planning Commission as Citizen Involvement Committee or other?
- What is the mechanism now? (Current practice may reflect a plan update not filed with DLCD)
- If Planning Commission, what is the rationale?
- Did the plan identify a funding source for the CIC?
- If so, from what budget is the money being allocated?
- Is there mention of an evaluation mechanism?
- If so, how often is the program to be evaluated?
- Does the purpose language in the plan reflect state requirements or does it vary?
- Could the plan be a case study for good citizen participation because it goes above and beyond what is required?

The data gathered from the reports is contained in a matrix found in Appendix B.

Key Informant Insights

The third research method utilized was semi-structured interviews with knowledgeable individuals. The purpose of these conversations was to understand more about the initial

objectives of those drafting the goals, understand how and why mechanisms had changed over time, gather elite opinions on the performance of the goal, and brainstorm potential mechanisms and measures for determining efficacy. We targeted program implementers such as planning directors, DLCD staff representatives, and current/former Citizen Involvement Advisory Committee (CIAC) chairs (see Appendix B).

The conversations were guided by the following core questions:

- What is the purpose of citizen involvement in the statewide land use system?
- Why do you think it is Goal 1? (i.e., in rank order)
- What is effective about Goal 1?
- What is ineffective about Goal 1?
- How would you measure effectiveness in the short term? Long term?
- Are there any places that implement particularly effective citizen involvement processes?
- Are there any places that implement particularly ineffective citizen involvement processes?
- If you were to rework or revisit this goal, what would you do to make citizen involvement as effective as it could be?

Survey of Planning Directors

Finally, we conducted an online survey via Survey Monkey of city and county planning directors (Appendix B). Sandra Zaida (Klamath Falls Planning Director) and Carla McClane (Morrow County Planning Director) distributed the survey to their respective email lists. It was sent out on July 1st, 2008 with a one-week window for completion. On July 7th, 2008 reminder emails were sent to the email lists. There was a 37% response rate (26 of 70) for city planning directors (of those who are members of the Oregon City Planning Directors Yahoo group – 14 percent of Oregon cities were represented in the survey) and 50 percent response rate (18 of 36) for county planning directors.

The survey was intended to 1) gain a better understanding of the current institutional framework for citizen involvement, 2) gauge perceptions of Goal 1 effectiveness from the professional planning community, and 3) solicit ideas for how to evaluate effectiveness in the future. The survey instrument is contained in Appendix B.

IV. Findings

Literature Review

Overall, the literature discussing citizen involvement in Oregon is descriptive, not evaluative. Of the 21 documents reviewed, only two were highly relevant for a study of goal effectiveness (Sullivan, 1998; CIAC, 2008). For example, many articles and agency reports outlined the requirements for participation but none give an informed critique of the efficacy of mandated outreach. As a result, no documents reviewed specifically addressed the effectiveness of the Oregon Land Use Program in fostering citizen involvement in land use planning. Our finding that there was little or no literature on the

effectiveness of citizen involvement was corroborated in our semi-structured conversations as none of the citizen involvement experts were able to identify literature that specifically answered the primary research question.

The most direct analysis of Goal 1 effectiveness uncovered in the literature search was contained in a speech by one of the state's leading land use lawyer, Edward J. Sullivan, to a University of Oregon symposium marking the 25th Anniversary of Senate Bill 100 (Sullivan, 1998). He noted that the premise of adopting statewide planning goals was that they would provide criteria for measuring the effectiveness of the overall system. He explained that each goal contributes *something* to the program but no goal is the subject of complete consensus for policy implementation, More specifically related to Goal 1, Sullivan called it "ineffective and meaningless" because the Department/Commission did not sustain objections to local citizen involvement processes and the average citizen is not familiar with the periodic review process (Sullivan).

While Sullivan's comments do not reflect a universally held perspective on the effectiveness of Goal 1, the perspective he presented that Goal 1 could be more effective was encountered often throughout the course of our research. In our interviews and survey of county and city planning directors, the overall effectiveness of Goal 1 is continually questioned. It is true that a nearly all of the participants in this research want citizen participation but they also doubt its efficacy in facilitating understanding of specific elements of the land use system such as periodic review processes. The need to gauge citizen understanding of the land use system as an outcome measure of participation is addressed in the recommendations section of this report.

Institutional Review

Due to a lack of secondary literature that directly addresses the primary research question, we undertook an institutional review to understand local-government compliance with the goal (the objectives of the review were detailed above). This included:

- A review of the original Citizen Involvement Program (CIP) plans filed with DLCD for all 36 Oregon counties
- A review of the CIPs for 25 of Oregon's biggest cities (but no more than one from any county). The following cities were chosen to provide urban/rural and west/east balance: Albany, Astoria, Baker City, Bandon, Bend, Brookings, Corvallis, Eugene, Grants Pass, Hood River, Klamath Falls, Lake Oswego, Lakeview, Madras, Medford, Newport, Ontario, Pendleton, Portland, Prineville, Roseburg, Salem, St. Helens and Tillamook.
- Review of a 2005 survey of county CIPs conducted by CIAC. (No survey was conducted for city CIPs by CIAC.)

This approach provided a baseline understanding of what was required under Goal 1 and what jurisdictions did to comply. It also provided data relevant to our secondary research questions:

How have local governments structured citizen participation in land use planning?

- CIPs are required by Goal 1. All 36 counties completed CIPs per the law; their original CIPS were filed over the five year period from 1973 to 1978. They are on file with DLCD. However, according to CIAC's survey, only 13 of 36 counties had current CIPs in 2005. (Appendix 4)
- Of the 25 cities we reviewed, 21 had original CIPs filed with DLCD.
- In the survey we conducted in July 2008, only 31 percent of respondents from cities and counties said there was an updated CIP for their jurisdiction.

What mechanisms (e.g., independent committees, planning commissions) have been employed?

- While 10 of 36 counties originally chose the Planning Commission to implement citizen involvement, the balance intended to have an independent entity, or CCI. With the methods deployed for this study and the short time period at hand, we were unable to determine the exact status of CCIs today. However, of the 18 counties that did respond to the survey 16 indicated that the mechanism for conducting citizen involvement was the planning commission.
- Fifteen of the 21 cities with original plans filed with DLCD *did not* have PCs as the CCI. However, according to CIP revisions, at least 5 cities either added PCs as a major component to the CCI or switched to PC as the CCI
- Out of the 26 city planning directors that responded to the survey, 22 indicated that currently the planning commission is responsible for citizen participation.
- Almost 40 percent of respondents to our survey said their jurisdiction's citizen involvement has been evaluated.
- The evaluating body, according to the survey, is the Planning Commission for most jurisdictions.

Has citizen participation in land use planning changed over time? If so, how?

- Over time jurisdictions switched from CCI to using the Planning Commission. Reasons given for this vary. However, many jurisdictions reported this occurred due to waning citizen interest in participation. According to the 2005 CIAC survey of counties, only six of 36 had bylaws for a CCI.
- As a result, the main method for citizen involvement in planning in Oregon is a traditional approach used in most other states without an explicit citizen involvement goal: the Planning Commission.

Key Informant Insights

We conducted 13 semi-structured interviews with experts on Oregon's land use program; we specifically targeted individuals who had played a role in citizen involvement, in either a paid or volunteer capacity. The experts represented a variety of perspectives and worked in a variety of sectors including higher education, public (state agency), non-profit, and private sectors. Given the very short timeframe of the study, this method enabled us to capture diverse perspectives pertaining to effectiveness of Goal 1. As this method is qualitative, we make no claims that the views expressed are generalizable.

The following general themes emerged:

- Goal 1 is an important foundation of the program.
- Goal 1 is fairly effective in ensuring opportunities for citizens to participate in land use decisions.
- It is harder to get citizens involved than it used to be.
- People are more engaged when there is a crisis or if the issue directly affects them.
- There seems to be an overall lack of understanding in our communities about land use issues.
- This lack of understanding may lead to more contention about the program.
- There are more ways to communicate with the public now than in 1973.
- Citizen involvement is time consuming and expensive.
- Citizen involvement is the right thing to do.

Additionally, the following observations were made by informants about what works and does not work regarding Goal 1.

- Citizen involvement, if done correctly, can be a tool to cultivate understanding of the program.
- Citizen involvement, if done correctly, can be a tool to cultivate interest in the program.
- There are not enough resources (financial, people-power) for citizen involvement to be done correctly.
- Citizens do not understand how their involvement affects their communities or the statewide program.
- Citizen involvement is tough to maintain/sustain over time.
- Citizen input in a lot of communities comes from the same individuals that consistently participate but may not be representative of the viewpoints of others in the community.
- Having to do citizen involvement is seen as a liability by some elected officials.
- For Goal One to be effective, it is imperative for people to work together to get people involved in planning.

Survey Results

The final mechanism for gathering data on Goal 1 was a web-based survey. In Table 1, we provide an overview of the questions and the frequencies disaggregated by type of planning director.

Opinions on Efficacy

In the survey respondents were asked to indicate the degree to which they agreed or disagreed with a series of statements about the program. The following are some highlights.

Goal 1 is effective in fostering citizen participation in land use planning in Oregon

- 48 percent of respondents agreed or strongly agreed. No county planning directors strongly agreed; just two city planning directors strongly agreed. None strongly disagreed.

Citizen participation in my jurisdiction provides frequent and adequate opportunities for involvement

- Over 77 percent of respondents agreed or strongly agreed. None strongly disagreed.

Citizen participation in my jurisdiction provides for diverse groups of citizens to be involved in planning and decision-making

- Over 68 percent agreed or strongly agreed, but 33 percent of county planning directors either disagreed or strongly disagreed.

Citizens in my jurisdiction feel included in the planning process

- Only 36 percent of respondents agreed or strongly agreed, including 5 percent that strongly agreed.

Citizens in my jurisdiction feel their input is utilized in decision-making

- Just under 41 percent of respondents agreed or strongly agreed. Only one city planning director strongly agreed and no county planning directors strongly agreed.

There should be an institutionalized evaluation mechanism for citizen participation

- Formulating an explicit mechanism for evaluating citizen participation is not a popular idea amongst planning directors. Over 61 percent of city planning directors disagreed or strongly disagreed; just under 28 percent of county planning directors felt the same way.

There should be better enforcement of mandated local-level evaluation

- State oversight of local level evaluation is also unpopular. Only 14 percent of respondents agreed or strongly agreed. The same percentage strongly disagreed.

Effective citizen involvement can lead to a better understanding of the land use planning program

- Planning directors link citizen participation to understanding of the land use system. Only two percent of respondents disagreed.

Better understanding of the land use program can lead to less contention (i.e. fewer LUBA cases, ballot measures)

- Almost 67 percent of county planning directors agreed or strongly agreed, including 29 percent that strongly agreed. Only 39 percent of city planning directors agreed or strongly agreed.

Given more financial and human resources, my jurisdiction would put more effort in citizen involvement

- Almost 39 percent were neutral (neither in agreement or disagreement) while 39 percent agreed or strongly agreed; 22 percent disagreed or strongly disagreed.

Overall, citizen participation efforts are effective in my jurisdiction

- Overall 59% of respondents agreed or strongly agreed that their efforts were effective; not surprisingly no respondents were willing to indicate that their efforts were ineffective.

Table 1.1: Opinions on Goal 1 Performance - City and County Planning Directors

Please indicate the degree to which you agree or disagree with the following statements.	Strongly agree		Agree		Neither agree or disagree		Disagree		Strongly disagree		Total number of responses	
	City	County	City	County	City	County	City	County	City	County	City	County
Goal 1 is effective in fostering citizen participation in land use planning in Oregon	0.0% (0)	11.1% (2)	42.3% (11)	44.4% (8)	34.6% (9)	16.7% (3)	23.1% (6)	27.8% (5)	0.0% (0)	0.0% (0)	26	18
Citizen participation in my jurisdiction provides frequent and adequate opportunities for involvement	15.4% (4)	16.7% (3)	61.5% (16)	61.1% (11)	15.4% (4)	11.1% (2)	7.7% (2)	11.1% (2)	0.0% (0)	0.0% (0)	26	18
Citizen participation in my jurisdiction provides for diverse groups of citizens to be involved in planning and decision-making	11.5% (3)	22.2% (4)	53.8% (14)	50.0% (9)	19.2% (5)	5.6% (1)	11.5% (3)	16.7% (3)	3.8% (1)	5.6% (1)	26	18
Citizens in my jurisdiction feel included in the planning process	7.7% (2)	0.0% (0)	34.6% (9)	27.8% (5)	34.6% (9)	38.9% (7)	23.1% (6)	27.8% (5)	0.0% (0)	5.6% (1)	26	18
Citizens in my jurisdiction feel their input is utilized in decision-making	3.8% (1)	0.0% (0)	42.3% (11)	33.3% (6)	30.8% (8)	38.9% (7)	23.1% (6)	27.8% (5)	0.0% (0)	0.0% (0)	26	18
There should be an institutionalized evaluation mechanism for citizen participation	3.8% (1)	16.7% (3)	15.4% (4)	22.2% (4)	19.2% (5)	33.3% (6)	57.7% (15)	27.8% (5)	3.8% (1)	0.0% (0)	26	18
There should be better enforcement of mandated local-level evaluation	0.0% (0)	11.1% (2)	15.4% (4)	0.0% (0)	19.2% (5)	22.2% (4)	46.2% (12)	55.6% (10)	19.2% (5)	11.1% (2)	26	18
Effective citizen involvement can lead to a better understanding of the land use planning program	19.2% (5)	29.4% (5)	65.4% (17)	41.2% (7)	11.5% (3)	29.4% (5)	3.8% (1)	0.0% (0)	0.0% (0)	0.0% (0)	26	17
Better understanding of the land use program can lead to less contention (i.e. LUBA cases, ballot measures)	3.8% (1)	27.8% (5)	34.6% (9)	38.9% (7)	26.9% (7)	5.6% (1)	30.8% (8)	27.8% (5)	3.8% (1)	0.0% (0)	26	18
Given more financial and human resources, my jurisdiction would put more effort in citizen involvement	3.8% (1)	22.2% (4)	30.8% (8)	27.8% (5)	34.6% (9)	44.4% (8)	26.9% (7)	5.6% (1)	3.8% (1)	0.0% (0)	26	18
Overall, citizen participation efforts are effective in my jurisdiction	7.7% (2)	5.6% (1)	53.8% (14)	50.0% (9)	11.5% (3)	27.8% (5)	26.9% (7)	16.7% (3)	0.0% (0)	0.0% (0)	26	18

Opinions/Insights on Measuring Effectiveness

Additionally, respondents were asked to identify how they would measure the effectiveness of Goal 1 over time (questions 11 and 12 on the survey instrument). The intent of the question was to ask those participating in the system to identify appropriate approaches/mechanisms and measures for judging the effectiveness of Goal 1 in the short and long term. Unfortunately, these two questions were not highly successful as respondents interpreted the question in different ways and answers varied from further opinions on the program to mechanisms for evaluation. The table below thus includes only answers that reflect the intended purpose of the questions.

Table 1.2: Evaluation Ideas from Planning Directors

	City Planning Directors	*County Planning Directors*	*Citizen Involvement Experts*
How could we measure effectiveness of Goal 1?	• Gauge if citizens feel as if their input has been sought, valued and listened to • Gauge familiarity with the state and local land use planning goals • Gauge citizen opinion on their community's efforts in fostering citizen participation • Quantify the ratio of participants (written and oral comments) to the number of notices distributed (mailed and e-mailed) • Count web-site hits for planning projects.	• Determine if citizens are given opportunities to be involved in all phases of planning not just land use decisions • By talking with local Planners and Planning Directors about what local jurisdictions are doing with Goal 1 and how they do public outreach. • Quantify diverse opportunities for participation (Advisory Groups, Participating at hearings, Providing Comments by Mail or Email)	• Quantify number of people attending meetings • Quantify number of non-required citizen involvement events by a jurisdiction • Gauge support of program • Gauge trust level of local government • Gauge understanding of program • Use CCIs to evaluate and provide reports as originally required in local CIPs. • Quantify types and decisions of LUBA cases • Gauge how people feel about continuing to live and work in their communities

V. Discussion

In looking at these various data in totality, three main conclusions stand out. We have dubbed them: Expectations versus Reality; Quantity versus Quality; and Measuring Involvement across Processes.

Expectations versus Reality

We found that many counties and cities, rural and urban, had lofty and ambitious ideas at the outset for what citizen involvement in their jurisdiction would look like and how effective it could be, but history shows that more often than not, these ideas did not come to fruition. Among the reasons identified through our interviews and a web-based survey are: a lack of financial resources for the undertaking, varying levels of interest across communities over time, a lack of political support for citizen participation amongst the elected leadership (including leadership at the local level), and a lack of institutional support for participation and requirements about participatory processes from the state level. However, respondents were uniform in their views that citizen involvement is important and is still a priority for the state.

Excerpts from the conversations and survey data

Citizen involvement was Goal 1 because Oregonians value it highly. It is part of the culture here.

It makes people part of the program.

Without it, nothing would be effective.

It keeps the process transparent.

It ensures that planning is not just a technical exercise.

More can be achieved when people believe in it and are active.

Quantity versus Quality of Participation

Overall, the perception of implementers and experts is that Goal 1 has been successful in mandating opportunities to participate, but that this is not the same as fostering participation. Likewise, they were virtually unanimous in their perspective that some participation is certainly better than none—but they were also worried about the quality of participation (i.e., involvement for the sake of involvement is not good enough.) A common observation was that the land use hearings process tends to be the main avenue for involvement and that this only provides narrowly defined roles for participants in relation to specific land use actions.

There is consensus that indicators or measures of effectiveness must measure both quantity and quality of involvement. Specifically, it was suggested that any evaluation process formulate evaluation questions and establish appropriate measures in accordance to the six subcomponents of the goal. So for instance, an evaluation of communication would need to examine whether there was a communications strategy, how frequently citizens received information or communications related to planning, whether communications were two-way (that involving listening as well as imparting information), and how communications from citizens were responded to or utilized in planning and land use decision-making processes.

To gauge the quality of citizen involvement, participants in this research suggested looking at citizens' understanding of the land use system, their levels of satisfaction with the community in which they live, their understanding of opportunities to participate, and their overall satisfaction with planning (specifically related to their local comprehensive plan). To quantitatively measure effectiveness, participants mentioned tracking numbers of participants at planning events, the number of non-required meetings held in a community, and the percentage of LUBA cases filed and their outcomes.

Excerpts from the conversations and survey data

If there is an upfront investment in citizen involvement, then costs to local jurisdictions and taxpayers will be minimized because plans will more accurately reflect the needs and desires of citizens.

Most local governments are making a least a good faith effort to engage citizens in planning processes. However, planning directors were mixed on whether citizens feel their input makes a difference.

Citizen apathy is one of the biggest barriers local governments face.

Efforts to be more inclusive and far-reaching are very expensive and are sometimes met with limited success.

Measuring Involvement across Planning Processes

Finally, participants in this research also indicated that any evaluation approach for citizen involvement must recognize the variety of planning processes that exist and establish metrics appropriate for these processes. For example, short-range (land use hearings) and long-term (comprehensive plan update) planning require different levels and depth of participation. Furthermore, our expectations for levels of citizen involvement vary across stages in the planning process, namely plan formulation, plan implementation, and plan review.

Excerpts from the conversations and survey data

It is possible that Goal 1 works in some ways and not in others. For example, the rules of testifying in land use hearings provide a forum for people to provide input. The downside is that input must address criteria applicable to the decision—a concept that is hard to understand for many people.

Hearings tend to occur pretty late in the land use process and allow for much narrower citizen input.

VII. Data Needs and Recommendations

As we have stated previously, there is a lack of easily available quantitative data from primary sources suitable for an external evaluation of Goal 1. There are, however, a variety of measures that could be used to evaluate citizen involvement; getting data for these measures would require reporting from local government to a central data repository, such as DLCD.

Rather than create a laundry list of potentially useful data, we have chosen to identify data by relating it to the desired outcomes of the program.

Recommendations for Future Monitoring and Evaluation

To understand if the Oregon Land Use Program has been effective in fostering citizen participation in land use planning, the state and local governments need to develop some form of programmatic evaluation that gathers data on agreed upon performance measures in a defined time period. This evaluation approach should be applicable to all localities so that conclusions can be drawn about the performance of the Goal and appropriate adjustments and improvements in practice can be made. Optimally evaluation measures would gauge both quantity (such as opportunities to participate, level of citizen turnout for key planning events) as well as quality (e.g., extent to which citizen perspectives as acknowledged and considered in planning; level of understanding about land use system amongst various groups in our communities). Likewise, the measures would disaggregate involvement by type of planning process (e.g., short term-land use decisions or long term-comprehensive planning type processes).

Based on the suggestions of research participants, we created a logic model for Goal 1, which is contained in Figure 1.1. A logic model is simply a depiction of a program showing what resources a program needs (inputs), what the program will do (outputs) and what it is to accomplish (short-/medium-/long-term outcomes.) Both outputs and outcomes can be measured although the evaluation mechanisms for them are different.

This logic model reflects four premises: 1) *citizen involvement is still a priority for the state of Oregon and its communities*, 2) *it can be better*, 3) *we currently have no objective way to know how effective it is*, and 4) *the perspectives of planning professionals and citizenry are equally important*. Our logic model is written as if the program were being reestablished today. DLCD, CIAC and local governments are seen as the primary actors.

Outcomes: We see three distinct outcomes (or impacts) of the citizen involvement program. In the short term, the program will raise awareness amongst the citizenry about the land use program and their opportunities/right to be heard in local planning. In the medium-term we see a well-performing program enhancing planning actions at the local level—citizen participation in planning is more robust and citizen inputs influence and strengthen local policy and decision-making. The long-term outcome is a change in conditions: community planning has more successful outcomes and the level of conflict over the system is lessened.

Suggested Outcome Evaluation Approach

1. *A periodic statewide, multi-jurisdictional evaluation:* At the state level, with CIAC oversight, conduct a period longitudinal or panel survey of the state's residents.

   Objective: To gather data on levels of citizen participation or engagement in local land use planning, as well as citizen understanding of and attitudes toward the land use program.

   - This would begin a conversation with citizens about 1) whether citizen involvement is working or not and 2) what would be good citizen involvement.

- This could quantify how many new participants are involved as opposed to only hearing from the 'usual suspects.'
- This would provide information on quality of involvement such as understanding of the program, understanding of public land use documents and the accessibility of those documents (physically and linguistically).
- This would allow people to rate satisfaction of planning process versus outcomes for their communities.
- This would allow for quantifiable information such as percentage of citizens in a jurisdiction who attended meetings, knew of meetings, etc.

Finally, in the logic model, we also recognize the importance of tapping the knowledgebase and professional insights of the state's planning professionals. In particular, it could strengthen the system (and foster learning across government units) if periodically a survey was conducted in which their opinions on the structure and performance of public involvement processes were measured.

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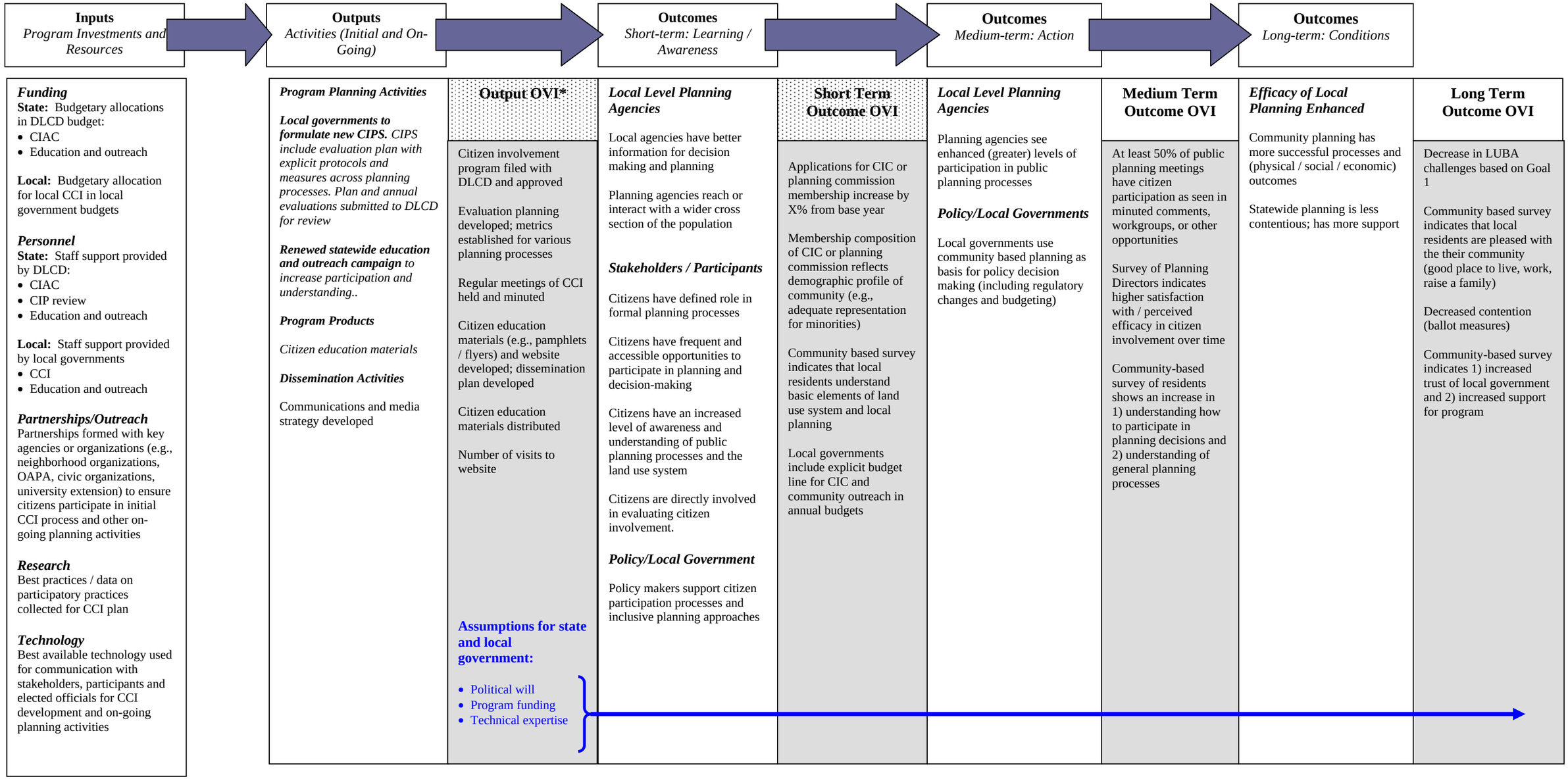
Figure 1.1: Logic Model for Goal One Evaluation
This logic model builds on intentions expressed in original city and county citizen involvement programs (CIP) to develop a *'citizen involvement program that insures the opportunity for citizens to be involved in all phases of the planning process.'*



OVI = Objectively Verifiable Indicator (preferably quantitative data)

Chapter 2
Agricultural Lands

Hannah Gosnell and Garrett Chrostek

Goal 3 Planning Guideline

To preserve and maintain agricultural lands.

I. Introduction

Goal 3, which pertains to the preservation and maintenance of agricultural lands, is one of the cornerstones of Oregon's statewide land use planning program. Specifically, Goal 3 states that "[a]gricultural lands shall be preserved and maintained for farm use, consistent with existing and future needs for agricultural products, forest and open space and with the state's agricultural land use policy expressed in ORS 215.243 and 215.700" (OAR 660-015-0000(3), 1). Goal 3 was established in 1973 in response to concerns about the future of Oregon's agricultural land base, and has evolved over time in response to a variety of factors. How well Goal 3 has performed in meeting its core objectives is unclear, however, thus an evaluative study is warranted.

In the following pages, we summarize the current state of knowledge regarding the efficacy of Oregon's efforts to realize Goal 3, including major data sources used to carry out such evaluations, and provide suggestions for improving future monitoring and assessment efforts. To begin, we briefly review the history of agriculture in Oregon and the evolution of efforts to protect farmland through the statewide land use planning program, then describe major sources of data that researchers have drawn on over the past thirty years in efforts to assess the system. We then present the results of a systematic review of literature and data, informed in part by consultation with experts from state agencies and academic institutions, aimed at answering the following question: *Has Oregon's land use planning program been effective in preserving farmland for farm uses?*

As part of the review, we identify recurring themes, questions and concerns raised in the literature, including the extent to which *high quality* farmlands have been preserved; the impact that *parcelization* of land zoned for exclusive farm use and the rise of *hobby farming* has had on maintaining farmland for farm use; and the extent to which *local governments* have complied with policies governing non-farm dwellings on resource lands. We also consider the cumulative impact of all of the above in contributing to what farmland advocates call the "*impermanence syndrome,*" in which farmers, anticipating the inevitable march of development, reduce investment in their operations and prepare to "sell out" (Nelson, 1992).

Related to the impermanence syndrome is a phenomenon known as "*shadow conversion*" of agriculture, wherein the cumulative impacts of urbanization and nonfarm development adjacent to working farms contribute to farmers' eventual decision to give up farming in

that locale. Finally, we report on perceived gaps in data necessary to more accurately assess the performance of Goal 3, and offer suggestions for how the data gaps might be filled. We also identify questions for future research.

II. History of Agriculture in Oregon

Like many other western states, Oregon's economy has historically been based in agriculture and natural resource production. Oregon's agricultural land, especially in the highly productive Willamette Basin, was a significant draw for westward-bound migrants and played a significant role in the state's development patterns. Agricultural communities were established throughout the state, including the more arid landscapes in eastern Oregon, but much of the current concern about farmland loss is concentrated in the Willamette Basin, where over three quarters of the state's population now lives, and where roughly one third of the state's agricultural products are produced. In 2007, for example, 50 percent of the value of Oregon's agricultural production could be attributed to the Willamette Basin (Daniels and Nelson, 1986; Robbins, 2004; Jim Johnson, ODA, personal communication 2008).

Concerns about farmland loss in the state date back to the 1950s and 1960s—when unprecedented development and population growth led to widespread agricultural land encroachment, particularly in the Willamette Basin (Liberty, 1997; Robbins, 2004). Demand for housing coupled with strong preferences for rural living pushed development away from the urban areas and onto agricultural lands, resulting in "leap frog development" and rural sprawl as residential and commercial development expanded disproportionately to population growth. Although the Willamette Basin was the primary impetus for more stringent farmland protection policy, serious threats to agriculture in eastern and southern Oregon, where amenity migrants and "back-to-the-landers" sought hobby farms and ranchettes, also played a role. Former Governor Tom McCall, who spearheaded the statewide land use planning program during his 1967-1975 tenure, raised concerns about these "sagebrush subdivisions" (Walth,1994).

Farming advocates were concerned about a number of impacts related to unchecked development. First and foremost, rapidly expanding urban areas fuel land speculation, elevating land values beyond what farmers can pay with farm receipts. As a result, landowners often see greater financial gain in development than in agriculture. Rising land prices also discourage new operators from entering the industry, raising questions about the future viability of farming as a profession. Another impact has to do with conflicts between farmers and neighboring homeowners who move into farming communities and are not accustomed to the noise, smells, dust, and other nuisances associated with farming operations. Unabated urbanization can also erode the "critical mass" of farmland and farmers necessary to maintain a farming economy. Without a sufficient market, suppliers, processors, and other industries that support farming operations, such as grain silos, tractor dealerships, and feed stores, go out of business, forcing farmers to find more costly means to obtain these goods and services.

Even as Oregonians became aware of these trends and impacts during the 1960s and 1970s, however, agriculture remained one of the top industries in the state. Agricultural sales increased by over $150 million during the 1960s and over 100,000 people were

employed in agriculture-related jobs in 1971 (Obermiller and Nelson, 1983). Still, agricultural and environmental groups were becoming increasingly worried about the industry's future, as well as the future of Oregon's beloved "open space," given development trends at the time. Legislators representing agricultural interests, such as former state Senator Hector Macpherson, along with Governor McCall, championed efforts to institute comprehensive land use planning that would make farmland protection a top priority for the state. An earlier chapter in this document reviews the history of Oregon's land use planning system.

III. Key Data Sources for Tracking Agricultural Land Use Change

The first step in evaluating the performance of Goal 3 is understanding the type and availability of relevant data. A review of the literature and discussions with land use policy analysts reveal seven primary sources for data that are (or could be) utilized to evaluate the effectiveness of Oregon's land use program in preserving agricultural lands for agricultural uses. This section provides an overview of these sources along with a limited analysis of their strengths and limitations.

The ***USDA Census of Agriculture***, also known as the "Ag Census," is taken every five years and claims to be a complete count of U.S. farms and ranches and the people who operate them. The Ag Census looks at land use and ownership, operator characteristics, production practices, and income and expenditures, among other things. Because it tracks this data by farm size, it is useful for understanding how small- and medium-sized farms are faring compared to commercial operations, shedding light on hobby farm dynamics, for example. It should be noted, though, that small farm advocates and those concerned about the plight of "the ag-of-the-middle" have expressed concerns about underreporting among this class of operators, resulting in a lack of data representing recent growth and dynamism in this sector. Because it reports on operator characteristics, the Ag Census aids in investigations of the aforementioned "impermanence syndrome" by tracking median operator age and changes in levels of investment in farming equipment.

One limitation of this data source is that, while it provides information about farmland loss over time, it does not indicate how land previously in farms is currently being used. Another problem relates to the definition of "farm," which has been changed nine times since the census was established in 1850. The current definition, first used for the 1974 census, is any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. Most researchers agree that data comparability is generally limited to the 1997, 1992, and 1987 censuses. In addition, a few important definitional changes for the 1997 census may affect comparability for some data; for example, farms with all of their land in the Conservation Reserve Program (CRP) or Wetlands Reserve Program (WRP) were included as "farms" in 1997, but not in 1987 or 1992. This inconsistency in data complicates tracking long-term trends. Finally, since it is a national survey, the Ag Census does not differentiate between farms zoned for "exclusive farm use" (hereafter EFU) in Oregon and those zoned for rural residential use. This compromises efforts to assess the extent of *unplanned* farmland loss (conversions taking place on EFU land) and, by extension, the performance of Goal 3 (Pease, 1994).

The ***Natural Resource Inventory*** (NRI), managed by the Natural Resources Conservation Service (NRCS), is an agriculturally-oriented statistical survey of land use and natural resource conditions and trends on U.S. non-federal lands that utilizes remote sensing techniques. NRI data is an excellent source for assessing land use change over time (Kline, 2000). Its compatibility with zoning overlays enables more precise analyses of *where* farmland loss is occurring and thus the extent to which planning efforts are working. It also includes data on soil quality, which aids in understanding whether and where *high quality* farmland is being lost. A major limitation on its usefulness, however, is the fact that the data is only available for the time period between 1982 and 1997. Also, technical problems have prevented the release of the most recent (2002) data, further frustrating analyses of recent land use change.

The ***Forest Inventory and Analysis Program*** (FIA), managed by the U.S. Forest Service, is similar to the NRI but is better-suited for evaluating land use change in forested regions. Systematic surveys of plots occur roughly every ten years and are regional in scope, but consist of significantly fewer observations than NRI data. Although the focus of the FIA is to gather forest-related information, some plots fall on other land cover types, including cropland. Kline and Alig (1999) note that users of this dataset should be cautious, as FIA data is too "coarse" to draw solid conclusions on land use change.

DLCD "Farm & Forest Reports," produced annually for the Land Conservation and Development Commission (LCDC) since 1981 (the reports did not become mandatory until 1984), represent a promising but perhaps underutilized source of data for assessing the performance of Goal 3 over time. The reports track land use activities in the state's farm and forest zones, providing data regarding approvals of dwellings, land divisions, and other land uses by county. Land use change analysts have long suggested that these reports "could be useful in evaluating trends if compiled in a computer database program, especially a geographic information system, which would permit spatial analysis and soils/landforms analysis" (Pease, 1994:178). This data could aid in evaluating planned versus unplanned loss of agricultural lands, and could make data regarding increases in nonfarm dwellings on EFU land spatially explicit (e.g., see Veka, 2008).

The ***Oregon Department of Agriculture***, in cooperation with the USDA's ***National Agricultural Statistics Service*** (NASS), provides data on production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of U.S. producers, along with a variety of other metrics. Although this source does not track land use change, it offers insight into the economic health of Oregon's agricultural sector and could be used to evaluate the effects of policy changes. It could also be utilized to monitor parcelization through tabulations of the number and types of operators.

The USDA's ***Economic Research Service*** (ERS) conducts research on economic and policy issues involving food, farming, market and trade economics, as well as natural resources and rural development more generally. Periodic reports on topics like hobby farming have been deemed very useful by land use change researchers in Oregon.

Oregon State University's Extension Service and the ***Oregon Agricultural Experiment Station*** produce a variety of agricultural reports by county. Similar to the NASS, the Extension

Service and Agricultural Experiment Station compile a wide range of agriculture related statistics, generally available by county. The Agricultural Experiment Station also produces reports on a wide variety of agriculture-related studies specific to Oregon.

IV. Evaluating the Performance of Goal 3

Oregon has received widespread recognition for its efforts to develop an innovative suite of planning strategies aimed at combating farmland loss. The American Planning Association, for example, described it as a "model" land use plan (Pease, 1994). Given the widespread interest in assessing the positive and negative impacts of Oregon's system among academics, planners, policymakers, developers, and a variety of other opponents and advocates, and the large amount of relevant data on farmland loss and preservation, one would expect to find a series of systematic evaluations over the past thirty years; yet the literature is surprisingly limited.

As Kline (2000) notes, there are a number of challenges involved in isolating the effects of a given land use planning program from endogenous factors including, for example, "population densities, regional economic growth, new industries, changes in personal income, changes in average household sizes, changes in tastes and preferences regarding housing, the availability of land for re-development, regional comparative advantages of land in different uses, and physical land features, such as slope, that constrain certain uses, among others" (Kline, 2000:7). For these reasons, few studies have attempted to investigate this research question and fewer still have provided confident conclusions. Evaluative research is further complicated by the evolving nature of the land use program. Periodically the Oregon Legislature, the Land Use Board of Appeals (LUBA), the DLCD, or the courts institute new laws or policies to correct perceived problems. These structural changes add complexity to obtaining and analyzing data, as policy changes and sampling periods are rarely aligned.

Therefore, this study does not in any way *quantify* the successes of Oregon's system or even provide a definitive answer as to its overall effectiveness. It simply summarizes the evidence and draws tentative conclusions based on principles of effective farmland protection strategies outlined in the literature. One useful set of criteria, we suggest, states that an "effective" farmland protection program will: (1) increase the productive value of farmland; (2) stabilize, reduce, or eliminate consumptive value (value of farmland tracts as a single home site); (3) eliminate inefficient speculative value of farmland, which can happen only if speculative value attributed to urban spillovers, inefficient urban development subsidies, and undervaluation of the public goods provision of resource land, is offset; and (4) eliminate the impermanence syndrome, which should be accomplished if the first three objectives are met (Nelson, 1992:3). Nelson's criteria for efficacy, along with other measures, provide a general framework for evaluation of the success of Oregon's approach to farmland protection.

Preservation of Farmland for Farm Use

Farmers and developers often compete for the same land, with flat parcels having good access to water being an ideal property type for both uses (Furuseth, 1979). For this reason, there is greater pressure for conversion of agricultural lands than forest lands, as

the latter tends to be less accessible by road and more topographically diverse (though in today's market, these attributes are more attractive). This section reviews literature that addresses the program's ability to retain land in agricultural uses and reduce rates of conversion. Some of the literature compares the Oregon program's performance with programs in other states. A recurring theme throughout the literature is the difficulty of isolating the effects of Oregon's land use planning system on farmland preservation, given all the other factors that could be contributing to land use change over time.

Early evaluative work in this area involved simple comparisons of basic statistics regarding farmland loss, typically relying on Ag Census data. Daniels and Nelson (1986) were the first to attempt a quantitative evaluation of Oregon's farmland protection program. The authors concluded that Oregon was performing better than national averages for retaining farmland, given that, between 1978 and 1982, Oregon lost only 1.7 percent of its farmland while the nation lost about 3 percent. They also found that Oregon had lost fewer acres of farmland during that time period than did Washington, a comparable state with no statewide land use planning at the time (Daniels and Nelson, 1986). However, given that the study was conducted before many of Oregon's county comprehensive plans were completed and approved by the DLCD, the findings probably underrepresented the program's fully implemented potential. In addition, the study did not account for many of the other factors influencing land use conversions discussed in the previous section.

Nelson (1992) conducted further comparative research and discovered that, between 1982 and 1987, Oregon gained more farms over 500 acres (proportionately) than did Washington or the U.S., while losing fewer mid-size farms of 50 to 499 acres. He attributed these results to Oregon's land use planning system, but without sufficient analysis of endogenous factors, the conclusiveness of his findings was not definitive.

A 1998 study resulting from a collaborative effort to examine land use change in Oregon by the Oregon Department of Forestry, USDA Forest Service, DLCD, and Oregon Department of Agriculture focused on the effectiveness of Oregon's land use program in protecting resource lands in western Oregon, but produced inconclusive results, as periods during which rates of farmland loss decreased were again associated with endogenous factors such as decreases in population growth and personal income (Lettman, 1998).

In 1999, Kline and Alig attempted to address some of the endogenous factors complicating analysis of Oregon's land use planning program by developing an empirical probit model that incorporated population growth, personal incomes, geographic location, ownership patterns, and various land rents. Using a number of dummy variables for the presence of land use laws and zoning restriction, the authors estimated the likelihood that land in western Oregon and Washington classified as agricultural or forestland changed to land classified as developed between 1962 and 1994. Land use change data came from the U.S. Forest Service's Forest Inventory and Analysis (FIA) program, which conducts periodic inventories of private land based on a systematic sampling of plots on the ground. Results from this study suggested that, after controlling for population growth, the actual timing of plan implementation, and other factors, there was no statistically significant difference in the likelihood of forest and farmland being developed before and after the implementation of Oregon's land use program. The authors attribute their findings to the possibility that lands now located within forest and agricultural zones have

always been less likely to convert to residential uses relative to lands now located within urban growth boundaries, because of their greater distance to urban areas, where development is most likely. Other explanations for the apparent absence of a post-plan implementation decrease in rates of farmland conversion include "leakage" of urban development through hobby farms, in which case a parcel might appear to have been developed but in fact remains as farmland; and noncompliance or weak compliance of local governments with the statewide program, although the authors make no differentiation between farm and non-farm developments on resource lands. The authors also caution that the Forest Inventory and Analysis data may have been too coarse to examine changes in rates and patterns of forest and farmland development and resulting effects of land use zoning over the period examined (Kline and Alig, 1999).

Nelson (1999) also developed a set of indicators for analyzing the effectiveness of state growth management strategies that attempted to take into account linkages between population growth and land use change. Using data from the U.S. Census and the Ag Census, he calculated farmland loss per new resident, and showed that between 1982 and 1992, Oregon lost .33 acres per new resident, whereas Georgia, a state without strong land use planning, lost 2.1 acres per new resident (Nelson, 1999:124).

Kline (2000) identified several problems with Nelson's methodology, data sources, and indicators of land use change and urban sprawl. First, he noted that the U.S. Census defines urban areas based on population density and thus fails to capture growth in urban fringes. The Ag Census was also an imperfect data source for measuring land use change, he argued, since it is based on a survey of landowners rather than land use. It also includes landowner income thresholds as part of the definition of farmland, which could result in lands that have been abandoned or converted to hobby farms (and no longer meet the income test) inaccurately being recorded as "lost" to conversion. To overcome these data limitations, Kline proposed incorporating NRI data into Nelson's indicators because it is a survey of land use rather than landowners, and thus more accurately describes land use change. Recalculating Nelson's indicators for farmland loss using NRI data, Kline produced different results. Kline's analysis of farmland loss in relation to population growth between 1982 and 1992, found that Oregon lost .71 acres, Florida lost .36 acres, Georgia lost .63 acres, and the nation as a whole lost .84 acres of farmland for each new resident (Kline, 2000:4). These results suggested that Oregon had performed slightly better than the national average, but no better than a state with a strong land use program (Florida) nor a state with a weak program (Georgia). Kline then expanded the study period to 1982-1997, which produced similar results, with Oregon losing .84 acres, Florida losing .45 acres, Georgia losing .75 acres, and the nation as a whole losing 1.03 acres of farmland per new resident. In his conclusions, Kline argued that the effectiveness of a state's land use planning program, especially in comparison to other states, could not be adequately determined based on these indicators, given the many other factors shaping development patterns (Kline, 2000).

A 2002 report by Lettman provided a better understanding of the long-term effects of land use planning in Oregon because of a longer study period, which spanned 1973 to 2000. Using aerial photographs, the authors identified dominant land uses in repeat photos taken from several photo-points in western Oregon. Zoning maps from county comprehensive plans were then overlaid to determine if development had occurred in areas designated for development, or in areas reserved for resource use. The authors then

broke the study period into three "eras" in Oregon's land use planning history: 1973 to 1982, during which the policy had been enacted but most counties and cities did not yet have comprehensive plans; 1982 to 1994 when comprehensive plans were first activated; and 1994 to 2000, characterized by high rates of growth in both population and personal income. Results from this study indicated that private lands closest to urban areas were more likely to experience conversion than those at greater distance throughout the study period, as predicted. The study also documented declining rates of resource land (lands zoned as exclusive farm or forestry use) conversion over time, though there was a slight increase in agricultural land conversion during the latter period (See Table 2.1). The percentage of total agricultural land conversions that became low density residential housing (generally characterized as "rural sprawl"), however, declined throughout the study period (See Table 2.2).

Table 2.1: Agricultural Land Use Change in Western Oregon by Year

	1973	1982	1994	2000
Percentage of Area in Intensive Agriculture	18.7%	17.8%	17.5%	17.3%
Change from Previous Measurement	N/A	-.9%	-.3%	-.2%

Source: Lettman, 2002

An examination of differences between planned and unplanned agricultural loss during the 1973 to 2000 time period found that while 18,000 acres of agricultural land in areas planned for development were lost, only 1,000 acres were lost in areas zoned for exclusive farm use. These results suggest that the system has indeed been effective in steering development away from areas designated for agricultural uses. Finally, the authors noted that only 7 percent of land in intensive agricultural use is classified as developable by county comprehensive plans (rural residential, rural exemption areas, and urban areas inside urban growth boundaries), which suggests that local governments, through their comprehensive plans, have performed fairly well in identifying and zoning areas for agricultural uses (Lettman, 2002).

Table 2.2: Agricultural Land Use Change in Western Oregon by Period

	1973-1982	1982-1994	1994-2000
Acreage of Agricultural Land Conversions	12,000	2,000	3,000
Annual Rate of Agricultural Land Conversions	-.6%	-.1%	-.2%
Percentage of Low Density Residential Conversions from Total Agricultural Land Conversion Previous Period	63%	47%	14%

Source: Lettman, 2002

Lettman (2004) then conducted a similar analysis of eastern Oregon but only divided the study into two periods, 1975-1986 and 1986-2001, and differentiated between rangelands (large tracts of land with no significant rainfall, irrigation, forestation, or habitation) and intensive agriculture (actively farmed areas such as cropland associated with very low development densities). As in the western Oregon study, the rate of all resource land conversions decreased between 1975 and 2001. There were differences, however, in rates of conversion between the two land classes, with rangeland converting at a higher rate, suggesting that the system had been successful in steering development away from higher quality farmland (Table 2.3). In addition, while development of intensive agricultural land tended to take place in areas zoned for development rather than for resource use, the reverse was true for rangelands, which saw more in the way of unplanned development. The authors noted that significant development around Bend during the 1990s was a major factor contributing to increased loss of rangeland in the latter period.

Table 2.3: Agricultural and Rangeland Land Use Changes in Eastern Oregon by Period

	1975-1986	1986-2001
Total Conversions of Intensive Agriculture in Acres	34,000	19,000
Average Annual Conversions of Intensive Agriculture in Acres	3,000	1,000
Percent of Intensive Ag Conversions to Low Density Residential	91%	89%
Total Conversions of Rangeland in Acres	135,000	78,000
Average Annual Conversions of Rangeland in Acres	14,000	5,000
Percent of Rangeland Conversions to Low Density Residential	27%	59%

Source: Lettman, 2004

Results from the three Lettman reports suggest that Oregon's land use system has been effective in slowing rates of farmland loss, given that 89 percent of non-federal resource lands in western Oregon, and 97 percent in eastern Oregon, have remained in resource use since the mid-1970s; however, the program appears to be more effective at preventing unplanned development in western Oregon. These reports, like others, do not adequately investigate the influence of other development factors. Population growth and personal income are mentioned but not specifically analyzed, thus preventing any conclusions regarding causal relationships between planning and farmland preservation.

Kline (2005a) drew on the Lettman (2002) results to conduct a reexamination of development rates and patterns as a follow-up to his 1999 study. This new dataset offered many more observations of land use and land use change than previous data, and also included data describing "structure counts"—the numbers of buildings of any size or type within 80 acres surrounding sample points. To better examine the effects of proximity to urban areas, this study also included a gravity index to account for the combined influence of city proximity and size as likely commuting destinations for work.

The gravity index was computed as the sum of populations of cities within a 60-minute drive (commute) to each sample point, weighted by the estimated driving time to each city's edge. Rather than using discrete land use classifications from this new data set, similar to that used in the 1999 study, Kline instead examined changes in the structure counts as the dependent variable in a negative binomial regression model. A set of explanatory variables described the locations of land within designated forest, agriculture, and urban growth zones following implementation of land use planning, enabling comparison between rates and patterns of growth within each zone before and after zoning implementation to be compared. Results from this study provided evidence that Oregon's land use laws *have* had a measurable effect on reducing the rate of farmland conversion. The coefficient representing the location of farmland within agricultural use zones after implementation of zoning ("Farm Land x Land Use Law" in Kline, 2005a: Table 3) was negative and statistically significant, suggesting that rates of farmland development have decreased on lands now located within agricultural use zones since the implementation of the program. Coefficients from this regression were then used to estimate the number of structures constructed on farmland with implementation of land use planning and also in a scenario assuming planning had not been implemented. Structure estimates were then converted into "structure density" categories with 0 to 6 structures per square kilometer representing "undeveloped" land, 7 to 25 structures per square kilometer representing "low-density" development, and greater than 25 structures per square kilometer representing "developed" land. Kline estimated that by 1994, 299,023 acres of agricultural land (14.4 percent of agricultural land identified in western Oregon in 1974) would have been converted to "low-density" or "developed" had land use planning not been implemented (Kline, 2005a: Table 4).

Shortly after the passage of Measure 37, Kline (2005b) attempted to estimate future farmland conversion if Oregon's land use planning system was rendered completely unenforceable by passage of the measure. Using the same model of land use change described above (Kline, 2005a), he projected structure counts on farmland for 2004 to 2024. Results suggested that without land use planning, an additional 387,878 acres of farmland would be converted to the "low-density" classification described above, and 282,828 acres would become "developed" (Kline, 2005b: Table 3). These figures implied that Oregon's land use program, if it remained intact, would continue to have a measurable effect on farmland preservation in the future.

More recently, Wu and Cho (2007) analyzed land use change in five western states (including Oregon) between 1982 and 1997, with the goal of establishing linkages between land use regulations and the supply of developable land. Their analysis was based on the assumption that land that has greater value in permissible developed uses than it does in resource use will be converted, and that the value of land for agricultural use is determined by land use regulations that increase the value of resource production such as the establishment of agricultural districts and/or decrease the value of development such as performance zoning. Estimates of land conversion in the five states were derived from NRI data, and probabilities of conversion were acquired from a previous model that included socioeconomic characteristics, various financial risk variables, and a measure of urbanization pressure while assuming no land use regulations.

Based on their analysis, Wu and Cho suggest that Oregon's land use planning system prevented 12.6 percent of the total developable land supply from being developed

between 1982 and 1997, and that the most effective form of land use regulation has been incentive-based policies such as tax deferrals, which have reduced the supply of developable land by 8.4 percent. In comparison, Washington's land use regulations prevented 13 percent of the state's total land supply from becoming developed with 8.7 percent attributable to incentive-based policies, and Idaho had a 4.7 percent reduction with 3.2 percent associated with incentive based policies. The authors acknowledge that these estimated figures may be inflated, given that they do not capture any secondary general equilibrium effects of actual land developments (e.g., decreased profits from additional development resulting from the effects of initial development such as market saturation) (Wu and Cho, 2007).

A review of the literature reveals an overall consensus that Oregon's land use program has been effective in preserving the agricultural land base. Although it has not performed markedly better in comparison to other states (Kline, 2000), it has produced measurable results when compared to the alternative of no land use program (Kline, 2005a; Wu and Cho, 2007). Obviously, this research cannot determine if the benefits of agricultural land conservation resulting from the land use program have outweighed the costs of implementation and other various opportunity costs. But even when the broad range of factors influencing development patterns are taken into account, the research reveals that Oregon's land use system has played a significant role in slowing the rate of farmland conversions since its implementation.

Aside from these major peer-reviewed studies aimed at assessing the efficacy and outcomes of Oregon's land use planning program, there are a number of unpublished reports, websites, newsletters, and newspaper articles relevant to this study. Oregonians in Action and 1000 Friends of Oregon, for example, are interest groups who hold opposing views on the need for land use planning. These groups circulate newsletters, produce reports, maintain websites, and write books, many of which involve non-peer-reviewed analyses of the land use program's efficacy (Pease, 1994). Literature produced by these and other related organizations has produced mixed results, and are beyond the scope of this review.

Preservation of High Quality Agricultural Lands

An important aspect of Goal 3 is the notion that in order to maintain a viable agricultural economy, simply aiming to preserve farmland in general is not enough; rather, *high quality* farmlands must be preserved (OAR 660-015-0000(3)). The quality of soil in a given area pertains to its suitability for sustained agriculture production and ranges from Class I to Class VIII according to the NRCS Soil Capability Classification System. Soil quality is a function of soil type, geographic location, water availability, and other variables. Class I soils are generally suitable for any type of agricultural use and require little management to achieve optimal production results, while soils in Class IV exhibit characteristics suitable for a very limited number of crops and therefore are generally used for pastures and woodlots. Class VIII soils cannot support commercial agricultural activities and are generally left for wildlife, recreation, or aesthetic purposes (Marion County Planning Department, 2004). Farmland in EFU zones in western Oregon include Class I-IV soils, with approximately 60 percent of the soils in the Willamette Basin classified as Class I-IV, and just over 20 percent in Class I (Enright et al., 2002). Soils in EFU zones in eastern Oregon range from Class I-VI.

While this is an important metric to track, our review found a very limited number of peer-reviewed articles linking soil quality specifics with Oregon's land use planning program. Most of the studies that mention farmland quality simply refer to soils in EFU zones as "high quality" or "prime" (Furuseth, 1979; Nelson, 1992). We found no studies that investigated rates of conversion by soil class.

One study that could be relevant, but only if *westside* and *eastside* are used as proxies for high and low quality soils, suggested that efforts to prevent farmland loss have been more successful in western Oregon than in eastern Oregon. Liberty (1998) compared the westside Willamette and Lower Columbia Basins with the eastside Deschutes River Basin in terms of farmland loss and population growth and found that, on average, for every 1000 new residents, 480 acres of farmland were lost in the Deschutes, compared to only 156 acres in the westside basins.

Impact of Hobby Farms and Parcelization on Exclusive Farm Use

Hobby farms, recreational retreats, and rural residential developments are generally seen as a threat to commercial farming because they typically (but not always) are situated on or near productive agricultural land. Because buyers of such properties tend to prefer smaller parcels and are willing to pay higher prices than the land is worth for agricultural uses, their purchases drive up land values while simultaneously contributing to parcelization. These twin threats can erode farmers' confidence in the future viability of farming and increase the temptation to break up large tracts of farmland to take advantage of emerging, and more lucrative, real estate markets. Also, reductions in production levels resulting from conversion to hobby operations threaten the critical mass of agricultural activity necessary to sustain the commercial farming infrastructure, and by extension, the local agricultural economy (Buttel, 1982; Daniels, 1986; Daniels and Nelson, 1986; Furuseth, 1980). This section explores the literature pertaining to hobby farms and parcelization in Oregon, focusing on the nature of the threats they pose to commercial agriculture, as well as the extent to which the rise in hobby farming in Oregon can be attributed to unintended consequences of the state land use planning program.

Daniels and Nelson (1986) were the first to bring attention to the proliferation of hobby farms in Oregon, noting that between 1978 and 1982, Oregon ranked fifth in the nation in terms of the percentage increase in small farms (the authors defined small farms as less than 50 acres). Oregon added 600 more small farms during this period than did Washington, for example, which did not have statewide land use planning at the time. The authors also identified a growing imbalance in farm types, with the ratio of commercial farms (farms reporting $10,000 or more in annual sales) to small farms decreasing by 20.8 percent and the ratio of commercial farms to farms of less than 10 acres decreasing by 36.5 percent (Daniels and Nelson, 1986).

The authors attributed the rise of hobby farms (non-commercial farms) during the first decade of the land use program to four major factors. First, rural settings were becomingly increasingly attractive to Americans at this time, evidenced by the West's first big amenity migration boom during the 1970s (see also Travis, 2007). Second, until the comprehensive plans required by the new land use planning system were completed, county specific minimum lot sizes tended to result from political compromise rather than

agricultural and economic analysis. These somewhat arbitrary determinations generally favored smaller lot sizes and therefore counteracted the desired effects of keeping large tracts of agricultural land intact. The authors also found that county commissioners were playing a significant role in decisions regarding development, for example by overruling planning officials and approving inappropriate farm dwellings. Third, while adoption of large minimum lot size requirements may have discouraged subdivisions, it may have inadvertently encouraged the growth of hobby farming on larger lots. Finally, hobby farm development was inadvertently accelerated by perverse incentives, especially lenient requirements regarding eligibility for reduced property taxes intended for "real" farmers. Since any property in an EFU zone was initially automatically assessed based on "farm value," improper assignment of farm use tax status often took place, not only contributing to the proliferation of hobby farms, but also wrongly burdening urban taxpayers. It was not until 1983 that the Oregon legislature addressed this problem, amending Goal 3 to include "performance based zoning" through the "means income test" to better designate tax status.

Daniels (1986) conducted additional research on hobby farm proliferation and found that the average size of a Willamette Basin farm decreased by 18 percent between 1978 and 1982, from 144 to 117 acres. Given the simultaneous rise in total farms, these findings suggested that hobby farming might be contributing to greater fragmentation of the farmland base. Supporting this hypothesis was the fact that the average annual sales from farms grossing less than $10,000 dollars also fell during this time period, which Daniels attributed to hobby farmers using their land less productively than the former small farm owners. The effects of hobby farming were also reflected in land prices, as the per acre value of farmland increased by 53 percent during the study period, with greater increases found in proximity to urban areas. Based on this research and previous work by others, Daniels determined that hobby farming was *the* primary threat to commercial agriculture in Oregon.

Responding to Daniels and Nelson, Bernhardt (1988) used Standard Industrial Classifications (SIC) and the Ag Census to better describe the dynamics of farmland consolidation and parcelization in the Willamette Basin between 1978 and 1982. Daniels and Nelson were primarily concerned with the decline in the number of midsize farms (a.k.a. "the ag-of-the-middle") and the rise in the number of small farms; but by breaking down farm figures into acreage, Bernhard discovered that farms over 320 acres gained *more* acreage than farms with less than 20 acres. Her results suggested that more consolidation occurred during this period than parcelization. She also placed farms into their SIC groups to identify which *types* of farms experienced the greatest change in acreage and found that the least efficient farms in terms of adjusted gross incomes were the most susceptible to parcelization, while SIC groups with the highest incomes saw an increase in acres farmed. These findings provided evidence of a strong agricultural sector supported by a competitive market.

Nelson (1992) also found evidence suggesting that hobby farms and large-scale commercial agriculture were able to coexist. In spite of declining productivity in the small farm sector, agricultural production and the overall value of agricultural products in the state increased from $619 million in 1982 to $909 million in 1987. Nelson further concluded that the more productive hobby farms might be *beneficial* to commercial farms

in the Willamette Basin, adding new dimensions to the agriculture economy and helping maintain farming industry infrastructure.

There has been little recent work on hobby farming in Oregon, although the Oregon Board of Agriculture keeps track of this sector in annual reports drawing on the Ag Census. The most recent (2007) report noted that hobby farm proliferation continued between 1992 and 2002, evidenced by a 7 percent increase in the number of farms in Oregon with less than $10,000 in annual sales and a 2 percent increase in acreage. Contributions to total state agricultural production attributed to this sector decreased from 2.3 percent to 1.9 percent during this same period (Table 2.4). While these numbers might denote a threat to the viability of Oregon's agricultural economy, the report points out that a growing number of small farms are filling a niche, supplying produce for local restaurants and farmers' markets, and that overall agricultural production in the state continues to grow (Oregon Board of Agriculture, 2007). The report does raise concerns, however, about the status of the "ag-of-the-middle," which saw declines in all three metrics.

Table 2.4: Farm Composition and Contribution in Oregon, 1992-2002

	% of farms			% of ag production $$			% of acres		
Farm Size by Annual Sales	**1992**	**1997**	**2002**	**1992**	**1997**	**2002**	**1992**	**1997**	**2002**
<$10,000	62.1%	61.8%	69%	2.3%	1.9%	1.9%	11%	9%	13%
$10,000-$250,000	31.6%	31.2%	25.3%	27.1%	21.5%	18.6%	51%	51%	45%
>$250,000	6.3%	7%	5.6%	70.6%	76.6%	79.6%	38%	40%	42%

Source: Oregon Board of Agriculture, 2007

There are problems, however, with using average farm size as a proxy for investigating the extent of parcelization, especially for the purposes of evaluating the efficacy of the Oregon land use program. The USDA National Agriculture Statistics Service (NASS) produces figures on average farm size (used in the Oregon Board of Agriculture report) based on self-reported statistics collected through the Census of Agriculture, and the Ag Census definition of a farm. As discussed previously, there are definitional problems with the term "farm" in the Census which make it difficult to track changes in average farm size over time. As a result, differentiations should be made between farms of varying levels of income. This type of analysis has not been performed by NASS and, to our understanding, has not been undertaken for the state of Oregon by anyone with data dating back to the 1970s. Further complicating such analysis for Oregon is the fact that NASS's figures do not differentiate between farms in EFU zones and those in other zoning types which would more accurately gauge the program's ability to preserve large tracts of farmland planned for resource use (Jim Johnson, ODA, personal communication 2008). Such research would then need to incorporate other factors influencing rates of parcelization such as farm incomes and population growth in order to establish causal relationships.

As an alternative to tracking average farm size, the Oregon Department of Forestry is currently developing an indicator to predict future forest land development in Oregon

based on historical and current tax lot parcelization. The indicator is intended to shed light on the relationship between parcelization and development. Data collection involves the use of tax data and county assessors' maps to determine change over time in the number of tax lots, the number of owners, and the number of buildings present within 640-acre circles surrounding FIA (Forest Inventory and Analysis) field plots. Data has been collected for five representative counties for the years 2006, 1994, and 1974. Not surprisingly, regression analysis of this dataset indicates a strong correlation between the number of tax parcels and subsequent increases in the numbers of buildings. Thus, parcelization, i.e. the number of tax lots within the above-mentioned field plots, could be used as a reasonable indicator of future development (i.e. increases in buildings). This methodology is far superior to measuring average farm size because information developed about parcelization and development from assessors' maps could be used in conjunction with digital aerial photos used in Oregon Department/FIA land use studies allowing documentation of actual land use changes (in addition to the addition of structures). Zoning overlays could also be incorporated to compare parcelization in various zoning designations in order to assess "planned" versus "unplanned" development. In addition, this methodology relies on a larger number of observations than NRI data (Gary Lettman, ODF, personal communication 2008).

Local Government Compliance

Some studies (Coughlin, 1981; Daniels and Nelson, 1986) have focused on the extent to which local governments are complying with state land use policies, programs, and goals, including adherence to local comprehensive plans. A common concern in the literature has to do with patterns and impacts related to the permitting of farm and non-farm dwellings on resource lands. This section reviews literature relevant to this topic.

Pacific Meridian Resources (1991) found that the majority of new dwellings approved in EFU areas, between 1985 and 1987, were not being used in conjunction with commercial farm use, defined by performance-based standards as at least $10,000 in annual income from farming. Most farm operations of less than 80 acres on which new dwellings were permitted, and approximately 90 percent of farm operations of less than 160 acres, reported no farming receipts. More than half of farm operations approved for new dwelling units statewide (358 of 667) were located in the Willamette Basin, and approximately a third of the forest operations that received approval for new dwellings units were not being managed for timber production.

The Oregon legislature and LCDC attempted to address this problem in a 1993 amendment to the laws pertaining to resource land use, mandating that counties report dwelling approvals on resource lands to the legislature (the impetus for the annual DLCD Farm & Forest Reports mentioned above). The most recent (2007) report (DLCD, 2007) reveals that between 1994 and 2005, the annual number of new dwellings approved in farm zones decreased from 1137 to 747, with the greatest reductions occurring in approvals for primary farm residences (Table 2.5).

Table 2.5: Dwelling Approvals in Farm Zones, 1994-2005			
Type of Dwelling	**1994**	**1999**	**2005**
Primary Farm	372	88	84
Accessory Farm	122	53	23
Family Farm Help	34	59	49
Temporary Hardship	105	105	89
Lot-of-Record	68	94	51
Non-Farm	225	208	218
Replacements	211	354	233
Total Approvals	**1137**	**961**	***747***

Source: DLCD, 2007

While the Farm & Forest Reports represent a significant improvement in monitoring activities related to Goal 3, the DLCD has been criticized for not following up on resulting resource uses after farm zone dwellings have been approved, and for not using spatial analysis to track development patterns. A University of Washington graduate student (Veka, 2008) demonstrated the utility of this approach in an analysis of the effects of approval and siting of dwellings in Hood River County between 1994 and 2005. She sought to determine whether increases in dwellings led to decreased resource land activity, and whether siting decisions had been effective in preventing resource land conversion to other forms of development. Using aerial photos to locate dwellings on resource lands, Veka classified the surrounding resource uses and documented how resource use had changed. Results showed there were no significant differences in either resource use or land conversions between areas where higher numbers of dwellings were approved on resource lands and areas were fewer numbers of dwellings were approved. In fact, there were instances in which dwellings approved for resource use corresponded with more intensive (activities requiring more investment) resource use on surrounding lands. Although this study was not statistically robust, land use planners have expressed great interest in the potential for applying this methodology in other parts of the state.

Cumulative Effects: The Impermanence Syndrome

As described earlier, "impermanence syndrome" is a term that has been utilized by many scholars and planners to describe the actions of farmers who believe that farming has no future in a particular area due to the inevitability of ongoing urbanization (Nelson, 1992). It manifests as disinvestment in farming inputs, sale of farmland tracts for hobby farm or acreage development, and shifting of crops from those requiring labor or capital intensity, such as berries and orchards, to those requiring little labor or investment, such as pasture or annual crops. Nelson has suggested that an effective farmland conservation program would be able to prevent "impermanence syndrome." This section reviews literature (most of it outdated) assessing the efficacy of Oregon's land use system in maintaining farmers' confidence in the agricultural industry and not only keeping them on their land, but inspiring confidence in the rationality of investments for the future.

One method for assessing the onset of "impermanence syndrome" involves tracking investment in farm operations and the average age of farm operators. Using the Ag Census, Furuseth (1981) found an increased investment in equipment and machinery and a decrease in average operator age during the 1970s, both of which demonstrate overall confidence in the future of agriculture. In addition, agricultural production increased in several urban counties, which would seem to negate the presence of "impermanence syndrome" given that farms in these counties would likely face greater pressure related to urbanization. He concluded that Oregon's land use system was playing a role in improving agricultural prospects in Oregon.

Another approach for assessing the extent of "impermanence syndrome" is to analyze the affordability of land. Knapp and Nelson (1988) determined that the establishment of urban growth boundaries (UGBs) and EFU zones had resulted in a decrease in agricultural land value and an increase in urban land value around Portland and Salem, which is evidence of a shift in regional demand of land. Keeping demand for farmland low is essential for enabling operations to expand, and for attracting new participants in the agricultural industry. Nelson (1986) found that land prices in EFU zones fell more significantly with proximity to Salem's UGB, which suggests that the speculative value of farmland has been reduced as a result of EFU zoning.

V. Data Gaps and Areas for Future Research

Based on our analysis of peer-reviewed literature and data relevant to Goal 3, we have identified several ways in which analysts might improve on efforts to assess the performance of Oregon's land use planning program in terms of preserving farmland for farming. We briefly review these suggestions below.

Tracking Farmland Loss: In order to better differentiate between planned and unplanned farmland loss (e.g., inside and outside UGBs and EFU zones), NRI data documenting land use change over time can be overlaid with Oregon's zoning classifications. This type of spatial data analysis has been conducted in Oregon with the assistance of the NRCS (Jim Johnson, ODA, personal communication 2008), but a more systematic and regularized approach would greatly assist in tracking the type and location of development taking place, and would aid in targeting areas of concern.

Tracking "Quality" Farmland Loss: More research regarding Oregon's effectiveness in preserving high quality agricultural land needs to be undertaken, as well as appropriate methods for doing so. Kline (2000) has suggested that NRI data could be used in a more systematic way to determine land use change by soil type. Similar to the method suggested above, soil maps can be overlaid with DLCD zoning maps, improving planners' ability to steer future development away from the highest quality soils. Enright et al. (2002) conducted such an analysis for the *Willamette Basin Planning Atlas* (Hulse et al., 2002), tabulating the amount of acreage in each soil class within the Willamette Basin using two different databases managed by the USDA. They also calculated acreage in various soil classes within the UGBs of the major cities in the Basin. Although this work did not track change over time, the process could be replicated to acquire such information for the entire state, and analysis could be performed to determine whether quality soils are being adequately conserved (David Hulse, UO, personal communication 2008).

Utilizing Spatial Data Analysis to Track Development Trends: Several land use analysts have suggested that the utility of the annual *Farm & Forest Reports* described above would be greatly improved by requiring geocoding of new dwelling approvals on resource lands. This would enable more systematic and comprehensive spatial data analysis, similar to the Veka (2008) analysis in Hood River County, to better assess the impact of dwellings on farming communities.

Analyzing Performance of the Means Income Test: Since we were unable to identify any analyses aimed at assessing the efficacy of current tax policies for accurately assigning tax status to promote farm use, we suggest developing methods to systematically conduct this type of analysis.

Assessing Causes, Extent and Patterns of "Impermanence Syndrome": Better methods for tracking the various dimensions of "impermanence syndrome" are needed. The Ag Census includes several simple indicators that could be tracked more systematically, including investments in agricultural machinery, average age of operators, and changes in production of capital-intensive products.

Analyzing Linkages Between Land and Water Resource Management: Several experts we consulted with emphasized the need for a better understanding and documentation of the relationship between land use policies and water resource management, especially in regards to the unintended impacts on groundwater supplies, irrigation, and farming related to a lack of coordination between DLCD policies regarding residential development and Oregon Water Resource Department (OWRD) policies regarding exempt wells. Farmers throughout the state are concerned about the cumulative impacts that unmonitored pumping of groundwater by individual well owners in rural residential areas is having on water available for irrigation and are calling for more oversight than currently exists. The passage of Measure 37 fueled even more concern about this issue and inspired a flurry of reports and maps showing how proposed subdivisions would intersect with existing agricultural water use (Jim Johnson, ODA, personal communication 2008; Todd Jarvis, OSU, personal communication 2008). The OWRD has an excellent GIS database that could be better utilized to systematically monitor these issues.

VI. Summary, Conclusions, and Recommendations

Our review of existing data and literature pertaining to Goal 3 suggests that Oregon's land use planning system has been successful in preserving agricultural lands for agricultural uses when judged against several of the criteria described at the outset of the chapter. Land in EFU zones went down in value after implementation of the program (Knapp and Nelson, 1988), investment in farm machinery went up, and the average age of operators went down (Furuseth, 1981). Perhaps most important, overall agricultural production has gone up since 1973 (Oregon Board of Agriculture, 2007). Both Kline (2005a) and Wu and Cho (2007) conclude that the program has been successful in achieving desired effects.

There is also evidence that program adjustments and amendments since 1973 have improved the performance of the program. The addition of performance based zoning,

for example, has improved the accuracy of farmland tax assessments (Nelson, 1992) and the reporting requirements regarding dwelling approvals established in 1993 have resulted in fewer approvals (Oregon Board of Agriculture, 2007). In at least one instance, policies regarding such approvals were shown to have negligible effects on resource use (Veka, 2008).

Areas of concern identified in the literature include spatial variation in the program's performance, with better success in western Oregon than in eastern Oregon, where significantly more resource land (especially rangeland) has been developed (Lettman, 2004).

Based on our analysis, we suggest that there are three actions that should be prioritized by the DLCD: ***First, more analyses using NRI data should be supported.*** The NRI is widely considered to be the premier data source for tracking aggregate land use change due to the advanced methodology used and the number of observations. Kline (2000) notes that the NRI is more accurate than the Ag Census because it documents actual land use change instead of reported land use change, and Kline and Alig (1999) point out that FIA data is not ideal for land use change analysis. In addition, NRI data comes out every five years as opposed to the FIA, which operates on ten-year intervals. The DLCD and legislature should actively support more systematic tracking of farmland change using NRI data.

Second, geocoding of new dwelling approvals in each county should be required. As discussed in previous sections, approvals of dwellings on resource lands have been a primary concern in regards to preserving agricultural lands for agricultural uses. Non-farm dwellings threaten agricultural economies by taking farmland out of production, creating speculative value, and increasing conflict with neighboring farm operations. Therefore it is vitally important that dwelling approvals are granted in compliance with DLCD approved comprehensive plans and in a manner that limits impacts on resource uses. Geocoding new dwelling approvals would be a relatively simple procedure that would allow better monitoring and analyses of dwelling compliance and associated impacts on resource use.

Third, the DLCD and legislature should support better tracking of soil quality in areas undergoing or being considered for development. By request, the NRCS can produce soil maps that are compatible with DLCD zoning maps. If the goal is to preserve the best farmland available, these maps will promote identification, conservation, and monitoring of the best farmland. Currently, there is no tracking of the rates at which different soil classes have been converted to developed uses. Efforts similar to Enright et al. (2002) should be funded to tabulate soils by their soil class and monitor their conversion in both EFU zones and within UGBs.

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Chapter 3
Forest Lands

Jeff Kline and Jim Duncan

Goal 4 Planning Guideline

To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture.

I. Historical Context of Goal 4

Prior to 1973, rapid population growth, the post-war homebuilding boom, and demographic and economic changes combined to cause expansion of residential and commercial development in much of the US. In Oregon, these socioeconomic changes were perceived by some as a threat to Oregon's forest and agricultural landscapes and associated economic activity, as well as the overall quality of life. These concerns eventually led to the passage and implementation of Oregon's statewide system of land use planning.

The comprehensive land use planning program uses zoning as the primary mechanism to prevent the loss of privately-owned agricultural and forest lands. All land falling outside an urban growth boundary had to be zoned for forest or farm use or declared an exception area (requiring approval from the LCDC). Comprehensive plans were required of each county and had to be acknowledged by the LCDC. Most plans were completed and acknowledged by the early 1980s (Lettman, 2004).

At the time of passage in 1973, there were about 10.7 million acres of privately owned "wildland" forest in Oregon and that area had declined to about 10.5 million acres by 2001 (Lettman, 2002; Lettman, 2004). Today, private forestlands make up 35 percent of the forested acreage in Oregon, and the forest sector accounts for 190,000 direct and indirect jobs, and about 11 percent of Oregon's economic output (Oregon Department of Forestry, 2007). Protection of forest land remains a significant policy concern in the State.

Although rates of forest land conversion have declined since implementation of the land use law, these changes have coincided with shifts in other factors not inherently related to the implementation and refinement of the land use planning system. These include socioeconomic changes, such as population and income growth, expansion of and increased competition from commercial forestry in the southeastern U.S., changes in the management of Federal forests in response to the listing of the northern spotted owl as an

endangered species, and changes in Oregon's timber processing infrastructure owing to reduced federal timber harvests, technological changes, and other factors.

Of particular concern is the potential adverse impact encroaching development can have on existing commercial forestry operations by fragmenting forest land parcels into small and less economically viable management units, changing forest ownership patterns, potential conflicts with new non-forestry-minded neighbors, and other changes (e.g. Kline et al., 2004). From a forestry perspective, Oregon faces the following land use challenges: (1) maintenance of the forest land base, and (2) maintenance of the productive capacity of the forest land base. Oregon forest policymakers look upon the state's land use planning system as one of the most promising tools for addressing these challenges.

II. Methods for the Review of Evidence

To address the question of how well Oregon's land use planning program has worked, the methods of a systematic review were employed. It was determined that there was a sufficient body of literature available to answer the question, and thus a document review was undertaken. One primary and two secondary research questions were posed:

Primary Research Question

- Has the Oregon Land Use Program been effective in preserving forest land?

Secondary Research Questions

- Has the Oregon Land Use Program been effective in preserving forest land for forestry use?
- Has the Oregon Land Use Program been effective in preserving forest land for the purpose of protecting the state's forest economy?

To answer these questions, various databases were searched using a predetermined set of keywords. Broad keywords used were:

Oregon AND

- Comprehensive planning
- Land use
- Land use change
- Land use conversion
- Land use laws
- Land use policy
- Land use program
- Land use regulations
- Zoning
- Land use planning

The following search terms specific to Goal 4 were also used:

- Agriculture
- Conservation
- Economics
- Farmland
- Forest
- Forestland
- Forest Use
- Forestry
- "Loss of"
- Timberland

The number of citations found for each combination of keywords was recorded, and all potentially relevant titles were entered into a spreadsheet. Abstracts for those citations were retrieved and examined for relevance. If the abstract proved insufficient for determining the relevancy of the study, then the full text of the study was retrieved and read. Where appropriate, citation threads were followed to identify other relevant literature.

Studies included in the review met criteria in the following three categories: *study descriptors*, *relevance*, and *source*.

Study Descriptors – Studies must have been published between 1973 and 2008 and the type of study (qualitative or quantitative) could not be used as the sole basis for excluding a study from consideration. Studies also could not be rejected solely on the basis of their outcomes.

Relevance to review questions – Each study was ranked based on its relevance to the primary review question using the following criteria:

- **Does the study address the review question?** No = not relevant
- **Was the study designed to answer the review question?** No = low relevance
- **Is the study robust (statistically or qualitatively)?** No = low relevance

  Robustness here implies that the analysis was structured in such a way as to permit evaluating the likely effects of land use planning at meeting Goal 4 objectives separately from other confounding factors. Regarding the maintenance of forest land, for example, robustness implies that changes in rates of forest land development resulting from land use planning could be distinguished from changes likely resulting from other factors effecting rates and patterns of development, such as population growth, income growth and topography.

- **Yes to all** = high relevance

Source – Peer reviewed articles, agency reports, and reports issued by advocacy groups, public interest groups could be seen as sources, or leads to sources. For all sources of studies, the question first asked was "C*an we find the reference*?" If so, then the reference was verified:

a. Is the reference *peer reviewed*?

b. Is the reference from *grey literature*? If so,

- Does the grey literature paper *use a credible scientific method*?
- *What* is the *source material* for the paper?
- *Who funded* the paper?

All of the above information was recorded in a spreadsheet and can be viewed in Appendix D.

III. Summary of Evidence

The above methodology yielded 155 citations, of which three were deemed "high relevance" and twenty-eight were found to be of "low relevance". Nineteen citations were duplicates or could not be located. While the document review was not comprehensive or exhaustive, it was done systematically according to the protocol.

> *Can we answer the question "Has the Oregon Land Use Program been effective in preserving forest land?"*

Based on the studies reviewed below, it is possible to address the primary research question—whether the land use law has reduced the conversion of forest land to developed uses. Empirical analysis of rates and patterns of forest land development before and after implementation of the land use law suggest that the land use planning system has redirected residential and other development to locations within urban growth boundaries and other designated growth areas. Land use planning has reduced the amount of forest land conversion that otherwise would have taken place without implementation of the land use law (Kline, 2005a). Additional analysis suggests that the continuation of the land use planning program into the future will yield further prevention of development on forest lands (Kline, 2005b).

However, although the implementation of forest zoning appears to have reduced development rates on forest lands located within such zones, analysis suggests that those lands were already less likely to develop even before forest zones were implemented because of their more distant location relative to existing cities. Conversely, both forest and agricultural lands now located within urban growth boundaries were already more likely to be developed prior to the implementation of zoning because they were closer to existing cities. The Oregon land use planning essentially confined the expansion of cities by drawing a line around those lands already most likely to develop and development has continued within those bounds. In this way, zoning mandated by comprehensive land use planning in Oregon somewhat institutionalized regional development patterns that were already occurring before statewide zoning was implemented (Kline, 2005a). Land use planning also provided local planners with greater control of development though associated permitting processes.

Studies Addressing the Primary Research Question

The results of the search methodology yielded three categories of studies: highly relevant studies, lower relevance studies, and studies that were not relevant. Studies that did not include forestland in their definition of agricultural or resource lands were deemed to be "not relevant" and are generally not discussed here. High relevance and low relevance studies are classified and discussed below.

High relevance studies

The search methodology yielded three studies found to be highly relevant. All of these studies use an econometric spatial land use model to control for socioeconomic and topographic variation in an attempt to isolate the effects of the land use planning program on development rates and patterns (Kline, 2005a; Kline, 2005b; Kline and Alig, 1999). Two of these studies were peer-reviewed (Kline, 2005a; Kline and Alig, 1999), while one was a publication of the USDA Forest Service (Kline, 2005b).

One study found no statistically significant effect of zoning on the rates of development on forest zones following the implementation of the land use planning system (Kline and Alig, 1999). This study used USDA Forest Service data collected on private forest land from 1961 through 1994 before and after the implementation of the land use planning system. The data were combined with other data describing socioeconomic and topographic variables to estimate a regression model describing the development of forest and agricultural lands over the data period. No statistically significant correlation was found between the zoning and the likelihood of forest land development, suggesting that land use zoning had not influenced forest land development rates and patterns since its implementation. However, the authors noted that the spatial resolution and size of the dataset may not have been sufficient to adequately evaluate the effects of the land use zoning on development rates and patterns.

Two other studies (Kline, 2005a; Kline 2005b) used an approach similar to Kline and Alig (1999) but with a much larger and more detailed dataset. Kline (2005a) provides the strongest evidence that the land use planning system has had a statistically significant negative effect on the rates of development in forest zones relative to lands zoned for other uses, although the magnitude of that effect could be considered by some to be fairly small. After controlling for various factors such as population growth and topography, this study found that by 1994 forest zoning had prevented low-density or higher density development on an area equivalent to 1.4% of the 1974 forestland base (Kline, 2005a:376). In a follow-up study published by the USDA Forest Service, Kline (2005b) used the regression model developed by Kline (2005a) to project the effects of the land use planning system forward to 2024. Those projections suggest that by 2024, continuation of the land use law will have prevented development on an area equivalent to 4.4% of the forestland base present in 2004.

Low Relevance Studies

A number of studies examined historical trends in land use change and development before and after implementation of the land use laws (Lettman, 2002; Lettman, 2004; Gedney and Hiserote, 1989; Zheng and Alig, 1999) or general indicators of

development rates and patterns (Kline, 2000; Moore and Nelson, 1994; Nelson and Moore, 1996) without formally attempting to control for other factors that might influence those changes, such as population growth, macroeconomic forces, etc. While these studies were classified as "low relevance," two studies deserve particular notice— Lettman (2002, 2004). Although both only document historical trends before and after implementation of forest zoning, the data-gathering methods they describe and the historical data actually gathered are possibly the most promising resources for examining land use and land use change in Oregon. The data gathered by Lettman (2002) were those eventually used by Kline (2005a, 2005b). Moreover, the methods used are of sufficient interest to land use analysts generally that pilot data-gathering efforts modeled on the methods outlined in these two studies are currently underway in Washington State.

Studies that did not explicitly answer the review question and were deemed to be of low relevance fell into five main categories: (i) studies that project or describe forestland development trends without controlling for other influencing factors; (ii) studies that examine development trends on resource lands in Oregon that aggregated forest lands with range lands, agricultural lands or both in their analysis; (iii) studies that could provide baseline data or research methods for future analyses; (iv) studies that used the Kline (2005a) spatial land use model to answer an unrelated research question; and (v) studies that summarize the data or results of other studies to address the primary research question.

(i) Studies that project or describe forestland development trends without controlling for other influencing factors.

> Studies in this category: *Lettman, 2002; Lettman, 2004; Edwards and Bliss, 2003; Gedney and Hiserote, 1989; and, Zheng and Alig, 1999.*

This group of studies report on historical trends in forest land development over various periods. They were classified as low relevance because they did not isolate the effects of the land use planning on development rates and patterns by attempting to control for other influencing factors such as population growth or macroeconomic market forces. Although these studies help to paint a picture of how forestlands have been developed in Oregon, they offer little hard evidence linking changes in forest land development rates and patterns explicitly to the implementation of the land use planning system. Lettman (2002) and (2004), however, describe data that exists as perhaps the most useful for examining changes in land use rates and patterns in Oregon.

Gedney and Hiserote (1989) used aerial photographs to classify land in western Oregon into dominant land uses for two time periods: 1971-4 and 1982. Based on these classifications, it was determined that 63000 acres of primary forestland was converted to “low-density urban” or “urban” uses. This study also provides an estimate of the amount of primary forest present prior to the implementation of the land use planning program at 6,195,000 acres.

Using a survey of forest owners and their neighbors, Edwards and Bliss (2003) examined how the land use planning system and other regulations have affected people’s perception of development of forestlands at the urban fringe and landowner decisions to stay in forestry near the Corvallis urban area.

Zheng and Alig (1999) reported on a study of land use conversions from 1961 to 1994. They found that 192,000 hectares of forestland had been lost in the 35-year period. They did find that the rates of conversion slowed from 4% in 1961-63 to 2% during the late 1980's and early 1990s, and even further to 1.3% from the mid 1980s to 1993. However, the authors were unable to empirically link these rate changes explicitly to land use planning.

(ii) Studies that examine development trends on resource lands in Oregon without explicitly identifying or quantifying forestlands.

> Studies in this category: *Kline, 2000; Moore, 1999; Moore and Nelson, 1994; and, Nelson and Moore, 1996.*

This group of studies examined development trends on resource lands in Oregon with the aim of evaluating the effectiveness of the land use planning system. They aggregated all lands into resource lands, which could include forest, agricultural and range lands.

Moore and Nelson (1994) and Nelson and Moore (1996) examined how the land use laws were implemented by local governments. These studies were conducted as part of a larger effort to assess the effectiveness of implementation of urban growth boundaries in four regions of Oregon. One measure used to evaluate effectiveness was the number of dwellings built on resource lands outside the urban growth boundaries. For example, during the study period examined (1985 to 1989), 27% of the residential development in Jackson County occurred outside urban growth boundaries, and 41% of those 529 residential units were built in resource zones (Moore and Nelson 1994, p 162). However, it is difficult to conclude from the analysis what influence the implementation of land use zoning had on effecting these changes.

In a different analysis, Kline (2000) used USDA Natural Resource Conservation Service's Natural Resources Inventory data to measure the total number of acres developed per person. The paper was written in response to another paper (Nelson, 1999) determined to be "not relevant" to the research question at hand because the Nelson (1999) analysis only included trends in farmland acres reported by the US Census of Agriculture. In response to Nelson (1999), Kline (2000) reported developed acres per person for all types of resource lands (agriculture, forest, and range). Using this alternative metric of sprawl, Oregon ranked 12th in the nation for its prevention of sprawl. As with other "low relevance" studies, however, Kline (2000) did little to control for the variety of factors that could account for development rates and patterns in Oregon or elsewhere. In fact, Kline (2000) even cautions against using such simplistic "indicators" as a basis for evaluating the effects of land use zoning on forest and agricultural land development.

In a report to the Governor's office on growth and its impacts, Moore (1999) summarizes other work and presents new data on several ways to measure the impact of growth on forestlands. A tightening of the rules in 1993 and 1994 reduced the annual number of dwellings approved on lands zoned for forest use. Another measure reported the amount of land rezoned from forest to other uses in the period 1987 to 1996 to be 5,900 acres. In general, resource land that included forests had been lost, but the percentage change was lower than any other state.

(iii) Studies that could provide baseline data or research methods for future analyses.

> Studies in this category: *Baker et al., 2004; Branscomb, 2002; Butler et al., 2004; Cho et al., 2005; Wu and Cho, 2007; Gedney and Hiserote, 1989; Hulse et al., 2004; Jaeger and Plantinga, 2007; Johnson, 2000; Kline, 2003; Kline and Alig, 2001; Kline and Alig, 2005; Kline et al., 2003; Kline et al., 2007; Lettman, 2002; and, Lettman. 2004.*

The studies by Kline (2003) and Kline et al. (2003) serve to describe, demonstrate and validate a spatial econometric model of land use change that ultimately served as a basis for the analysis of Kline (2005a) that explicitly examined the effect of Oregon land use zoning on forest and agricultural land conservation. The earlier models detailed in Kline (2003) and Kline et al. (2003) describe changes in building densities as a function of existing building densities, slope, development pressure and land-use zoning. Development pressure was modeled using a gravity index that accounted for the combined influence of the proximity of a parcel to cities located within a one-hour commute as potential employment destinations and the various sizes of those cities.

Several studies have reported on changes in land use that have occurred using the interpretation of aerial photographs taken at successive time periods (Lettman, 2002; Lettman, 2004; Gedney and Hiserote, 1989). The data developed by Lettman (2002, 2004) were analyzed by Kline (2005a, 2005b) and will likely continue to serve as the most promising starting point from which to conduct future analyses. Data used in those studies currently are periodically updated by the Oregon Department of Forestry in cooperation with the USDA Forest Service, Pacific Northwest Research Station, and continuation of these updates would seem to be in the interest of State agencies seeking to monitor and periodically evaluate land use change and development in Oregon.

Kline et al. (2007) conducted analysis of rates and patterns of development on forest, range, and agricultural lands in eastern Oregon, using methods similar to that of Kline (2003) and Kline et al. (2003). They found generally that development was more likely to occur on lands now located within urban growth boundaries relative to lands now located within forest, range, and agriculture zone. However, the analysis is limited in its usefulness for drawing conclusions about the actual impact that the implementation of land use zoning had on affecting development rates and patterns. This is due to the fact that zoning variables used in the model were not structured in such a way as to enable pre- and post-zoning evaluation of development rates and patterns similar to analysis conducted by Kline (2005a). However, further refinement of the Kline et al. (2007) models could facilitate such evaluation in regions included in that study.

Jaeger and Plantinga (2007) found that, over the last 40 years, the strictest land use regulations, specifically those governing farm and forest lands, have not had an adverse effect on land values. In a comparative analysis of property values in rural Oregon and Washington, Oregon's land use planning system showed no observable effect on land values. While this does not address development and conversion rates explicitly, it does suggest that the land use planning system is not contributing to low land rent values for forestlands in Oregon.

In their econometric study of the east and west side of the Cascades in Washington, Oregon and California, Cho et al. (2005) found that land use regulations implemented by counties had a negative influence on development. Land use regulations were more stringent on the west side, and thus these regulations reduced land development by a greater amount than on the east side. They also report that forestry zoning reduces the amount of development that occurs on forestlands, but that development is shifted to agricultural lands instead. This study does not explicitly address the effects of Oregon's land use planning system in their analysis or discussion.

In a study of 5 western states, Wu and Cho (2007) found that local land use policies in Oregon reduced the supply of developable land by 12.6%, with 2.6% of that reduction being attributable to the development guidelines. The study was based on surveys of county planning officials and NRI resource land inventory data, and thus cannot address the effect on forest lands alone.

Butler et al. (2004) used a multiple regression analysis and modeling approach to test a new forest fragmentation metric for the Pacific Northwest. Their analysis showed that land in Oregon (as compared to Washington) had a statistically significant negative influence on the amount of land in non-forest use. Land use regulations were one of many potential forces offered as an explanation for this relationship.

Johnson (2000) mentions the potential ecological and economic effects of development as a concern for forestlands in the future, but focuses more on ecological conditions than socioeconomic factors influencing land use change.

Gedney and Hiserote (1989) classify land use and land use change based on aerial photographs taken at two points in time. Although not particularly useful for examining the effects of land use zoning, the work somewhat formed the foundation for developing land use data-gathering methods later used by Lettman (2002, 2004).

A body of work was done to examine a set of alternative futures for the Willametter River Basin (Baker et al., 2004; Branscomb, 2002; Hulse et al., 2004). These studies used an iterative mapping process with experts and stakeholders to identify lands that, based on group knowledge and expectations, would be subject to changes under the three different futures tested. The project compared a scenario where the land use regulations were relaxed to allow more development, a scenario where the current regulations were left unchanged, and one where more emphasis was placed on meeting conservation goals. The results showed significant differences in forestland ownership between the three scenarios, with attendant changes in management.

(iv) Studies that used versions of the Kline et al. (2003) or Kline (2005a) spatial land use models to answer an unrelated research questions.

Studies in this category: *Cathcart et al., 2007; and Johnson et al., 2007*.

These studies used the land use change models from Kline et al. (2003) and Kline (2005a) to project land use changes for the purpose of answering an unrelated or tangentially related research questions. While these studies do not address questions about the land

use planning system directly, the constraints of that system are incorporated into their results.

Using the land use model developed by Kline (2005a), Cathcart et al. (2007) estimated the contribution of land use planning to carbon sequestration in Oregon owing to maintenance of the forest land base. The study found that 13.9 million tons of carbon dioxide had not been released as a result of the forest land conservation effects of Oregon's land use planning system. The study further projected that 3.4 million more tons would not be released between 2004 and 2024.

Johnson et al. (2007) used the Kline et al. (2003) model to project the long-term effects of current forest policies on ownership and forest structure in the Coast Range. They incorporated land use regulations and forest management regulations into their projections and concluded that the region will undergo changes in land use. The effects of several alternative policies were also examined, but did not relate to land use changes.

(v) Studies that summarize the data or results of other studies.

Studies in this category: *Pease, 1994; Lorenson, 2002; and, Birch, 2002.*

The chapter in *Planning the Oregon Way* by Pease (1994) provides a summary of all the work that had previously been done to examine the effectiveness of Oregon's land use planning system on preventing development on resource lands. Pease (1994) also provides a narrative of forces that shaped specific modifications to forestland zoning and development rules, and identifies gaps in the body of research that made a rigorous evaluation of the land use planning system difficult at that time.

Lorenson (2002) is a presentation given to the Big Look Task Force about the many factors affecting forestlands and the services they provide to society. Birch (2002) is a memorandum delivered to the Big Look Task Force that summarized the findings of Lettman (2002, 2004).

Studies Addressing the Secondary Research Questions

Can we answer the question "Has the Oregon Land Use Program been effective in preserving forest land for forestry use?"

No studies were found that examined the role of land use planning program in influencing how forest lands are used or managed in Oregon. However, several low relevance studies examined the effects of current and future development patterns as constrained by zoning on the likelihood of commercial forest management activities (Lettman, 2002, Kline et al., 2004; Kline and Alig, 2005; Kline and Azuma, 2007). These studies sought to examine whether fragmentation of forest lands and ownerships lead to reductions in the intensity of forest management as indicated by more intensive forestry practices such as pre-commercial thinning, harvesting, and re-planting following harvest. Empirical analysis of forestry practices in western Oregon suggests that pre-commercial thinning and post-harvest tree planting have tended to be less likely in more developed locations (Lettman, 2002, Kline et al, 2004), though similar relationships are not found for eastern Oregon (Kline and Azuma, 2007). These relationships suggest that investment in commercial

forestry may wane as development becomes more prevalent in forested areas, leading to greater fragmentation of forest lands and ownerships. However, when these relationships between development and forest management practices for western Oregon are combined with regional development patterns and projections of future development as constrained by the land use system, results suggest little real influence on commercial forestry over the next 50 years, largely because the most productive forest lands remain rather isolated from both current and projected future (Kline and Alig, 2005).

Additional analysis that could examine this issue further would involve combining the "with and without" development projections provided by Kline (2005b) with the forest management relationships examined by Kline et al. (2004) to estimate the magnitude of changes in forest management intensity that might result from continuation of land use zoning into the future.

Other additional analysis could potentially examine fragmentation of forest land and ownerships more directly. The analyses by Lettman (2002), Kline et al., (2004), and Kline and Azuma (2007) address fragmentation using "building" (or structure) counts within well-defined areas surrounding USDA Forest Service Forest inventory and Analysis sample plots on which forestry practices have been observed. Their assumption is that greater numbers of buildings likely indicates greater fragmentation of both land and ownerships. Additional analysis could measure fragmentation more directly using tax-lot data. In fact, pilot data collection efforts currently are underway at the Oregon Department of Forestry to develop an indicator of future forest land development based on historical and current parcelization. Data collection is focusing on recording the number of tax lots and number of owners present from tax data, and the number of buildings present from county assessors' maps within 640-acre circles surrounding Forest Inventory and Analysis field plots. Data has been collected for five representative counties for the years 2006, 1994, and 1974. The parcel data can be combined with previously collected building count data. Preliminary regression analysis indicates a strong correlation between the number of tax parcels and subsequent increases in the numbers of buildings in later years. Additional analysis potentially could examine whether some forestry practices are more or less prevalent based on numbers of tax parcels and ownerships.

In other research, Edwards and Bliss (2003) provide the only qualitative study that we know of that examines the role of regulation in the decisions of land owners. They report that forest owners at the urban fringe of Corvallis credit the land use planning system with maintaining active forestry operations, but worry that burdensome levels of regulation force landowners to cease forestry activity. More rigorous qualitative studies of this type were not found for other areas in Oregon.

The chapter in the *Willamette River Basin Planning Atlas* by Branscomb (2002) found that if the emphasis was shifted to either conservation goals or development goals, an increased amount of land was projected to leave industrial ownership for other owner classes.

One basic assumption underlying Oregon's land use planning program is that the presence of non-forestry users adjacent to or within lands managed for forestry produces a conflict of use that can force forestry to cease. In his summary of Schmisseur et al. (1991), Pease (1994) notes that while conflicts do seem to occur, there is little evidence to suggest a direct correlation between such conflicts and decisions to abandon forestry operations.

Can we answer the question "Has the Oregon Land Use Program been effective in preserving forest land for the purpose of protecting the state's forest economy?"

We were unable to locate any studies that explicitly examined the impact of land use planning on maintaining the state's forest economy. However, a few studies examine questions that are tangentially related to the issue. For example, Kline and Alig (2005) combine empirical models relating building densities (from data provide by Lettman, 2004) to commercial forest management activities such as thinning and harvest (Kline et al., 2004), with development projections from Kline (2003) to consider what projected development might mean for commercial forestry activities in the future. However, results suggest fairly limited commercial forestry impacts resulting from future development. The majority of Oregon's most productive and intensively managed forest lands, especially in western Oregon, are fairly far removed from those places where development is most likely to happen, such as near existing urban centers. Because of this inherent spatial relationship, the effect of land use planning's containment of urban growth on the forest economy likely has been fairly minor relative to other more significant external changes that have affected forestry in the state. Several factors other than forestland development likely have played a greater role in western Oregon timber production, including national and international market forces, continued shift of domestic timber production to the U.S. south, changing public attitudes about forestry, and greater regulation of forestry practices (Kline and Alig, 2005:717). With regards to the land use planning program, it is important to note that the state's forest economy relies on the presence of the physical resource base, and thus the protection of the land available for forest use is an important component in preserving the economic potential of Oregon's forestlands.

In another study, Kline and Alig (2000) examined likely impacts of land use zoning changes advocated by 1000 Friends of Oregon on "productive" (commercial) forestry in the Willamette Valley. The "Willamette Valley Alternative Futures Project" had sought to compare the long-term consequences of development on the farm and forest economies under two different development scenarios—one based on historical trends and one that assumes even more compact development patterns than that provided under current land use regulations. The forestry portion of the report (Kline and Alig, 2000) examined rates of forest land development under both scenarios and evaluated what changes in land use planning would mean for private forestry. Their conclusions suggested that the land use zoning changes analyzed were likely to result in very little impact to commercial forestry, because the most productive lands most likely to be under commercial management would remain unaffected by zoning changes proposed. Although the study did not directly examine the effect of land use planning at maintaining the forest economy, it does highlight an issue also mentioned by Kline and Alig (2005)—that because the most productive forest lands remain relatively distant from where most development is likely to occur, any impacts of forest land zoning on commercial forestry activity are likely to be fairly low relative to the influence of other economic factors.

Several studies could be used as guidelines for future work to relate the effects of the land use planning to various economic effects (Cho et al., 2005; Jaeger and Plantinga, 2007; Johnson 2000; Johnson et al., 2007; Moore, 1999). For example, Jaeger and Plantinga (2007) examine the potential influence of land use zoning on land values for various regions in Oregon. Although this study does not explicitly address "the State's

forest economy," it does help to characterize some of the economic effects of land use planning felt by forest owners in the State. Johnson (2000) addresses economic changes in Oregon's forestlands without explicit reference to the land use planning system. Johnson et al. (2007) used the land use change model developed by Kline (2003) to project the effects of land use change on timber harvests in the Coast Range and found that timber revenues would remain level but the land available for commercial forestry would be reduced.

One study discusses the role of the land use planning system in carbon sequestration (Cathcart et al., 2007). As this is an emerging natural resource and environmental policy objective at state and national levels, the provision of carbon sequestration benefits to society by forestland owners might translate into increased economic returns, which could have a significant interaction with the land use planning system.

IV. Benchmarks and Performance Measures

Only one Oregon Progress Board Benchmark and one agency performance measure were identified as pertinent to tracking the success of Goal 4 of the land use planning program. Several performance measures aimed at gauging the economic viability of Oregon's forests cannot be easily tied to the land use planning program, and thus are not included here.

The OPB Benchmark 82 is based on the same data that the DLCD uses for Performance Measure 11. Both track the actual forest acreage that remains zoned for forest use, but do not track the type of use on those lands. These measures provide a way to check that the planning guidelines are being implemented as designed, and ensure that comprehensive plans are not being changed in ways that reduce the forest land base at too high a rate.

Oregon Benchmark 82 – Forest Land
This benchmark measures how many acres of the 1974 wildland forests are still preserved for forest use. This benchmark reports the percentage of forest remaining from the original stock in 1974. The 2010 target established by the Oregon Progress Board was 97.4% and in 2005, 98.2% had been retained. According to a straight line projection, the 2010 target will be met. Data for this benchmark comes from the Oregon Department of Forestry.

> Studies addressing this benchmark: *Lettman,2002; Lettman,2004; Kline, 2005a; Kline, 2005b.*

DLCD Performance Measure 11 – Percent forest land outside UGBs
This performance measure reports the change in forest land outside urban growth boundaries. The reference data is the amount of land zoned for forest or mixed farm and forest use outside of urban growth boundaries in 1987, and the change is reported as a percent of that land that remains in that zoning. A small amount of decline in the percentage is expected as a result of expanding urban areas; this expectation is incorporated into the reporting of this performance measure. Targets have been met since

the measure was established in 2002. Data for this measure comes from the DLCD rural GIS database and the plan amendment database.

> Studies addressing this benchmark: *Lettman,2002; Lettman,2004; Kline, 2005a; Kline, 2005b.*

V. Data Sources and Data Gaps

The foregoing synopsis is not intended to provide an exhaustive listing and analysis of available data sources and their potential usefulness for further examining the forest land conservation effects of land use planning in Oregon. Rather, it is intended to note existing data sources that appear to be readily available and to provide a brief evaluation of the advantages and disadvantages of those data, as well as an initial assessment of the types of analysis such data might enable. Further assessment regarding the merits and usefulness of these sources likely would be necessary prior to embarking on specific studies.

Oregon Department of Forestry Development Zone and Structure Counts

Nature of data available: Aerial photo-interpreted data describing discrete land use classes as well as building (structure) counts within 80-acre circles surrounding sample points, collected for individual years at roughly 10-year intervals spanning 1974 to present. Sampling and data-gathering methods are described in Lettman (2002, 2004). To date, the data have been periodically updated through the collaborative efforts of the Oregon Department of Forestry and the USDA Forest Service Pacific Northwest Research Station, Forest Inventory and Analysis Program.

Advantages: The most extensive and detailed spatial land use data set available for Oregon and one that includes observations both before and after land use planning was implemented. Current efforts by the USDA Forest Service, Pacific Northwest Research Station are attempting to procure similar data for Washington State, which could provide opportunities for cross-state comparisons of rates and patterns of development. A pilot data-gathering effort has already yielded data for Clark County Washington, which potentially could be used to examine development spillover effects into Washington resulting from land use planning in the Portland metropolitan area.

Disadvantages: Currently only available for Oregon (with the exception of pilot data for Clark County, Washington) so does not enable cross-state comparisons. Generally requires fairly complex empirical techniques to analyze if the goal is to examine forest land conservation effects of Oregon land use planning while attempting to control for other socioeconomic and topographic factors that also influence land use change and development.

Forest Land Tax Parcels

Nature of the data available: Data consist of the size, number, and location of tax parcels on all private land in Oregon. Although the data potentially are available for several years enabling analysis of time trends, the full time span for which data are available is uncertain and could vary by county. The data potentially could be used to examine rates and patterns of forest land parcelization—the breaking up of forest land into smaller and

smaller management units and ownerships. Parcelization is considered to be an important factor leading to reduced management of forest lands for commercial purposes. Analysis of forest parcelization thus could help to address secondary research questions pertaining to the protection the state's forest economy. Analysis potentially could focus on identifying where parcelization of forest lands is occurring and whether it is impacting those lands likely to be managed for commercial purposes. Additional analysis could focus on evaluating whether greater parcelization of forest land is correlated with active forest management for commercial purposes and/or increased development of those lands in future years. Currently, the Oregon Department of Forestry is gathering tax parcel data for select areas of five counties for use in developing prototype indicators of potential future forest land development.

Advantages: Tax parcel data exist throughout the state and can contain fairly detailed information describing a variety of characteristics of forest land.

Disadvantages: To our knowledge, tax parcel data can only be obtained directly from counties who maintain it, sometimes for a fee, making the construction of regional or statewide databases a potentially time-consuming and expensive process. The quality, consistency, and temporal coverage of tax parcel conceivably might vary by county.

National Resources Inventory

Nature of data available: Nationwide inventory of land use based on a systematic sampling of points on the ground. The data are known to be consistent in land use definitions for inventories conducted in 1982, 1987, 1992, and 1997, enabling time-series analysis for that period.

Advantages: Historic data of national consistency, allowing cross-state comparisons based on aggregate land use figures.

Disadvantages: Point-level data that would enable fine-scaled spatially explicit analysis is difficult to access. In fact, the USDA Natural Resources Conservation Service advises against using data to aggregate land uses below the state level. Given data consistency extends only as far back as 1982, its usefulness for pre- and post-land use planning types of analyses is limited. Also, the inventory is focused predominantly on characterizing agricultural lands, so data characterizing forest lands beyond simply "forest use" is limited.

US Census

Nature of data available: Data describing population and housing counts gathered at 10-year intervals.

Advantages: Easy to access and easy to use. Enables examining aggregate changes in population and housing densities over time, as well as more spatially explicit analysis of population and housing density patterns based on geo-referenced census tract and block group data.

Disadvantages: Two factors greatly complicate fine-scale spatial analyses of population and/or housing density. Census tract and block group boundaries shift from census year to census year and thus some analyses may require specialized analytical techniques to

"backcast" population and housing density data into census units of consistent size, shape and location. In addition, low population densities in the rural areas where most forestland is found lead to larger tract and block group sizes, and thus a coarser data set, since the individual household data is aggregated to protect the privacy of individuals.

DLCD Permit Data

Nature of data available: Permit data potentially could be used to describe development rates and patterns that have been allowed under Oregon's system of land use planning. However, to our knowledge such permit data are aggregated at the county level and are not spatially referenced, potentially limiting its usefulness for examining the spatial relationships governing where development occurs.

Advantages: Permit data potentially could provide a direct measure of the allowable development on forest lands. If spatially explicit data could be obtained, analysis potentially could examine the characteristics of forest lands on which development activities are being approved under land use planning. Such analysis could focus on characterizing the potential impact of development on more commercially productive forest lands versus less commercially productive lands, to consider what if any impact approved development might be having on forestry-based economic activity, Such analyses could help in addressing secondary questions.

Disadvantages: Since permits of this sort were not necessarily required prior to implementation, permit data likely could not provide an indication of how development prior to implementation of land use planning might have impacted forestry-based economic activity.

DOR Harvest Tax Data/ODF Notification of Operations Data

Nature of data available: All timber harvests on private land require that notification of operations be provided to the Oregon Department of Forestry prior to harvesting. The locations of harvests must be described spatially by the applicant to a resolution of $1/16^{th}$ of a section (10 acres). This notification form is used by the Department of Revenue to determine the amount of taxes to collect based on the harvest amount and the type of forestland. Although the availability and temporal extent of this data are not known at this time, the data potentially could be used to examine how harvest activities—as an indicator of commercial forestry—have changed over time in the presence of land use planning.

Advantages: Spatially explicit harvest information could be input into a land use change model to examine the interactions between the locations of forest zones, urban development and harvest operations.

Disadvantages: The data appear to be fairly coarse in resolution, and it is unclear at this point if the nature of the data would allow meaningful examinations of the extent and type of forestry operations being conducted on each 10-acre area described in the operations notification.

VI. Data Gaps and Future Goal Tracking

The most significant confounding factors involved in examining the influence of land use planning on rates and patterns of forest land development are: (1) describing historical development rates and patterns with and without zoning, and (2) controlling for other factors besides zoning that also influence development. Currently, the only data set that enables analysis of sufficient historical breadth to address the first factor appears to be the data developed by Lettman (2002, 2004). However, these data only provide historical data for Oregon, and similar data describing forest land development outside of Oregon could be useful for cross-state comparison. The USDA Forest Service, Pacific Northwest Research Station in Portland, Oregon currently is leading an effort to gather land use data in Washington State that will be similar to the Lettman (2002, 2004) data gathered in Oregon, and a pilot data-gathering effort is underway in Clark County, Washington State. Thus, this data gap may be closing in the near future.

There are, however, still obstacles in addressing the second factor—evaluating the influence of land use planning on forest land loss while controlling for other factors that influence land use change and development. The work of Kline (2005a) attempted to control for population growth of western Oregon cities, road accessibility, and topographic factors such as slope and elevation, but other factors, such as potential returns to forestry are still omitted from modeling. Moreover, the use of population growth of cities as a proxy for regional population growth provided only an indirect link between Oregon population trends and development on the ground. As a result, even the work of Kline (2005a) is imperfect in controlling for many of the factors that influence development in addition to land use zoning.

The primary problem is that although data describing topographic variables can be found at fine spatial scales consistent with the data gathered by Lettman (2002, 2004), data describing socioeconomic factors such as population and income growth, and other factors affecting land use change are generally not available at spatial scales below the US Census block group. These block groups tend to be coarsest in rural areas where forest use is most common, confounding the use of such data in empirical analysis. Spatially heterogeneous data describing the potential returns to various land uses, such as forestry or agricultural income, are also difficult to come by. For this reason, future empirical analysis might best focus on addressing forest landowner decision-making regarding forest land development. Moreover, data addressing how forest landowners make decisions in response to regulations, including land use regulations, could be useful. Future analyses might best focus on improving upon the spatial modeling work of Kline (2005a) as well as initiating greater research efforts using quantitative and qualitative surveys to gather primary data describing the land use and development decisions of private forest landowners.

VII. Discussion and Concluding Remarks

Despite the significant interest in Oregon's land use planning program since its inception and the rather large body of literature that has been written about it, little empirical analysis actually exists that has attempted to evaluate the forest land conservation effects of forest and agricultural zoning in Oregon. Although a number of studies claim to do so,

many of those studies are more descriptive in nature and focus on examining trends in land use since land use planning was implemented. Although such descriptive analyses do provide a story of shifting land use trends after planning, the failure of most studies to control for the numerous socioeconomic and topographic factors that influence land use change and development confound our ability to draw strong conclusions regarding the likely influence of zoning in effecting rates and patterns of change.

A small body of studies, largely based on Kline (2005a), does attempt to control for factors such as topography and the spatial proximity of land to cities of varying population sizes. Although not without caveats, this small body of work provides probably the strongest evidence that land use planning has had at least some measurable effect at reducing development on forest lands in Oregon, however, this analysis is limited to western Oregon. Similarly rigorous analyses of land use planning effects on forest land development, in eastern Oregon remain to be done, but are within reach given the availability of data and initial empirical models—especially Kline et al. (2007)—on which to base new analyses.

What any of these analyses are unable to show is whether the magnitude of zoning effects are sufficient to consider land use planning a success. Such conclusions can only be made by policymakers and the public as they ponder research findings. Moreover, although an important concern underlying Goal 4 is the conservation of forest land to protect the state's forest economy, the role of active commercial forest management in securing the many benefits that private forests provide to the Oregon public remains largely unknown in its extent.

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Chapter 4
Goal 14: Urbanization

Ellen Bassett and George Zaninovich

Goal 14 Planning Guideline

To provide for an orderly and efficient transition from rural to urban land use, to accommodate urban population and urban employment inside urban growth boundaries, to ensure efficient use of land, and to provide for livable communities.
(*effective April 28, 2006*)

I. Introduction

The mechanism for achieving Goal 14 is an "urban growth boundary" which is drawn to identify and separate urban (and urbanizable) land from rural land. By law, UGBs exist around all Oregon cities; they are drawn to encompass a 20 year supply of land and can only be expanded or redrawn after a planning process in which the need for more urban land to accommodate population growth and achieve other objectives (such as economic growth and maintenance of livability) is demonstrated. Inherently the UGB goal is linked to Goal 3 (agricultural lands) and Goal 4 (forest lands) as the expansion of any UGB in the state will most often result in the conversion or loss of acreage in these categories of land.

Although the goal is central to the Oregon land use system (and is probably the single most familiar feature of the program from a national perspective), the goal as written does not explicitly lay out how the performance of Oregon UGBs is to be evaluated. The goal does present factors to be considered when drawing UGBs, including "efficient accommodation of land needs," "orderly and economic provision of public facilities and services' and land use compatibility. Departing from these and using economic theory, we can identify expected and/or desired outcomes and measure whether these outcomes have occurred. The UGB essentially is a constraint on the supply of urbanizable land. Land constraints can be natural (e.g., lack of water, existence of mountains) or they can be human-made (e.g., a policy decision as in Oregon's UGB or the Netherlands' delineation of its agricultural "green heart.") The UGB approach has been adopted because it is the goal of the Oregon land use system to protect productive resource lands and manage/curtail the spread of urban land uses on to these irreplaceable lands.

From the perspective of economic theory, land constraints are anticipated to have a variety of impacts, and these impacts can be measured to evaluate goal achievement. The most commonly foreseen (or "primary") impacts are upon 1) *rate of land conversion*—lands should convert to urban uses more slowly with the constraint present; put differently, the rate of resource land loss should be lower; 2) *urban form*—land use patterns should be less sprawling and urban areas more compact; in a growing region population densities will rise; 3) *land values*—land values will be higher within the UGB; land values will be lower outside; this latter effect is positive for agricultural profitability and an intentional policy outcome; 4) *infrastructure and service provision*

costs—costs to provide police and fire protection, sewerage and water supply will be lower in localities as a result of less sprawling development patterns; 5) *housing prices*—as an extension of urban land market effects housing prices may increase; this depends upon the type of housing units constructed, the rate of population growth, and housing demand increases; and 6) *transportation*—as a result of a tighter urban form, traffic congestion may worsen, particularly if a modal shift (from single occupancy vehicle to public transit or other alternatives) is not facilitated by public investment or does not occur.

In undertaking the literature review that follows, we explicitly looked for studies that addressed these impacts and we have organized the review accordingly. An interesting feature of the review is that several studies found unanticipated and positive impacts (e.g., upon residential segregation by race, downtown revitalization) as well as one potentially negative impact (e.g., vulnerability to natural disasters) from UGBs that are not commonly anticipated. (The latter paper on natural disasters is speculative and therefore not discussed here. Please see the matrix for details on the study.)

II. Methods

Primary Question

Has the Oregon land use planning system been effective in facilitating orderly and efficient urbanization?

Secondary Questions

What has been the impact of the land use system's urban growth boundary provision on:

- urban form; that is, the density and spatial spread of the state's urban areas?
- value of land in urban and rural land markets?
- housing prices?
- cost of providing infrastructure and public services?
- transportation systems (including traffic congestion)?
- economic performance?

(Note: Because the rate of land conversion is essentially about agricultural and forest land loss it is not covered here, please see chapters on Goals 3 and 4.)

Literature Review

The primary method used to evaluate Goal 14 was a literature review. This method was chosen because there is a large, methodologically robust literature available and, with a few exceptions, this research was conducted by well-trained, objective researchers working in key disciplines (e.g., economics, urban planning, law, political science, public health). Three distinct literatures were examined: social science and legal research published in peer reviewed scholarly journals, research reports produced by foundations and/or think tanks, and case law/opinions related to growth management as written about in law review journals.

The literature was identified using database services available at the university libraries at Portland State University and Oregon State University. The indexes used were: JSTOR, Urban Studies-Sage Full Text, PAIS, GeoBase, EconLit, and LexisNexis. In addition, specific journals were searched. These journals were: *Land Economics*, *Journal of Urban Economics*, *Economic Geography*, *Journal of the American Planning Association, Journal of Planning Education and Research, Journal of Planning Literature, Journal of Environmental Planning and Management, Land Use Policy, Local Environment, Urban Studies, Urban Affairs Review, Social Science Quarterly,* and *Journal of Regional Science*.

Searches were conducted with multiple terms in several iterations. In an effort to exclude non-Oregon related research, the first search was "Oregon" plus another search term. These secondary search terms were: urban growth boundary, urbanization, affordable housing, land use, land use regulation, growth management, urban containment, density, and urban sprawl. In the second iteration, the term "Portland" was grouped with these terms. This was done as the Portland UGB is the most well known nationally and the most studied. Finally, terms were initially used just in "key word" and "title" searches; as this yielded few articles the final searches were "all text" searches.

To complement this search method, Google and Google Scholar search engines were used with the same terms. These search engines helped us identify literature from foundations and think tanks. Additionally, key individuals with knowledge of the Oregon land use system provided difficult to obtain documents—such as consultants' reports—that had only limited printing and distribution and were not available in the library system. The final search conducted was done by author name as there is a distinct cohort of researchers paying attention to Oregon's UGBs.

Using these methods a large body of articles and reports were identified for review as part of the Goal 14 evaluation. (Just to give the reader an idea of just how much press Oregon's UGBs have gotten, the Sage Urban Studies database yielded 37 articles for "urban growth boundary and Oregon"; it yielded 86 peer-reviewed papers for "growth management and Oregon" and 94 for "land use regulation and Oregon.") Using the protocol discussed in the preceding section, titles and abstracts from these electronic searches were scanned for content; articles with some apparent relevance to the question (a total of 61 articles) were read, evaluated and entered into a matrix—which is an appendix to this report. Of these articles, 10 were not considered relevant or useful for answering our research question. In general, these articles were ones which spoke in descriptive terms about the Oregon land use planning system and the urban growth boundary but did not contain original research intended to evaluate the system. Another 19 articles were categorized as "low relevance". Articles were deemed low relevance if they: 1) lacked peer review, 2) were based upon obscure or questionable research methods, and 3) contained allegations or viewpoints that were not adequately substantiated (e.g., representing, for instance, clear ideological bias). The analysis that follows, however, does refer to a number of these "low relevance" articles if they present a common perspective or criticism of the Oregon land use system that is being tested or evaluated in a "high relevance" piece of research.

A total of 32 articles were considered "highly relevant" to the study and they form the majority of the literature we review below. To be "highly relevant" the research design had to be well documented and an appropriate way to answer the research questions. Methods, moreover, had to be adequately described and justified and utilize robust and trustworthy data sources and/or data collection methods. In general, the articles fitting these criteria also tended to be those published in peer reviewed journals and employed quantitative methods.

III. Findings

Overall, there is a large and sometimes conflicting literature on Oregon's urban growth boundaries and their performance as a method for containing urban sprawl and creating more livable communities. Part of the conflict arises because analysts have use different methodologies and measures for evaluating the outcomes of UGBs. This lack of uniformity in evaluation approach makes summarizing the literature and its findings a challenge. Another reason for the conflicting findings, however, relates to timing. While the growth boundary is a goal requirement, it took time for boundaries to be adopted. Likewise, because the boundaries drawn had to have an adequate supply of land for development over a 20-year period, the impacts have taken time to be realized and should be expected to fluctuate over time as land becomes developed (and hence scarcer) and boundaries are consequently redrawn.

On the following pages, we highlight the most significant studies and their findings. We ask the reader to please also look to the matrix of reviewed articles for more detail. To assist, we have included a statement called "the bottom line" in which we give our opinion regarding what, on balance, the research shows.

Urban Form (Spatial Spread / Density)

UGBs are intended to limit urban sprawl and create more compact cities. To put the Oregon experience in context, urban areas in the US overall have been becoming less dense since the Second World War. In 2001, Fulton, et al. measured sprawl to determine "who sprawls the most"? Their analysis looked at the change in urbanized land using the land data availed by the Natural Resources Inventory relative to population growth from 1982 to 1997. Nationally the urban land base increased by 47 percent, but the US population grew by 17 percent and overall densities in US urban areas fell by 15.7 percent. (Only 17 MSAs became more densely populated.) According to their calculations, one Oregon metropolitan area became more dense—Medford which saw its overall density rise by 2 percent. In contrast, Eugene-Springfield grew by 14.2 percent, but added 20.4 percent in urban land—a density decline of 5.2 percent; the population of the Portland-Vancouver, WA MSA grew by 32 percent but the land base increased by 48.9 percent, a density decrease of 11.3 percent. Including Vancouver, WA probably influences the calculation significantly, however, undermining the relevance of the finding for an analysis of the Portland area UGB. Finally, Salem grew by 28.1 percent, but added 45.9 percent to its land base—again de-densifying by 12.2 percent.

The earliest papers on the UGB and urban form emanate from a study done by ECO Northwest and other consultants funded by DLCD in 1991 (ECO Northwest, 1991; published later in Nelson and Moore, 1996; Moore and Nelson, 1995). The purpose of the study was to gather data on the performance of the system by key indicators and to identify issues related to urban growth in four case study areas with the overall objective of finding weaknesses in the state program so that it could be improved.

In the study, the consultants looked at residential building permits from 1985-1990 in four case study areas: Portland, Bend, Brookings and Medford. The researchers were interested in the location of residential development (within or outside the UGB) and the character of development (e.g., density of housing units). In relation to location, while they concluded that growth CAN be

contained in UGBs, their data showed that, in reality, localities varied greatly in the extent to which they honored growth boundaries in their development decisions. In Portland, only 5 percent of development took place outside the regional UGB, whereas in Bend 65 percent of new residential development was built outside the UGB. Nelson and Moore (1996) suggest that the findings indicate that a weakness of the program is administration and permitting at the local level. In relation to the character of development, ECO Northwest found that the density of development inside UGBs varied across the four localities studied with the Portland area achieving the highest densities at five single family units per acre (8000 square foot lots) and Bend realizing the lowest with 2 units per acre in SFR (lots of 20000 square feet). Overall, the actual density of development within the UGBs, with the exception of Portland, was found to be falling short of planned levels. Likewise, the research showed that in Medford and Bend single family subdivisions were being permitted on land zoned for multiple family residential—an occurrence which they warned could necessitate premature expansion of the cities' respective UGBs.

In 1995, the state's Transportation and Growth Management Program (TGM) program funded further case study research into development *within* UGBs; findings are reported in Weitz and Moore, 1996. The chief concern of this work was to characterize development and determine whether development patterns were dispersed or contiguous. Three places were selected for study: Florence, Medford, and McMinnville. The research lays out several principles for urban development (e.g., urban core development is desirable) and evaluates the cases against those principles. Overall the research found that dispersed development had not occurred to any significant degree in any of the three case study locations.

In 1999, Nelson published a straightforward comparison of three states (Georgia, Florida, and Oregon) in order to answer a seemingly simple question: Does growth management matter? He looked at an array of outcome variables including urbanized land, density, farmland loss, and commuting times and found evidence for Oregon that growth management does indeed matter. In relation to urban form, for the time period 1980-1990, density loss was slowed: Oregon's urbanized population increased by 25 percent but the density of urban areas fell by only one-half percent; GA in contrast grew by 33 percent but density fell 15 percent. Likewise, from 1982-1992, less land was also converted to urban use: for each new urban resident, Oregon lost only 0.33 acres of farm or resource land, whereas the national average was 1.79 acres and GA's figure was 2.10 acres. From 1990 to 1995, vehicle miles traveled in Oregon (see below) rose only by 1.5 percent, whereas VMT rose by 25 percent in FL and 15 percent in GA. He attributes the positive data for Oregon to more compact development patterns.

In 2004, Song and Knaap published a GIS-based study that developed a methodology for evaluating differences in urban form; they use the method to evaluate development and trends in Washington County over three time periods (1940-2000, 1940-1989, 1990-2000). While they stress that the purpose of their study is not to perform policy evaluation as "we hold that growth management instruments in Portland are too numerous, too mutually interactive and too difficult to data stamp to isolate the impacts of any one instrument" (Song and Knaap, 2005:211), the trends they find on land use in Portland are pertinent to this review. Specifically they find that (1) neighborhoods in Washington County have increased in single-family dwelling unit density since the 1960s; (2) internal street connectivity and pedestrian access to commercial areas and bus stops have improved since the early 1990s; (3) external connectivity continues to decline; and (4) the mixing of land uses remains limited. They conclude that while Portland could be characterized as winning the war on sprawl at the neighborhood scale, progress is more illusive at the regional

scale. They speculate that "better land use mixing and regional connectivity is constrained by economies of scale in commercial uses and transportation infrastructure (Song and Knaap, 2004:223).[3]

Building off of the preceding work, Knaap, Song and Nedovic-Budic published a paper in 2007 that sought to develop a measure of urban sprawl that captures intra-metropolitan differences in development patterns at the neighborhood level. Using three GIS-based measures (street network design, land use intensity, and land use pattern) the authors evaluated five metropolitan areas: Portland, OR; Maricopa County, AZ; Minneapolis, MN; Montgomery County, MD; Orange County, FL. In looking at neighborhoods developed after 1995, they found that land use mixture and pedestrian accessibility varied the most across the metropolitan areas studied. In contrast, lot sizes and single family floor space are fairly uniform across metros. In every single study site, lot sizes have gotten smaller over time, but houses have become bigger. Specific to Portland, their research found that the Portland metropolitan region had the greatest overall land use mix in its new neighborhoods. But internal connectivity (that is, connections within a neighborhood) was the worst in Portland—with 35 percent of the new neighborhoods studied having cul de sacs. Pedestrian accessibility to commercial uses, in contrast, was greatest with "on average" 30 percent of Portland residences within 1/4 mile of a commercial establishment. They also noted a positive trend toward external connectivity in the region since the 1970s. They conclude: "In general, it appears as though recent developments in Portland and Minneapolis-St Paul exhibit fewer characteristics of sprawl than Montgomery County, Orange County or Phoenix. Specifically, Portland ranks best in lot size, land use mix and pedestrian accessibility; and second in external connectivity and distance to commercial use. The case of Portland is, of course, particularly interesting given all the controversy over its urban growth boundary and other land use controls. These results suggest that development patterns over the last 15 years indeed exhibit fewer characteristics of sprawl than other metropolitan areas" (Knaap, Song, and Nedovic-Budic, 2007:247).

In contrast to the previous studies—which only speak to trends and do not isolate causality—a handful of studies have been conducted recently that look at the role of growth management in general and urban growth boundaries in particular in creating a more compact urban form. To measure urban form, analysts tend to rely upon two indicators: population density and the spatial spread or extent of the city (e.g., number of square miles).

In 2002, Carruthers published research in which he judged the effectiveness of growth management programs across 283 metropolitan counties using 4 criteria—including whether or not the program led to a reduction in urban sprawl. Using a 3-stage OLS regression analysis with USDA National Resources Inventory (NRI) data from 1982 to 2000, he measured this reduction by looking at the outcome variables of population density and the spatial extent of the metropolitan area. His findings show that the Oregon system led to greater than expected densities and lower than expected property values (after controlling for density)—but it has not "directly affected the spatial extent of urban land." He notes that the use of high density district zoning has allowed for abundant housing units to be produced which helps explain the limited price effects. He praises

[3] In 2005, Song published another iteration of this research in which he develops quantitative measure of urban form (based on dimensions of compact urban development and traditional neighborhood design) and evaluates three study areas to see how well their development patterns meet smart growth principles. Portland, OR is one of the study areas; the others are Montgomery County, MD and Orange County, FL. His findings for Portland parallel those reported in Song and Knaap (2004) so they are not reviewed here. Please see the matrix of articles for more information.

Oregon's planning system as "the most effective of those examined here" (Carruthers, 2002:1974).

In another study using the same NRI data set, but looking at a cross-section of states "with" and "without" growth management, Anthony (2004) found that nationally urban land increased from 1982-1997, but densities dropped 13 percent. Overall he determined that Oregon performed better than the national average—the state's urbanized land base increased 32 percent, but densities decreased by only 2.02 percent. Anthony also used multivariate techniques to determine the impact of growth management upon sprawl at three distinct points in time (1982, 1992, 1997—the time periods for NRI land data). In his two equations, growth management was operationalized as simply being present (dummy variable) or according to its duration (years in place). In all results he found no statistically significant effects on his (rather reductionist and simplistic) outcome measure for sprawl, namely population density.[4]

In 2005, Nelson and Sanchez tested the impact of urban containment on exurban growth. They identify three different forms of containment: "natural containment" –i.e., physical barrier to growth like lack of potable water; "strong containment"—containment created by public policy that allows such growth only in specially designated exception areas; and "weak containment"—another public policy form that uses minimum lot size restrictions to restrict density. Oregon is a strong containment state. They looked at growth in the 35 largest MSAs in the USA and measured change in census block group population densities over time as their performance indicator. They find that "urban containment whether natural or driven by policy increases urbanized land density (Nelson and Sanchez, 2005:44). Their figures show that Portland increased its density by 8.0 percent between 1990 and 2000. In regards to exurban land, only three MSAs saw an overall reduction in exurban land: Miami, Portland, and New Orleans. Strong containment, moreover, was shown to result in a negative rate of growth in exurbanized land change relative to non-containment. This leads them to conclude: "The available evidence suggests that urban containment policies, especially ones that are rigorous in managing development outside development boundaries, are most effective in restraining exurban sprawl in the USA" (Nelson and Sanchez, 2005:46).

A sophisticated study of the impact of state growth management and urban containment was published by Wassmer in 2006. He examines 425 urban areas (Census definition) in the United States to see how they have grown in the period from 1982 to 1997; his measure of effectiveness of these policies is the change in urban footprint (land mass) of urban areas. Departing from the work of Nelson and Dawkins (2003), Wassmer categorizes the urban containment plans and policies of the localities studied into four categories.[5] All Oregon MSAs are characterized as being part of a "non-local" growth management system. The categorization of urban containment programs at the local level, however, is not uniform. While all Oregon MSAs, except Salem, were seen as "accommodating future growth," the urban containment policies of Medford were characterized as weak whereas those of Bend and Corvallis were characterized as strong.

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[4] Wassmer (2006) presents a methodological critique of Carruthers (e.g., specification errors and omitted variable bias) that may undercut the validity of his analysis.

[5] Definitions: "Strong urban containment" means that a locality's plans/policies ensure current adequate land supply, offer affordable housing, provide for adequate infrastructure, and promote land conservation. In "weak urban containment" local plans and policies fail in most of these categories. Additionally, policies/plans are further categorized as 1) "accommodating"—that is plans accommodate projected urban growth and 2) "restrictive"—that is not accommodating of projected growth. The final typology for urban containment programs thus has four categories: Strong-restrictive; strong-accommodating; weak-restrictive; weak accommodating.

Portland, oddly, was characterized as both weak and strong, which may be a result of the difficulty of drawing generalizations about an MSA with so many units of local government that also encompasses two states. Wassmer also differentiates between different types of growth management. Following the work of Burby, et al. (1997), Wassmer categorizes growth management programs by the extent to which they require consistency. Oregon's system requires vertical consistency (compliance/integration with state goals) and horizontal consistency (consistency in planning across multiple neighboring units of government). Internal consistency, the third type, refers to consistency in actions with the plan(s) of only one governmental body.

His regression analysis findings are quite interesting (and too numerous to review here). He found that "just the presence of any form of urban containment is found to exert no significant influence on square mile size"; likewise, dummy variables for different types of containment also proved to be statistically insignificant (Wassmer, 2006:55). But he finds time important. As time progresses, urban containment has an impact with containment urban areas having smaller footprints than would be predicted. State growth management programs, additionally, are significant and also gain in significance over time. In his analysis "only statewide growth management programs with vertically or horizontally integrated components—i.e., i) the stipulation that local plans must coincide with a state plan requiring greater statewide compact development or ii) geographically contiguous local plans must be consistent—have been found to be effective at reducing the square mile size of US urban areas" (Wassmer, 2006:56). Programs based on internal consistency do not reduce the urban footprints because they only are applicable to a single local government and "an independent city or county's land use plan is less likely to discourage more-dispersed urban regional growth" (Wassmer 2006:55).

His specific findings for Oregon are worth noting. He ran an analysis in which he predicted what the size of an urban area would be in 2000 if the regulatory policies associated with urban containment and growth management had never been adopted. In this analysis, all Oregon cities studied—with the exception of Bend—are smaller than they would have been. Bend is 1.27 square miles larger than predicted—which is an interesting finding given that the city's urban containment policies were characterized as "strong-accommodating," the same categorization as Corvallis and Portland. While Wassmer does not explain individual cases, drawing from Nelson and Moore (1995) and ECO Northwest (1991) the explanation for Bend's size may arise from failures of local level implementation (e.g., percentage of permits given for building outside the growth boundary; permitting SFR in multi-family zones) that is not reflected in the planning/policy documents used to categorize MSA's containment programs.

The most recent published study of the impact of growth management on urban form/population density was written by Howell-Moroney; it appears in the Oct. 2007 edition of *Urban Studies*. He differentiates growth management regimes by "intensity"—that is the extent to which they use planning mandates and require state review of plans. Oregon in this schema is a strong growth management state as is Washington and Florida. As in other studies, his outcome measures are amount of urban land and urban density; unlike other studies he uses USDA's data on "major land uses"—a data series that "tracks land use at fairly regular intervals" (Howell-Moroney, 2007:2168). (He presumably uses this data in order to have complete panel data for the 8 time periods examined. His first time period is 1964 which predates NRI data.) His findings are positive but limited: "only strong growth management states have consistent success at altering land development outcomes" (Howell-Moroney, 2007:2173). In particular, he finds that, all else equal, his models predict that strong growth management states have less urban land and higher densities than either moderate or weak growth management states.

The final study reviewed for this evaluation is not quite "hot off the press"—the work is due out this fall but a key chapter from the book has been availed to us by its authors (Knaap and Lewis) and its publisher (The Lincoln Institute of Land Policy). In this research, state growth management (SGM) programs are evaluated according to their impacts on development patterns, housing prices, fiscal impacts, and natural resource lands preservation. The study examines 8 states: 4 with growth management regimes and 4 without using national level (federally collected) data for the time period 1980 to 2000. The growth management states are Oregon, Florida, New Jersey, and Maryland; non-growth management states are Colorado, Indiana, Texas and Virginia. States are paired in the study (growth management/no growth management); Oregon's paired state is Colorado.

In the chapter on development patterns, Knaap and Lewis calculate five quantitative sets of indicators of development patterns across the 8 states for the period 1982-1997. Two indicators, Land Use and Urbanization are the most relevant to this review. The *land use* indicator measures land use share (percentage of land under different uses) and developed land per capita (total amount of developed land divided by population). While developed land grew across all states studied, at 0.43 percent Oregon had the lowest level of land converted to urban uses of all states studied; Colorado was second at 0.62 percent. The land that did convert to urban uses in Oregon was generally rangeland. Oregon also witnessed a decline in the amount of developed land per capita—with the figure falling from a high point of .000604 square miles per person in 1987 to .000578 in 1997. They note that a "decline in developed land per person is a reasonably good measure of growth management success" but notes that on average growth in developed land per capita was actually higher in the SGM states. (Florida, Maryland, and New Jersey performed poorly on this measure.)

The *urbanization* indicator focuses on the "location and density of urban growth relative to existing areas". In this measure they allocate the share of growth across three types of areas: urban (areas already urban in 1990), new urban (not urban in 1990 but urban in 2000) and never urban. The way growth was distributed across these areas in our state is notable: 48 percent of population growth in Oregon was absorbed in pre-existing urban areas, 19 percent was absorbed in new urban area, and 33 percent was took place in always rural areas. As Oregon's urban land base is quite small (less than 1 percent of state's land)—this large influx of new residents into (pre-existing) urban areas has driven up urban population densities by 17 percent. The study also looks at urbanization at the metropolitan level, specifically infill development patterns. According to this analysis, already existing urban areas in the Portland metropolitan area experienced considerable in-fill—with population densities rising in those areas by 17 percent. In their conclusion, the authors offer various caveats about the research (e.g., measurement errors), but note that "the indicators do offer new information about state development trends that have never before been compiled" (Knaap and Lewis, forthcoming:25). They conclude:

> *Our results suggest there are few statistical differences in most of the indicators across states that have and do not have SGM programs, but there is some evidence to suggest that development patterns in Oregon during the 1990s had more growth management success than other states. Specifically, although Oregon is not among the fastest growing states, developed land per capita had a decade-long decline. Further, Oregon is the only state where population became more concentrated during the 1990s and where employment deconcentrated the least. The Portland*

> *metropolitan area was the only metropolitan area where population did not deconcentrate and where employment deconcentration was among the lowest of all metropolitan areas. The percent of urban population growth in urban areas was higher in Oregon than any other state and the percent of population growth in rural areas was the second lowest. This occurred in part because Portland was second only to Miami in the growth of population density within the urban envelope. Finally, though it did suffer declines, employment and population in Portland remains more centralized near the urban core than most other metropolitan areas (Knaap and Lewis, forthcoming:25).*

Bottom Line: Studies of urban form vary greatly in their methodology; they utilize different measures (e.g., density, street connectivity) and different techniques (e.g., cross-sectional and longitudinal data comparisons, econometric modeling; GIS-based analyses.) Judging just on the criterion of population density (as an indicator of more compact urban form), most studies find positive impacts (that is, increasing or more slowly decreasing population densities) either for the UGBs under study or for the type of growth management implemented by the State of Oregon. The GIS-based studies find some physical evidence for compact urban form (greater connectivity, pedestrian-accessible commercial development)—these studies, however, have been only conducted for the Portland region (Washington County) and cannot be used as evidence for the other UGBs of the state as local level implementation has been shown (at least in 1991) to play a critical role in physical outcomes. The literature does raise continued concern about the performance of the Bend UGB in achieving higher densities and compact urban form.

Infrastructure and Public Service Delivery Costs

One argument for creating more compact cities is that the cost of providing public services like police and fire protection, sewer and water will be less on a per capita basis if residents live in closer proximity to one another and if development is contiguous (e.g., eliminating the cost of running pipes and other infrastructure through farmland). Likewise, duplicative services may be eliminated. While there a numerous studies about the fiscal impacts of urban development and sprawl, only two studies were found that looked at infrastructure and public service delivery costs in relationship to urban containment and growth management in Oregon.

The first examination of public service costs and urban containment was conducted by Nelson (1999). In his comparison of three states—two with growth management (Florida and Oregon) and one without (Georgia), Nelson (1999) asserts that one potential measure of public service efficiency is tax burden, and that a declining per capita tax burden can be interpreted as an indicator of more efficient service provision. He finds that both Florida and Oregon did better in minimizing tax increases than Georgia. Specifically, in 1982 Oregon's tax burden was higher than the national average, but by the 1990s the burden was less than national average ($5,760 per capita nationally to $3,746 for Oregon residents). (Note: his analysis does not take into account other factors that could limit tax burden including property tax caps such as Oregon's Measure 5 which was passed in 1990.)

In 2003, Carruthers and Ulfarsson published a more rigorous paper which analyzed the impact of urban form and the structure of local government upon urban service provision across 283 urbanized counties. While the UGB was not operationalized in the analysis, the planning mandate of the state was and in a previous article also drawn from this analysis Oregon's planning mandate was shown to have led to greater densities but had no impact on the spatial extent of

urbanized land (Carruthers, 2002). In this 2003 paper, the authors hypothesize that a more compact urban form would lead to more cost effective urban service provision, as would more a unitary (less fragmented) local government system. They examine twelve different measures of public expenditure (e.g., fire, libraries, roads) and estimate the relationship between these measures and urban form and political structure. Their OLS estimates provided strong support for the hypothesis that public service expenditure is closely linked to the physical and political structure of metropolitan areas. Specifically the relationship between population density and service costs is negative and significant which suggests that density creates economies of scale for public spending on the whole, including capital facilities, roadways, police protection and education. They conclude their article by noting, "By far the most salient finding of the analysis is that the per capita cost of most services declines with density (after controlling for property value) and rises with the spatial extent of urbanized land." This reinforces planners' claim that urban sprawl undermines cost effective service provision and lends support to growth management and "smart growth" programs aimed at increasing the density and contiguity of metropolitan areas--at least from the standpoint of public finance.

Bottom Line: This area of inquiry relative to the UGB and the land use system is under-researched. However, based upon the two articles reviewed, compact urban form and higher population densities are positively related to lower service delivery costs per capita and lower tax burdens. To the extent that the UGB has been shown to increase density and limit land consumption per capita (see preceding section), we can—by extrapolation—attribute such positive outcomes to the UGB.

Land Values

The impact of UGBs on land values has been the subject of several studies; the leading researchers on this subject are Chris Nelson and Gerrit-Jan Knaap. UGBs are theorized to impact land values in two ways: first UGBs represent a supply constraint, as such they are expected to raise the values of unimproved (undeveloped) land within UGBs since those wanting land no longer have access to land outside the UGB and must look inward. This is expected to contribute to efficiency of land use since it will facilitate contiguous and infill development. A UGB also represents a timing constraint, but one that interacts with local level zoning—regardless of its location land cannot be used for urban uses until it is zoned for urban uses (so lands designated rural within and outside the UGB theoretically have the same value). The impact of UGBs on value can be independent of supply realities as it constrains the timing of rezoning; it is anticipation by market actors about when the UGB will be extended that affects value.

The first empirical study of the impact of the UGB on land values was conducted in 1976 and analyzed the Salem UGB, one of first UGBs in the state. In this study, Beaton, Hanson and Hibbard (1977) gathered land sales data for 105 parcels of undeveloped land; they found no difference in land values between land within and outside the UGB. The most significant explanatory variable for price in this study was the availability of sewer services. In the next two studies from the 1980s, Knaap (1982, 1985) looked at the effect of the UGB on property values in Portland. At this time, the Portland UGB was considered large by LCDC and a growth moratorium on certain parts within it created what Knaap calls an intermediate growth boundary (IGB). Using regression analysis, Knaap analyzed land sales for 900 parcels completed between 1979 and 1980. He found the effects of the UGB on land values were positive (that is, raising land values for land within the UGB) for both Washington and Clackamas Counties. Even though there was still excess undeveloped land within the UGB at this time, he argued that land value

impacts occurred due to the influence of the UGB on expectations of participants in the land market (relating to timing).

In 1986, Nelson published two studies on the Salem UGB (Nelson, 1986a; Nelson, 1986b); these are summarized in Knaap and Nelson 1992. In these studies he underlined the finding of Knaap that perception is important and that the land value impacts of the UGB relate to the "extent to which participants in the land market perceive it as a binding instrument" (Knaap and Nelson 1992:55). Even when controlling for the availability of sewer services, Nelson found that land values outside the UGB were lower than inside the UGB. He also found that land values fell with distance from the UGB, but that land values began to rise again for properties within 5000 feet of the line. He attributes this rise to the amenity value of open space captured by those land owners. Outside of the UGB he found that rural property values varied in an opposite manner: distance from the UGB positively affected property values. He attributes this to the impact of disamenities from nearby urbanization upon farming practice.

Nelson extended this study in 1988 and looked at the impact of the UGB on exurban areas. He defined exurban development as low density residential development beyond built-up urban and suburban areas but within commuting range of urban employment. His main aim was to understand the interaction of greenbelts (where commercial farming occurs) and exurban districts (the area of hobby farms and ranchettes, generally exception lands in the Oregon context) within a regional land market with an urban land constraint. He hypothesizes three effects. He posits that to be effective, urban containment program must affect the regional land market so that the demand for small acreage residential shifts out of the greenbelts and into exurban districts. He also hypothesizes that greenbelt land value will not fall due to proximity to exurban areas because exurban dwellers don't impose restrictions (e.g., on hours of operation) that impose costs on commercial farmers. His third and final proposition is that exurban land values will be higher the closer the land is to greenbelt land. Using data from Washington County and analyzing it with multivariate statistical techniques, all findings are consistent with theoretical expectations. There is a significant difference between the value of greenbelt land and that zoned for exurban development. Greenbelt land sells at lower price, which implies that demand for exurban land has shifted from greenbelt zones to the exurban zones (as desired by the planning process and land use system). Moreover, he finds that the containment policy has segmented the market into greenbelt and exurban submarkets (as per expectations). He also finds that exurban land values fall with distance from the greenbelt boundary and that there is no statistical evidence that exurban development has an adverse effect on greenbelt land value.

If the UGB has had expected impacts upon property values, a follow-up question to ask is whether the *rate of change in value* is different (higher or lower) than in areas without this regulatory regime. Land and house prices have risen nationally in the last decade. What role might UGBs (as land constraints) play in price increases relative to other factors that affect land value? A recent study by Jaeger and Plantinga (2007) helps answer this question. In their work, the authors looked at property values in select counties in Oregon and compared value changes to those taking place in Washington State. They identify three distinct types of effects from Oregon's land use system that might impact property value: restriction effects (regulations that prevent "highest and best use"); amenity effects (regulations that preserve open space or enhance livability); and scarcity effects (where regulation constricts the supply of land, i.e., the UGB). Their findings show that while land values have risen in the state in the last 40 years, "land with the most stringent restrictions has risen at rates similar to those without restrictions" (Jaeger and Plantinga, 2007:9). In relation to UGBs, they note that the inclusion of land within the UGB does

not necessarily translate to higher *rates of increase* in land values; rural land in Lane county, for instance, grew faster than did values within the Eugene-Springfield UGB. In comparison to Washington State, their data gives no credence to the claim that land values in rural Oregon have been reduced due to the land use system. They conclude that these outcomes are consistent with the objectives of the existing land use system which is intended not to stop development, but to influence its location. They also note that periodic expansion of the urban growth boundaries takes place, and to the extent that the expansion is anticipated in the land market, land values are not subject to extreme value fluctuations.

Bottom Line: UGBs have been shown to impact upon land markets. Land within UGBs rise in value; land values in ex-urban areas are higher if the land is at a distance from a UGB. Likewise, land within but on the border of a UGB experiences a value rise from the amenity value of the nearby open space. Relative rates of land value change, however, have been shown to be similar to those experienced in Washington State—so UGBs do not appear to be distorting land markets. Two factors can affect land values in relation to the UGB and these can change over time: tightness of UGB/amount of developable land within the UGB and perception of the UGB's permanence/duration by market actors.

Housing Prices (Affordability)

A very common critique of a UGB is that it has negatively affected the price of housing in the state. Outspoken critics of land use planning in Oregon such as Staley, Mildner, O'Toole and Pozdena, for instance, all allege that UGBs are to blame for accelerating housing price increases, particularly in the Portland metropolitan region *(see* Staley, Edgens and Mildner (1999), Staley and Mildner (1999), Staley and Gilroy (2001), O'Toole (2000), and Pozdena (2002). Pozdena (2002), moreover, has coined a new pejorative term "Portlandization" and blames Portland-style growth management in general and the UGB in particular for fostering a "new segregation".

Their studies, as a group, argue for this effect by using cross-sectional analyses and data on trends over time and attributing all outcomes that are adverse to the UGB.[6] These studies, moreover, do not present original research that isolates UGBs or the "suite of growth management techniques" (as referred to in Song and Knaap, 2007) employed by Oregon localities. Likewise they are primarily published by think tanks with clear ideological biases. (Our bibliographic search did not reveal publications by these authors in more-rigorous peer reviewed journals.) As a result these studies are discounted in this review; the reader, however, can turn to the bibliographic matrix for further information.

That said, Goal 14 c*an* affect housing affordability because it affects the supply and the price of land upon which to build housing. A constrained land base should lead to more demand for land, and higher demand is expected to drive up housing costs. A UGB, however, is only one land use

[6] Staley and Gilroy did present regression results computed by the real estate center at Washington State University—Clark County (Vancouver). Their analysis looked at land value changes in Washington state associated with that state's Growth Management Act. No analysis was conducted for the Portland MSA as a whole. While Pozdena (2002) calls his study an econometric approach and makes some references to regression his methods (equations, coefficients, etc.) are opaque. His main data is a "site scarcity index" (which is called a "site availability index" in the small print." His index is essentially a ratio between the growth in developed land to the percent change in population growth. It is not clear just what the threshold is for declaring that a local land market has a "scarcity" problem. But any place that is adding more people than land (in other words become denser) would apparently be viewed poorly according to this index.

control that can affect housing production and prices. Local level regulatory regimes—particularly zoning codes and subdivision ordinances—determine residential densities and the types of residential development (e.g., multi versus single family development). Local level land use controls have been shown to have negative impacts upon affordability (*see* Pendall, 2000). If single family housing is built at higher densities (i.e., more units per acre), the impact of land value increases will be less on a per unit basis. Likewise, if greater accommodation is made for multi-family units, any rise in land cost will be spread across many owners and/or occupants. Finally, local level development processes (like permit approvals or rezoning requests) and their duration can also impact housing prices.

Only a small number of studies were found on this subject. In their book on the Oregon land use system, Knaap and Nelson (1997) argue that the land use program as a whole has been effective in mitigating negative housing price effects from a constrained supply of land. This has been done because residential densities have been increased—even if they fell short of planned densities as shown in ECONorthwest (1991) and Nelson and Moore (1996)—and each community has a housing supply target. In an econometric study from 2000, Phillips and Goodstein looked at housing values in the Portland metropolitan region compared to all other western US metropolitan areas from 1991 to 1995. The authors found no statistically significant association between Portland's urban growth boundary and housing price rises for the period studied. They conclude that housing price increases experienced in the region were attributable to rapid employment and income growth in the metro area, rather than to regulatory factors. Interestingly they also found that median housing values in metro Portland were $20,000 *less* than their model predicted. They conclude that while the growth boundary can *per se* reduce the supply of land for building, building higher density housing can offset expected price rises.

In 2002, Downs (2002) published an analysis of the impact of the Portland UGB on housing prices for the time period 1980-2000. Specifically, he looked at the change in housing values in the Portland metro relative to other regions in the nation that do not have an urban growth boundary. He found that Portland housing prices grew faster relative to other areas only from 1990 to 1994. During the rest of the period under review, Portland prices rose *less rapidly* than many of other regions, including comparable regions in the West. He identified other factors that have influenced affordability including rate of job growth (which also rose in the early 1990s), wage growth (which rose relatively slowly compared with other metro areas) and the land supply available within the UGB (the earliest period of study coincided with earliest phase of UGB so there was a 20 year land supply within boundaries). He concluded that "there is no simple relationship between containment programs and housing prices" and observes that condemnations of UGBs and other containment programs as "always undesirable because they inevitably cause higher housing prices are as unwise and unreliable as unqualified claims that UGBs never accelerate rates of housing price increase."

Two other studies published in 2002 are worth noting. Nelson, et al., (2002) produced a paper for the Brookings Institution looking at the academic evidence on growth management and housing affordability. While this paper does not present new evidence per se or conduct an evaluation that isolates the UGB, the authors do conclude that "market demand, not land constraints, is the primary determinant of housing prices" (p. 25). Their findings were echoed in an evaluation of state growth management effectiveness by Carruthers (2002) that has been referred to in previous sections. Carruthers hypothesizes that an effective growth management program should be able proceed with little impact on property values if it includes regulatory consistency across units of government and if it effectively accommodates new development. He finds that after

controlling for density and other relevant factors, Oregon's land use program has not had a significant effect on property values and housing prices because Oregon law requires communities to accommodate growth through higher density zoning districts. Drawing on Phillips and Goodstein (2000), he concludes that "while land may be more expensive in Oregon due to the increased densities created by growth management, the effect is balanced out by creating an abundance of housing supply with high density zoning…And while concern has been voiced over the rapid growth in housing prices in Portland in the past 10 years, this effect is more likely to be due to the city's bull real estate market than anything else" (Carruthers, 2002:1976)

Bottom Line: In the academic literature, the UGB has not been clearly associated with housing price increases. Rising incomes and job growth resulting from economic expansion have increased the demand for housing and this has driven up housing prices.

Transportation

Theoretically, a UGB (as a strong urban containment policy) can be hypothesized to have substantial impacts upon transportation outcomes. Three transportation outcomes are of particular interest and might be affected by a UGB: vehicle miles traveled (VMT), travel time/travel speeds, and mode choice.

As was discussed above, relative to other metropolitan regions, metropolitan areas in Oregon have either increased their density (e.g., Medford according to Fulton, et al., 2001; Portland in Knaap and Lewis, forthcoming) or de-densified at a slower rate. Likewise, in terms of land conversion, overall urban areas of the state have added less land per new resident. Most analysts predict that higher population densities and more compact urban form will lead to fewer vehicle miles traveled—as destinations of interest (e.g., work, shopping) are closer to residential points of origin (e.g., Rodriguez et al., 2006). Impacts on vehicle speed and/or amount of time spent in travel are more ambiguous. If there is complementary investment in transportation infrastructure and services (e.g., mass transit and infrastructure for non-motorized modes) and residents make decisions to use modes other than personal automobiles, then the impacts of increased density could be somewhat neutral. It can result in constant demand for the same road space (with constant travel times and unaltered average speeds); it can even result in reduced travel times/higher travel speeds if a sufficient number of travelers change their mode. If this investment is missing, then higher density is expected to increase travel times and lower speeds due to increased congestion. With regard to the last variable—mode of transportation—a denser, more compact city is seen as having a favorable environment for non-motorized transportation modes—namely walking and biking. However, as an increasing amount of research on physical activity and the built environment has shown, these behaviors require appropriate and facilitating infrastructure such as bike lines, sidewalks, street lights and crosswalk signals. Density is a necessary but not sufficient condition for modal change.

Although we believe there is potentially a UGB impact on urban transportation this is one of the least studied impacts in our examination of the peer reviewed literature. Ewing, Pendall and Chen (2003) showed that sprawling regions performed less well than compact ones on 5 key outcome measures (levels of vehicle ownership, total vehicle miles traveled per capita, levels of transit use, number of traffic fatalities per capita, and 8 hour ozone levels), but their study did not present data or findings by individual MSA, nor did it operationalize UGBs as a distinct variable. Similarly, while Jun's 2004 study of the Portland region examined transportation data in relation to the UGB, the methods used do not allow him to draw any conclusions about the impact of the

UGB on transportation. Like other authors previously reviewed, Jun shows that the Portland region increased its density by 13.6 percent in the period between 1980 and 2000 and still had a significant level of metropolitan employment captured by the central city (70 percent). He illustrates, however, that commuting patterns in the metro region are not very different from the other 31 US metros studied (Jun 2004). Specifically, commuting time grew by 14.5 percent over the 20 year period; mean commuting time per trip was just about the average for the sample of cities studied. The paper also documents a rise in inter-county commuting patterns (which is also a national trend): from 1980 to 2000 the number of commuters residing in Clark County, WA traveling to Clackamas, Multnomah or Washington Counties rose by 115 percent, whereas the number of Oregon residents in those three counties crossing the bridges to Clark County rose by 315 percent. He notes that while 60.4 percent of housing units were constructed within the UGB in the 20 year period studied, of the remaining housing units that were built outside the UGB 26 percent were built in Clark County. This growth—taking place in a very different land use planning context with vastly different transportation planning mechanisms—makes determining the impact of the UGB on transportation in Portland methodologically challenging. The most recent study reviewed (Rodriguez, et. al, 2006) was the most methodologically sound and promising because it used econometric modeling techniques to ascertain the impact of urban containment policies upon transportation outcomes. His study, however, was limited to the largest 25 metropolitan areas in the USA and Portland was not evaluated.

There is evidence, however, that UGBs have had a positive impact upon physical activity. In a very recent study that they characterize as exploratory, Aytur, Rodriguez, et al., (2008) modeled the impact of urban containment and state growth management policies upon transportation-related and leisure time physical activity (LTPA). As with other studies conducted by this cluster of researchers, they classified metropolitan statistical areas according to their type of growth management legislation and urban containment policies. Portland was the one Oregon MSA included in the study and was categorized as an MSA with strong containment. They found that strong urban containment policies were positively associated with higher levels of active commuting (walking or biking). Likewise, MSAs with state legislation mandating urban growth boundaries had "significantly lower average percentages of no LTPA from 1990 to 2002 compared to MSAs without policies" (Aytur et al., 2007:326) as were MSAs with strong urban containment policies. In short, the UGB appears to have played a role in the greater physical activity levels and walking and biking to work by residents of the Portland MSA.

Bottom Line: There is very little literature on the transportation impacts of UGBs. Initial research on non-motorized transportation modes (walking and biking) has positively associated strong urban containment (the Oregon classification) with higher levels of physical activity and more walking and biking to work.

Social Equity (Racial Segregation / Access to Housing and Opportunity)

A concern with social equity—particularly with problems associated with access to decent housing and economic opportunity as well as residential segregation and concentrated poverty—is central to land use planning. While land use controls are intended to control the way land is developed to ensure that the community achieves the goals of its comprehensive plan and protect "health, safety and welfare", land use controls have a strong tendency to be misused. Zoning, in particular, is inherently discriminatory; while communities *should use* it to decide which land uses are appropriate and wanted and which are inappropriate and undesired, they *often use* it as a method for discriminating against and excluding unwanted persons from their communities—

particularly low income and minority populations. Local zoning codes discriminate or exclude through many means, such as not zoning for specific uses (such as multi-family or manufactured housing), requiring large minimum lot sizes, or demanding expensive infrastructure investment that raises the cost of development and housing (e.g., burying utilities). There is reason to believe that state level land use controls can have a positive impact upon the provision of housing—particularly housing for lower income residents—and on the racial mix of our communities because there are defined mechanisms for oversight and control of exclusionary practices at the state level (*see* Pendall, 2000).

Our literature search uncovered three publications focused on the impact of urban containment upon residential segregation. All three publications were products of a research program conducted by Chris Nelson and co-authored with colleagues at Virginia Polytechnic Institute and State University (Virginia Tech). In the first "preliminary" publication from the study (Nelson, Dawkins and Sanchez, 2004) the authors reported changes in dissimilarity indices from 1990 to 2000. (A dissimilarity index is a measure of just how segregated a city is. A score of 100 is a completely segregated landscape.) Although segregation fell across all 242 metropolitan areas, segregation fell more rapidly in metros with containment policies. Portland had the largest decline in residential segregation by race. The Portland metro had an index score of 66.2 in 1990, but in 2000 its score was 48.1, a change of 27.4 percent, a drop which is more than 3 times the national average. Its "paired non-containment MSA" Columbus OH, in contrast, saw its dissimilarity index fall from 68.5 to 63.1 in the same period.

Also in this study and the next two publications (Nelson, Sanchez and Dawkins, 2004; Dawkins and Nelson, 2004), they reported results of a multivariate analysis aimed at explaining the factors behind falling dissimilarity indices across metropolitan areas. They asked two main questions: what role does urban containment (e.g., UGBs) and mandatory housing policies (e.g., inclusionary zoning) play in this? They hypothesized that both containment and mandatory housing elements would lead to a decrease in segregation. In their findings, however, only the urban containment hypothesis was sustained. They found that urban containment was a statistically significant variable explaining decreasing segregation but that it explained only the percentage change for segregation between Anglos (non-Hispanic Caucasians) and African Americans and not for other population groups such as Hispanics or Asians. Their regression coefficient suggests that 10 years of strong containment—as is implemented in the state of Oregon—would decrease segregation by 1.4 percentage points more than would have occurred without such policies. The UGB has this positive effect because land (and populations) that would otherwise be ignored in an unconstrained market becomes more valuable and attractive for re-development in a constrained situation.

The authors underline that this finding is important and that using land and housing as a method of achieving social equity goals is relatively new to American planning (compared, for instance, to social welfare policies). Although affecting residential segregation by race is not a standard justification for growth management strategies on the part of its advocates, this outcome ("collateral benefit" in their terms) is worth noting and investigating further since mandatory housing elements (e.g., fair share requirements) and even inclusionary zoning policies are very difficult to implement at the local level.

Bottom Line: Strong urban containment such as practiced in Oregon is shown to have positive impacts on reducing residential segregation by race.

Economic Growth (Downtown Revitalization)

A final effect of UGBs that has been studied in the scholarly literature is their impact upon economic growth. Critics of UGBs assert that by constraining land availability, UGBs will negatively impact upon growth since certain industries will be discouraged from investing here. Locations with UGBs are anticipated to be less attractive for investment due to higher land values and relative land scarcity (i.e., which is expected to increase the difficulty of locating there as larger tracts of land needed for large physical plants will be unavailable). Other perspectives, however, see UGBs as assets for economic growth as more efficient urban form will decrease key costs of doing business (relative to expenditures for public services over a spread out area). Drawing from the work of Florida (1999), still others argue that UGBs also aid business expansion and entrepreneurial activity because they create the denser, more diverse, and amenity rich environments that attract a highly educated and talented workforce (i.e., the creative class).

In a study from 2000, Nelson and Peterman (2000) examined the impact of growth management regimes across 182 medium sized metropolitan areas from 1970 to 1992 to ascertain what types of impacts they might be having on economic growth. In their analysis they identify 26 metros with "reasonably rigorous" growth management regimes; these include the cities of Eugene, Medford, and Salem. They hypothesize that growth management improves economic performance over the status quo (urban sprawl) because, if effective, growth management regimes channel new development into more efficient urban forms that lower direct costs to residents (e.g., tax rates) as well as indirect costs (e.g., hours spent commuting). They gauge economic performance by looking at market share and define a positive effect as one in which a geographic area employing growth management sees an improvement in market share (measured in personal income) over time relative to those without growth management. (The authors cite Buffalo as a counter case—while its economy is larger than it was in 1945, its dominance or market share relative to other MSAs has fallen greatly.) They find a positive association between growth management and market share—with MSAs that have employed growth management approaches since 1982 enjoying a 1.0 point improvement in market share relative to all other MSAs. They conclude: "This is an impressive figure...The growth management coefficient indicates that when present, growth management may account for about 10% or more of the change in an MSA's share of aggregate MSA personal income" (Nelson and Peterman 2000:283). (Note: results not disaggregated by type of growth management so this article does not enable us to draw conclusions about the relative benefits of being a rigorous growth management state.)

Wassmer (2002) studied drivers of retail sprawl in metropolitan areas of the western United States. Retail sprawl is defined as the decentralization of retail activity out of traditional central business districts to peripheral, suburban locations. Wassmer's aim is to determine whether a state's system of local public finance and the use of urban growth boundaries work to further or deter retail decentralization in a metropolitan area. He argues that the system of local public finance might exert an influence on local land use decisions, with localities with a high reliance on local sales tax, for instance, zoning more frequently for retail uses. He also posits that UGBs should slow or negatively affect retail growth at the periphery since they contain growth and direct it toward the CBD. He argues that if a UGB reduces non-central retail sales, then it has achieved a state policy goal of slowing retail sprawl. Departing from Nelson (2001), Wassmer categorizes the metropolitan areas as being closed region containment (Oregon system), open region containment, and isolated region containment. Using regression analysis he finds that a policy of closed region containment is the only one with an impact that slowed retail sprawl. He

notes that it takes time for the benefits of containment to be realized: "a region that institutes a policy of closed region containment at first exhibits more non-central retail activity; however after 12 years...it begins to have less. These findings are as expected if regions with greater sprawl are more likely to adopt closed region containment and over time this policy reduces decentralization" (Wassmer, 2002:1323).

In 2003, Dawkins and Nelson looked at the impact of state growth management programs on central city revitalization; while their research did not specifically isolate the UGB its findings are useful nonetheless. Their specific interest was the impact of these programs on the spatial distribution of new residential construction; their expectation was that central cities located in growth management states would capture a greater share of new residential construction than those located in non-growth management states. Their analysis of building permit data from 1980 to 1998 showed that trends data confirmed this—Eugene is highlighted as its share of metropolitan construction grew from 43 percent in 1980 to 65 percent in 1998. Their regression modeling results appear to support a causal relationship as well: the existence of a state growth management regime is statistically associated with a higher percentage of new construction in central cities and lower percentage in suburban and peri-urban areas.

The most recent study, which explicitly looks at the impact of UGBs and urban containment policies on economic outcomes, was written by Nelson et al. (2004). In this paper, the authors seek to understand the impact of urban containment on central city revitalization, which is measured by total real estate investment for the period 1985-1995. They hypothesize that urban containment can be an effective tool because if no new territory is available for development participants in the real estate market will look inward and seize bypassed opportunities. In their study of 144 US metropolitan areas, they find that in general central cities with containment saw higher per capita investment over the period 1985-1995 (regardless of the type of urban containment policy utilized). Specifically they find that construction of single family and multifamily housing in central cities was increased by the presence of containment programs, as was investment in residential rehabilitation. Closed region containment (Oregon's category) saw slightly lower investment in single family residential homes. Urban containment had the greatest impact on the value of commercial additions (rather than new commercial building). Finally, the value of industrial building was "significantly higher in metro areas with containment programs than those without." The authors note that:

> *urban containment appears to shift metropolitan development demand away from rural and exurban areas outside containment boundaries to suburban and urban areas inside them. This is an important finding because it suggests that central city gains do not have to come at the cost of reduced development in suburban areas located within urban growth boundaries (Nelson et al., 2004:421).*

Specifically in relation to Oregon, the state's urban growth boundaries had only been in effect for five years at the beginning of the study. They also believe that some differences are due to varying growth pressures during the study period. Eugene and Portland, which constitute 50 percent of their closed containment sample, were in recession from late 1980s to early 1990s so they caution that estimates for investment (as in single family homes) may be lower due to poor economic performance.

Bottom Line: Urban containment (as embodied in UGBs) has been shown to have a positive impact on economic performance measured by higher percentages of real estate investment,

growth in personal income, and proportion of retail activity captured by a central city and its CBD.

IV. Evaluation Data Needs

Summary of Existing Data

The studies reviewed above has utilized a wide variety of data sources to evaluate the impacts of urban growth boundary on a variety of indicators, including land prices, housing affordability, residential segregation, service provision costs, and real estate investment. In general, the data that has been used in these studies has been derived from federal and state government, regional entities (e.g., metropolitan planning organizations) as well as provided by professional associations such as the National Realtors Association. Few of the studies utilized local government data (such as building permits, assessors' records) or tapped into the potential of land data gathered through remote sensing and GIS by non-federal actors. This is probably the case due to the greater difficulty of gathering such data and the fact that state and local agencies gather data in a non-uniform manner which makes comparative studies difficult. Likewise, states and local governments vary greatly in the extent to which they gather data—some places are data rich, others data poor.

Most analysts relied upon federal data including the decennial US Census, the USDA Natural Resources Inventory, the USDA Census of Agriculture, business and employment data gathered by the Dept. of Commerce's Bureau of Economic Analysis, and the annual transportation reports of the Dept. of Transportation's Transportation Institute. Federal data is preferred because it is gathered in a uniform manner by an experienced agency which (at least theoretically given current concerns about the US Census Bureau and Census 2010) makes data more reliable and comparable across metropolitan statistical areas.

Data Needs

In the literature reviewed, few major complaints were made about data availability or data needs.

Analysts did differ, however, as to which data were most appropriate for the land use and land conversion analyses. In particular, Kline (2000) criticized Nelson's reliance upon data from the Census of Agriculture as a source of data on land use in his paper of 1999 as it gathers financial data on agricultural enterprises and does not directly measure land under certain crops. Kline argued that NRI data was a more appropriate method for gauging the amount of land in agricultural or forest uses. Nelson in a rejoinder pointed out weaknesses with NRI (it too relies upon a sampling methodology). Most critically, NRI data has problems of scale and availability of time: it is considered unreliable below the state level and is only available for four snapshots in time:1982, 1987, 1992, and 1997 (Knaap and Lewis, 2008). For our purposes, under standing UGB performance would be enhanced by greater availability of reliable data on land at the sub-state (county or municipal) level.

Assembling GIS and remote sensing-derived data at the parcel level by a state agency could potentially overcome these problems; this would only be possible, however, with a well funded and sophisticated GIS system that includes "ground truthing" of the data. Of particular concern

would be verifying that land categorized as being under agricultural or forest use was really in use and not transitional (e.g., shrubs and grasses in fallow land) or even ex-urban open space.

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Chapter 5
Goal 16: Estuarine Resources

James W. Good, Jenna Borberg, and Anna Pakenham

Goal 16 Planning Guideline

To recognize and protect the unique environmental, economic, and social values of each estuary and associated wetlands; and

To protect, maintain, where appropriate develop, and where appropriate restore the long-term environmental, economic, and social values, diversity and benefits of Oregon's estuaries.

I. Introduction

Statewide Planning Goal 16, *Estuarine Resources*, is the first of four "coastal goals" that were adopted by the Land Conservation and Development Commission (LCDC) in December 1976. It and Goals 17, Coastal Shorelands, Goal 18, Beaches and Dunes, and Goal 19, Ocean Resources, required significant additional planning tasks of coastal local governments and state agencies with responsibility for managing coastal and ocean resources. Development of the coastal goals was also central to Oregon's participation in the federal Coastal Zone Management program, and the coastal goals provided much of the basis for approval of the Oregon Coastal Management Program (OCMP) in 1977.

A great deal of time, energy, and resources were devoted to goal-related planning for Oregon's twenty-two estuaries and their adjacent shorelands from the mid-1970s to the mid-1980s. Cities, counties, ports, local councils of governments, state and federal agencies, tribes, nongovernmental organizations, and interested citizens all played key roles in decisions leading to land and water use plans for each estuary. For the larger estuaries, multi-jurisdictional planning task forces were formed, sometimes taking five or more years and millions in planning dollars to come to consensus on hosts of issues, develop needed goal exceptions, and incorporate results into local city and county comprehensive plans.

This chapter reviews the results of those extended planning processes and subsequent implementation of the plans, including related state agency roles and activities. The main focus is on the key question posed in the overall work plan:

> *Has the Oregon Land Use Program been effective in protecting and developing estuarine areas, consistent with Goal 16 requirements?*

Given the highly prescriptive and detailed inventory, planning, and implementation requirements of Goal 16, answering this question necessitates asking a more detailed set of secondary questions regarding the specific elements of the Goal. These are outlined later. In addition, relevant state agency key performance measures (KPMs) were also examined.

This chapter is organized as follows. Oregon's estuaries are briefly described, including their ecological, social, and economic importance and trends. Next, each of the secondary questions we identified is addressed. This includes a review of relevant administrative rules, goal amendments, and updates of associated statutes and programs; a summary of relevant data and assessment of its adequacy; the relationship to relevant Oregon Benchmarks and KPMs; and a subjective evaluation (i.e., the authors' opinion) of Goal effectiveness for each secondary question. Finally, conclusions are summarized and recommendations offered for improving the capacity to monitor and evaluate local and state agency decisions related to Goal 16's effectiveness.

II. Oregon Estuaries: Ecological, Social, and Economic Contexts

Oregon Estuarine Ecosystems

Oregon's twenty-two estuaries (Figure 5.1) are ecological transition zones, integrating features of the watersheds they drain with those of the marine environment. Physical characteristics strongly influence the structure, functions, and capacity of estuaries to provide valued ecosystem goods and services. By any standards, Oregon's estuaries are small, with the exception of the Columbia River estuary. Coos Bay and Tillamook Bay are the next largest estuaries, but these and the rest of Oregon's estuaries combined could be fit into two-thirds of the Columbia. Although small, each is highly valued for the unique and irreplaceable roles played in the transition from river to the ocean.

Some of these physical characteristics are similar for most estuaries along the coast—the amount of precipitation, solar heat input, and tide levels at river mouths, for example (NOAA-SEA, 1988). Other characteristics, such as the estuary size and shape, watershed area, geology, land use, and river gradient make for variety among Oregon estuaries. Regional ocean conditions also strongly influence Oregon estuaries.

Estuaries are biological "hot spots" along the coast. They are permanent or temporary home to a wide variety of organisms—some of marine origin, others from upstream, and some unique to the mixing zone. Biological productivity in this mixing zone is especially high, fueled by an abundance of food and tidal energy. Estuarine habitats—marshes, eelgrass beds, mudflats and tidal channels—serve important roles in the life cycles of marine and anadromous species like crab, salmon, herring, migratory waterfowl, shorebirds, and hundreds of less well-known species.

Because estuaries experience great variability in temperature, salinity, tides, and river flow, estuarine ecosystems and the organisms found there are naturally resilient to disturbance. However, the cumulative effects of human alterations such as filling, diking, dredging, and wood removal; the introduction of non-indigenous species; and excessive waste disposal have reduced the functional capacity and natural resiliency of these ecosystems.

Social and Political Dimensions

Humans have been attracted to estuaries for millennia. Native peoples built their villages along their sheltered shores, harvested the abundant salmon, oysters, and other fish and shellfish, and used them for local transportation and trading. Early Euro-American settlement of the Oregon coast also centered on estuaries, with early cities at Astoria, Newport, Reedsport, and Marshfield

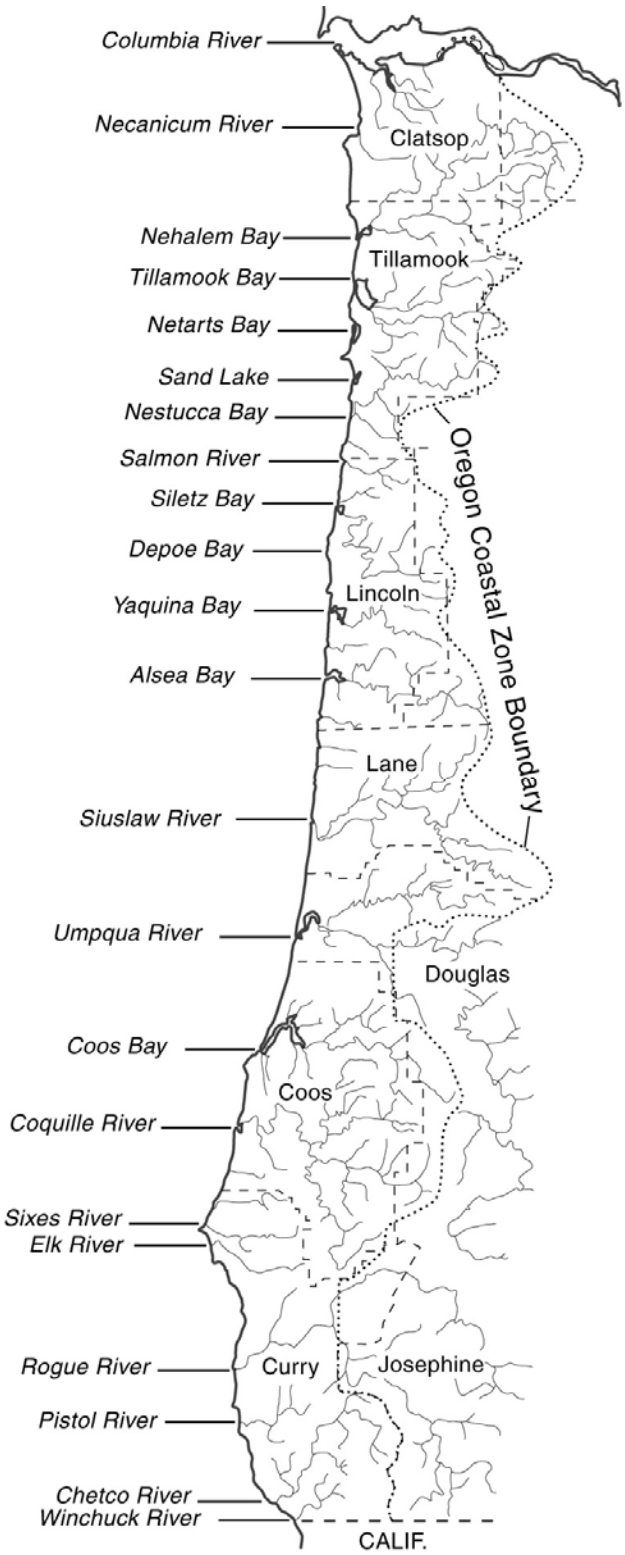

Figure 5.1: Oregon's Estuaries and Watershed-based Coastal Zone Boundaries.

(now Coos Bay). These settlers were attracted to estuaries by transportation convenience, and access to seemingly inexhaustible natural resources. Coastal rivers were used to transport logs down to estuaries for storage, processing at local mills, or shipment to distant markets. The 20th century saw growth of existing and new settlements; improvements in ports and navigation; industrial and commercial development; and commercial and recreational exploitation of salmon, oysters, and other living resources. With this development and resource extraction came a plethora of unwanted by-products—pollution, filling and conversion of valuable tidal wetlands to other uses, decline of native fish and shellfish, invasion of estuaries by nonnative nuisance species, and crowding of highways and recreational facilities.

In the late 1960s, several of these problems coalesced at Yaquina Bay. Local officials and port commissioners, responding to perceived recreational demands, clashed with fish and wildlife managers over plans to dredge and build a large marina at South Beach. In response, city, county, port, state agency, and federal officials formed an innovative planning task force. After a year of inventories, workshops, and debate, they produced the *Preliminary Land Use Plan for the Yaquina Bay Area* (BGRS, 1969). Similar conflicts in other estuaries led Governor Tom McCall to slap a moratorium on dredge and fill activities until the legislature could set up a regulatory program, which they did in 1971 by passing the Fill portion of the Removal/Fill Law (ORS 196.795-990). The Yaquina Bay plan also served as a model for similar planning efforts in Tillamook Bay and elsewhere on the coast, and influenced the final policy recommendations of the Oregon Coastal Conservation and Development Commission (OCC&DC) in 1975. OCC&DC's policy recommendations, in turn, became the basis for LCDC Coastal Goals 16 through 19, adopted in December 1976.

The U.S. Secretary of Commerce approved the Oregon Coastal Management Program in May 1977, with the Statewide Land Use Program and the Coastal Goals as its centerpiece. Incentives for Oregon's voluntary participation in the federal program included significant funding for program administration that continues today ($1.1 million for 2008-09) and the "federal consistency" provision of the federal Coastal Zone Management Act of 1972 (CZMA), whereby federal permits and development actions in the coastal zone must be consistent with the enforceable policies of the OCMP.

Today, a variety of local, state, and federal laws, regulations, and programs are in place to govern the actions of a diverse group of public and private estuary and shoreline users. Goal 16-based elements of local comprehensive plans establish permissible uses, conditions, and physical boundaries for many such actions. Subtidal and intertidal lands and natural resources in estuaries are mostly state owned and managed, although there is some federal ownership of wildlife refuges and recreation areas, and concurrent federal regulatory jurisdiction over some uses and activities. A significant fraction of estuarine lands is in private ownership—mostly tidal marshes and swamps above the mean high tide level, and tidelands that were sold off by the state early in the 20th century. Land along estuary shorelines is almost exclusively in private ownership and control, although local governments are required by land use laws to give preference to water-dependent shoreline uses.

Demographic and Economic Trends

Much has changed on the coast in the more than 30 years since the Coastal Goals were adopted by LCDC. According to a recent study conducted for the Oregon Coastal Zone Management Association (The Research Group, 2006), population grew 64 percent from 1970 to 2000, much

of it due to an influx of retirees. At the same time, there has been outmigration of youth pursuing education and job opportunities elsewhere; the result has been significant demographic shifts with older residents and newcomers playing greater roles.

Ports continue to play an important role in the economies and social make-up of coastal communities, providing access to the ocean for marine shipping, commercial and recreational fishing, and pleasure boating (Table 5.1). Fisheries and forest products, longtime coastal economic mainstays, have declined in relative importance over the past three decades, although what remains of these industries is relatively stable. The shrimp fishery, for example, recently was certified as "sustainable," providing new marketing opportunities. The Dungeness crab fishery, while cyclic, is also healthy. Agriculture has held its own on the coast, due largely to Tillamook County's dairy industry. Tourism has increased as well, but surprisingly accounts for just six percent of the economy coastwide (The Research Group, 2006). Transfer payments—mostly retirement and investment income—have seen the most growth, comprising a whopping 46 percent of personal income in 2003.

The Research Group report suggests that for the coast in general, the most significant "comparative advantage" for economic development is its natural amenities—beaches, rocky shores, lakes, and of course, unparalleled weather for storm-watching. The role of estuaries as amenity features is huge, with their aesthetic appeal and opportunities for boating, fishing, clamming, birding, sightseeing, and other recreation. And below the surface, estuaries play a critical role in the life cycle of many of Oregon's key ocean commercial and recreation catches—salmon, crab, flatfish, and even rockfish.

III. Methods for the Goal 16 Assessment

Primary Question and Agency Benchmarks

The overall goal for this part of the land use assessment is to answer the question:

> *Has the Oregon Land Use Program been effective in protecting and developing estuarine areas, consistent with Goal 16 requirements?*

In addition, the Department of Land Conservation and Development (DLCD) asked that Oregon Benchmarks and legislatively adopted key performance measures (KPMs) for state agencies be addressed (Oregon Progress Board, 1990 and 2007). For Goal 16, these relate primarily to selected environmental benchmarks and performance measures (Table 5.2).

Secondary Questions

As noted earlier, answering the central question for Goal 16 and addressing relevant Oregon Benchmarks and state agency performance measures (Table 5.2) requires asking a set of more detailed questions, mostly about specific elements of Goal 16. We identified 11 such questions (Table 5.3), one of which (Question 4) relates to a Goal 17 provision for identifying and reserving certain shorelands for water-dependent development. The remainder relate specifically to Goal 16's estuarine inventory, planning, and implementation requirements. All were judged as relevant to the central question above and, to differing degrees, the benchmarks and performance measures

Table 5.1: Human Uses, Population Centers, and Navigability of Oregon Estuaries.

Estuary	Major Uses	Cities/Towns (2006 population)	Ports	Navigation Channel (ft)	Jetties	Overall Estuary Classification*
Columbia	Navigation/shipping Fishing port Commercial fishing Recreational fishing Pleasure boating	Astoria (9,970) Warrenton (4,460)	1	55/45	Yes	Deep Draft Development
Necanicum	Recreational fishing Clamming	Seaside (6,165) Gearhart (1,095)	0	No	No	Conservation
Nehalem	Recreational fishing Clamming Pleasure boating	Wheeler (435) Nehalem (215)	1	No	Yes	Shallow Draft Development
Tillamook	Navigation/shipping Fishing port Recreational fishing Pleasure boating Clamming Commercial oyster	Garibaldi (920) Bay City (1,195) Tillamook (4,675)	2	18	Yes	Shallow Draft Development
Netarts	Recreational fishing Pleasure boating Clamming	Netarts (220)	0	No	No	Conservation
Sand Lake	Clamming	Sand Lake (210)	0	No	No	Natural
Nestucca	Recreational fishing Pleasure boating Clamming Habitat restoration	Pacific City (450)	0	No	No	Conservation
Salmon	Recreational fishing Pleasure boating Habitat restoration	Otis (100)	0	No	No	Natural
Siletz	Recreational fishing Pleasure boating Clamming Habitat restoration	Lincoln City (7,615)	0	No	No	Conservation
Yaquina	Navigation/shipping Fishing port Recreational fishing Pleasure boating Clamming Commercial oyster	Newport (10,240) Toledo (3,590)	2	40/30/10	Yes	Deep Draft Development
Alsea	Recreational fishing Pleasure boating Clamming	Waldport (2,110)	1	No	No	Conservation
Siuslaw	Recreational fishing Pleasure boating	Florence (8,270)	1	16	Yes	Shallow Draft Development

Table 5.1: Human Uses, Population Centers, and Navigability of Oregon Estuaries (cont.).

Estuary	Major Uses	Cities/Towns (2006 population)	Ports	Navigation Channel (ft)	Jetties	Overall Estuary Classification*
Umpqua	Navigation/shipping Fishing port Recreational fishing Pleasure boating	Reedsport (4,250)	1	26/22/12	Yes	Shallow Draft Development
Coos Bay	Navigation/shipping Fishing port Commercial oyster Recreational fishing Clamming Pleasure boating	Coos Bay (16,005) North Bend (9,720) Charleston (300)	1	40/35	Yes	Deep Draft Development
Coquille	Recreational fishing Clamming Pleasure boating	Bandon (3,115) Coquille (4,210)	2	13	Yes	Shallow Draft Development
Rogue	Recreational fishing Pleasure boating Gravel Mining	Gold Beach (2,425)	1	13	Yes	Shallow Draft Development
Chetco	Fishing port Recreational fishing Pleasure boating Gravel Mining	Brookings (6,315)	1	14/12	Yes	Shallow Draft Development

Literature and Data Review

With assistance from the Institute of Natural Resources at Oregon State University (OSU), we conducted a traditional literature review, searching for journal articles, books, and grey literature to see what existing data and information might be available to answer our questions. Databases and collections searched, using search terms—*Oregon estuaries, Goal 16, coastal land use*, and so on—included:

OSU Valley and Guin (HMSC) Libraries (OASIS database)
Scholar Archive
Google Scholar
GEOBASE
Agricola
Journal of Planning Literature
Web of Science

Collections held by the OSU College of Oceanic and Atmospheric Sciences, and the OSU Marine Resource Management Program, as well as the primary author's personal library, were also searched. Potentially useful state agency databases were identified; among them were the online *Oregon Coastal Atlas* (a primary source for estuary and shoreland zoning data) and databases at DLCD, the Department of State Lands (DSL), the Department of Environmental Quality (DEQ), and the Oregon Watershed Enhancement Board (OWEB). Where there was promise of easily-

Table 5.2: Oregon Progress Board (OPB) Benchmarks (2007-09 Biennium) and Associated State Agency Key Performance Measures (KPM) Relevant to Goal 16, Estuarine Resources.

Benchmark Title/#	Oregon Benchmark	Relevant State Agency KPM #	KPM target in % for 2008	Goal 16 Question [7]
Wetlands (edited) #78	Net gain or loss of wetland acres in any given year: a. Freshwater, b. Estuarine.	DSL #9: No Net Loss of Wetlands (78 a. & b. consolidated by legislature)	Percent change in wetland acreage due to permit actions (0%)	5
None	None	DLCD #8: Coastal Development Zoning	Percent of estuarine areas designated as "development management units" in 2000 that retain that designation (100%)	3
Stream Water Quality #79	Percent of monitored stream sites with: a. Significantly increasing trends in water quality, b. significantly decreasing trends in water quality, c. water quality in good to excellent condition	DEQ #10: Water Quality Conditions	Percent of monitored stream sites with (a) significantly increasing trends in water quality (25%) (b) decreasing trends in water quality (0%) (c) water quality in good to excellent condition (55%)	6
Stream Water Quantity – Min. Stream Flow #80	Percent of key streams meeting minimum flow rights: a. 9 or more months a year, b. 12 months a year	DWR #1: Flow Restoration DWR #2: Protection of Instream Water Rights	- Percent of watersheds needing flow restoration for fish that had a significant quantity of water put instream through WRD programs (20%) - Ratio of streams regulated to protect instream water rights to all streams regulated (0.4)	Not addressed
Freshwater Species #86	Percent of monitored freshwater species not at risk: (state, fed listing): a. salmonids, b. other fish, c. other organisms (amphibians, molluscs)	ODFW #7 & 8: Oregon Species of Concern	Percent of fish species of concern (threatened, endangered, sensitive) being monitored (86%)	3 & 10, but indirect via habitats
Marine Species #87	Percent of monitored marine species not at risk: (state, fed listing): a. fish, b. shellfish, c. other (mammals only - plant data n/a)	ODFW #7 & 8: Oregon Species of Concern	Percent of fish species of concern (threatened, endangered, sensitive) being monitored (44%)	3 & 10, but indirect via habitats
Natural Habitat(s) (new) #89	(Proposed wording): Percent of land in Oregon that is a natural habitat: (total) a. forest b. shrubland c. grassland d. wetland/riparian	None established	None established	3 , but indirect via habitats for d.

Source: *http://www.oregon.gov/DAS/OPB/obm.shtml*

[7] See Table 5.3 for Goal 16 secondary questions for this study.

Table 5.3: Secondary Questions for Evaluating the Effectiveness of Goal 16, Estuarine Resources

Secondary Question	Goal 16 Requirement Reference
1. Has the LCDC classified the Oregon estuaries to specify the most intensive level of development or alteration that may be allowed to occur within each estuary, and have subsequent development activities been consistent with those classifications?	Overall Goal Statement
2. Have estuarine inventories been carried out to provide physical, biological, social, and economic information needed to provide a sound basis for estuarine management?	Inventory Requirements
3. Have local governments classified estuarine areas into Natural, Conservation, and Development management units [zones] consistent with Goal 16 requirements for habitat protection and development needs, and have subsequent land use decisions been consistent with uses and activities permitted under the goal?	Management Units
4. Have estuarine shoreland areas designated and zoned for water-dependent and water-related development in local comprehensive plans developed in the 1980s been used for such development or, if not used, do they continue to be reserved for such uses in the future?	Goal 17 Comprehensive Plan Requirement, Coastal Shorelands Uses 2
5. Have specific development projects involving fill, removal, in-water construction, or other significant estuarine alteration (1) been consistent with management unit criteria; (2) obtained necessary local, state, and federal permits; (3) been evaluated for potential adverse impacts; and (4) met the tests for water-dependency, public trust protection, alternatives, and impact minimization.	Management Units; Implementation Requirements 1 & 2
6. Have state water quality agencies, using their authorities, maintained estuarine water quality and minimized human-caused sedimentation?	Implementation Requirement 3
7. Have the impacts of projects involving dredging or filling of intertidal or tidal marsh areas been mitigated as per Goal 16 requirements and have potential mitigation sites been protected for that purpose?	Implementation Requirement 5
8. Have adequate dredged material disposal sites been designated and used for that purpose consistent with overall estuary classifications and management unit designations?	Implementation Requirement 6
9. Have single-purpose docks and piers in estuaries been limited in favor of community facilities?	Implementation Requirement 7
10. Have potential restoration sites been indentified within each estuary? Have areas been restored consistent with Goal requirements?	Implementation Requirement 8
11. Are key state agency authorities, indentified in the Goal, in alignment with Goal 16 requirements?	Implementation Requirement 10

compiled data relevant to our questions, we sought queries of the databases, including (1) DLCD's Plan Amendment and Federal Consistency databases; (2) DSL's Land Administration System, which tracks Removal/Fill Law decisions; and (3) OWEB's restoration database. Available data and information from these sources and from discussions with agency staff were then organized for analysis under each of the questions in Table 5.3.

Institutional Analysis

Where available data or information were insufficient to draw meaningful conclusions about Goal 16 effectiveness, we spoke with key agency staff about their experience and perceptions of goal accomplishments and effectiveness. Finally, we analyzed statutory, administrative rule, and organizational changes that have influenced how this goal has been implemented over the past three decades.

IV. Findings

Impetus for Goal 16

Goal 16, Estuarine Resources, is highly prescriptive with detailed inventory, planning, and implementation requirements. There were several reasons for this. Two were discussed earlier—the pioneering work on estuary planning done for Yaquina Bay in 1969 and the detailed coastal policy development efforts of the OCC&DC between 1971-75. In addition, there was high visibility of coastal zone problems nationally, with several key reports documenting deteriorating estuarine conditions. Examples include *The National Estuarine Pollution Study* (FWPCA, 1969) and *The Water's Edge: Critical Problems of the Coastal Zone* (Ketchum, 1972). Locally, an article by Oregon's Sea Grant director, *Estuaries Under Attack* (Wick, 1973) and an OSU extension publication on the same subject raised awareness. On the more technical side, a report by Bella and Klingeman (1973)—*General Planning Methodology for Oregon's Estuarine Natural Resources*)—was instrumental in placing Goal 16's focus on maintaining both environmental and developmental diversity among and within Oregon estuaries.

Question 1: Estuary Classification

The overall statement in Goal 16 required the LCDC classify each Oregon estuary to specify the most intensive level of development or alteration that may be allowed to occur there. In 1977, DLCD established an Estuarine Classification Task Force to develop appropriate criteria and apply them to Oregon's 22 estuaries. The task force proposed four categories and classified each of 17 major estuaries accordingly; these recommendations were adopted by the LCDC in October 1977 (OAR 660-017). Minor estuaries were classified either Natural or Conservation during comprehensive planning and not discussed further here.

> (1) *Natural estuaries* are those lacking maintained jetties or channels, and which are usually little developed for residential, commercial, or industrial uses. Surrounding shorelands primarily in rural uses. Five estuaries were classified

Natural: Sand Lake, Salmon River, Elk River (Curry County), Sixes River, and Pistol River.

(2) *Conservation estuaries* are those lacking maintained jetties or channels, but which are within or adjacent to urban areas which have altered shorelines. Six estuaries were classified *Conservation*: Necanicum River, Netarts Bay, Nestucca River, Siletz Bay, Alsea Bay, and Winchuck River.

(3) *Shallow-draft development estuaries* are those with maintained jetties and a main channel (not entrance channel) maintained by dredging at 22 feet or less, except Nehalem Bay[8], which now has only authorized jetties and no authorized or maintained channel. Eight major Oregon estuaries were classified *Shallow-draft development*: Tillamook Bay, Nehalem Bay, Depoe Bay, Siuslaw River, Umpqua River, Coquille River, Rogue River, and Chetco River.

(4) *Deep-draft development estuaries* are those with maintained jetties and a main channel maintained by dredging at deeper than 22 feet. Three estuaries were classified *Deep-draft development*: Columbia River, Yaquina Bay, and Coos Bay.

Goal Effectiveness: HIGH. The classification system established by the LCDC pursuant to the Goal requirement has been highly effective in concentrating intensive development and associated navigation and port infrastructure in appropriate estuaries, while preventing such development in others. Although there have been informal inquiries by development interests along Siletz Bay to change its designation to *shallow-draft development*, so as to allow dredging, no formal proposals or studies have been initiated.

Question 2: Estuary Inventories

Goal 16 required that state agencies assist local governments in preparing detailed inventories of physical, biological, social, and economic information needed to provide a sound basis for estuarine management. DLCD invested significant CZM funding to develop detailed habitat maps, resource notebooks, and, for most estuaries, written summaries of relevant information. This work was done in partnership with the Oregon Department of Fish and Wildlife (Bottom et al., 1979), who devised a habitat classification system modeled on the new national system developed by the US Fish and Wildlife Service (Cowardin et al., 1979).

The detailed inventories and habitat maps developed by ODFW were invaluable during the first round of estuary planning in the late '70s and early '80s, providing local planning authorities and state agencies with the best scientific information available at the time in a user-friendly format (e.g., Ratti, 1979, for the Umpqua estuary). For a few estuaries, separate mapping and inventory efforts were undertaken to support planning efforts that were started earlier (e.g., USFWS, 1968; CREST, 1977). The inventories greatly facilitated planning and zoning of estuaries and adjacent shorelands and have been useful resources since, providing an excellent baseline of data and mapping.

[8] Nehalem Bay was originally classified Conservation by LCDC. Local governments successfully petitioned to change the designation to Shallow-draft development in 1979.

Goal Effectiveness: HIGH. The state and local governments get high marks for these early inventory efforts. However, the inventories are now nearly three decades old, and need to be updated and expanded to support comprehensive plan provisions. ODFW is presently seeking resources to update estuarine habitat maps (David Fox, ODFW, personal communication 2008). There is also a need to update the inventories to better understand present and future demand on lands and resources, particularly for water-dependent uses. Other topics like invasive species also need to be addressed.

Question 3: Estuarine Management Unit (Zoning) Designations

Goal 16 asked local governments, in collaboration with citizens, state and federal agencies, and others, to classify areas within individual estuaries into Natural, Conservation, and Development management units or zones, consistent with the overall estuary classification (Question 1 above), habitat type and extent, existing and proposed uses, and other features of the estuary and adjacent shorelands, as specified in the Goal. Was this accomplished? Further, have subsequent plan amendments and land use decisions been consistent with the goal, including the uses and activities that have been permitted?

Data to address the first part of this question is readily available in the *Oregon Estuary Plan Book* (Cortright et al., 1987) and online in the *Oregon Coastal Atlas* (http://www.coastalatlas.net/). The data have also been compiled in summary form (Table 5.4) in several other studies (Good, 1996; 2000). More detailed queries of these data can be used to determine just how much of any given habitat type—salt marsh, for example—has been assigned to each zoning category. Graphical display of the summary data (Figure 5.2) illustrates the high level of protection given to Oregon estuaries as a whole, particularly critical intertidal habitat, 64 percent of which was classified Natural and 34 percent Conservation.

Data that addresses the second part of this question—consistency of subsequent land use decisions with uses and activities permitted by the Goal—is more difficult to evaluate. DLCD's 2007 report on KPM #8 (Table 5.2) states that 100 percent of estuary zoning has been maintained (Bob Bailey, DLCD, personal communication 2008), although it is unclear how this was arrived at. In 1987, DLCD intended "to update maps and expand the data files to track plan amendments and approved development projects" in the *Oregon Estuary Plan Book* (Cortright et al., 1987), but that has not been done (Jeff Weber, DLCD, personal communication, 2008).

Because most if not all local decisions to change estuary zoning would require a plan amendment and/or a Goal 2 exception if protected habitat is rezoned for more intensive development, DLCD's plan amendment database should pick up these actions. Review of such actions would provide an overview of plan changes being made to accommodate uses not anticipated in an original estuary plan.

Table 5.4: Overall Classification and Management Unit or Zoning Acreage for Oregon Estuaries (original data from *Oregon Estuary Plan Book*, 1987).

Estuary	Overall Estuary Classification	Subtidal Zoning				Intertidal Zoning				Estuary
		NAT	CON	DEV	Subtotal	NAT	CON	DEV	Subtotal	Summary
Columbia	Deep Draft	970	44,051	2,894	47,915	15,588	17,233	77	32,898	80,813
Necanicum	Conservation	0	179	0	179	271	252	0	523	702
Nehalem	Shallow Draft	18	837	145	1,000	1,592	114	41	1,747	2,747
Tillamook	Shallow Draft	103	1,942	78	2,123	4,659	2,378	55	7,092	9,215
Netarts	Conservation	160	178	0	338	2,232	174	0	2,406	2,744
Sand lake	Natural	140	0	0	140	758	0	0	758	898
Nestucca	Conservation	50	261	0	311	771	93	0	864	1,175
Salmon	Natural	98	0	0	98	340	0	0	340	438
Siletz	Conservation	33	294	0	327	1,077	58	0	1,135	1,462
Depoe Bay [1]	Shallow Draft	-	-	-	-	-	-	-	-	-
Yaquina	Deep Draft	2,037	1,301	1,011	4,349	1,838	402	106	2,346	6,695
Alsea	Conservation	162	572	0	734	1,681	100	0	1,781	2,515
Siuslaw	Shallow Draft	100	1,257	84	1,441	1,385	209	25	1,619	3,060
Umpqua	Shallow Draft	1,947	817	984	3,748	2,393	240	161	2,794	6,542
Coos	Deep Draft	1,580	2,493	2,556	6,629	6,671	679	572	7,922	14,551
Coquille	Shallow Draft	4	368	103	475	529	65	12	606	1,081
Sixes[1]	Natural	-	-	-	-	-	-	-	-	-
Elk[1]	Natural	-	-	-	-	-	-	-	-	-
Pistol [1]	Natural	-	-	-	-	-	-	-	-	-
Rogue	Shallow Draft	19	461	95	575	97	182	27	306	881
Chetco	Shallow Draft	4	94	55	153	1	17	1	19	172
Winchuck [1]	Conservation	-	-	-	-	-	-	-	-	-
TOTALS		7,425	55,105	8,055	70,535	41,886	22,196	1,077	65,156	135,691

Source: Original data from Oregon Estuary Plan Book, 1987

[1] No zoning acreage data are available for these smaller estuaries

Management Unit/Zoning Categories: NAT – Natural management unit (high protection); CON – Conservation management unit (moderate protection); and, DEV – Development management unit (reserved for water-dependent uses).

At our request, DLCD queried their plan amendment database for Goal 16-related changes to local plans (Rob Hallyburton, DLCD, personal communication, 2008). A quick accounting of these data found 87 plan amendments related to Goal 16 (Table 5.5). As might be expected, nearly three-quarters of these related to Oregon's three deep draft development estuaries—the Columbia, Yaquina Bay, and Coos Bay. A cursory review of plan amendment descriptions illustrate their diversity, ranging from simple housekeeping changes to designation of new dredged material disposal areas to changes in zoning to allow for a particular use or activity. Analysis of these amendments would allow for a more accurate reporting on DLCD's KPM #8. Goal 17 plan amendments affecting water-dependent or water-related shorelands (Table 5.5) were slightly fewer, but more significant in terms of their implications. This is discussed under Question 4 below.

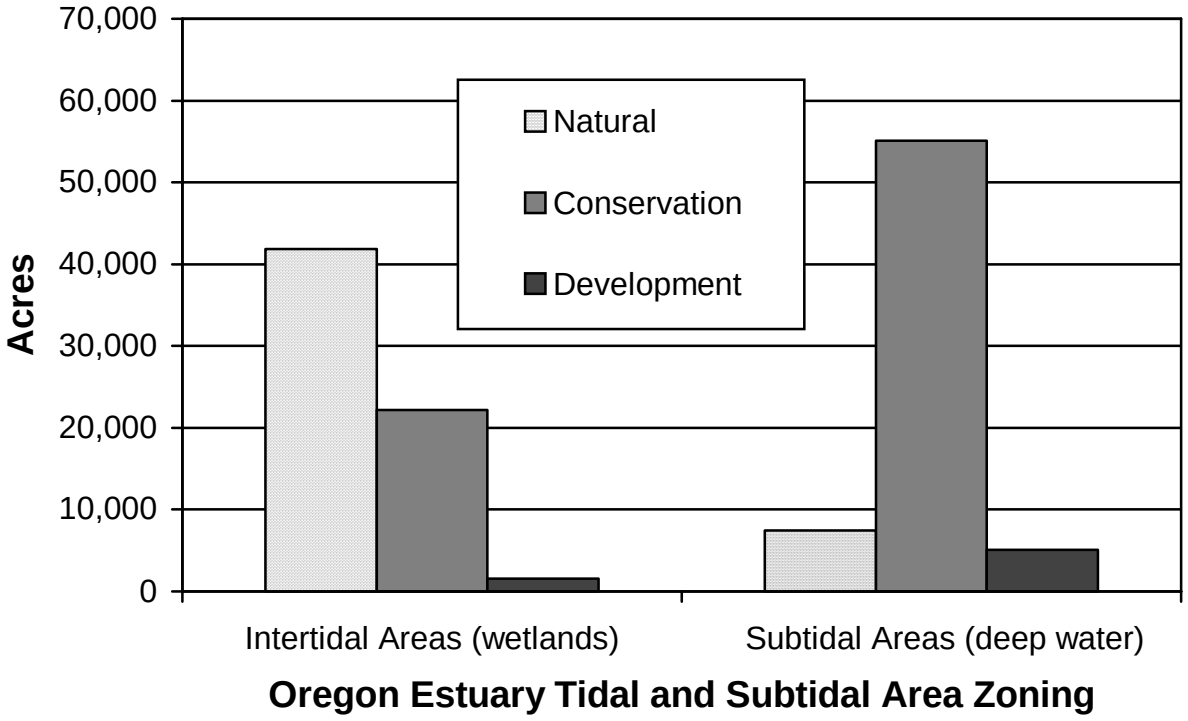

Figure 5.2: Summary of Intertidal and Subtidal Habitat Zoning Acreage for 17 Major Oregon Estuaries (data from *Oregon Estuary Plan Book,* Cortright et al., 1987).

Goal Effectiveness: HIGH for initial planning, UNCERTAIN for plan implementation. In a national study of the effectiveness of state coastal management programs in protecting estuaries and coastal wetlands (Good et al., 1998), Oregon received high ratings for its estuary planning efforts. It was also was singled out in a case study for the success of integrated approach it used to bring key stakeholders together for consensus-building on land and water uses, including areas for dredged material disposal and sites that could be used to mitigate habitat losses.

The effectiveness of these plans in guiding Goal 16-related implementation is less certain. A brief review of the information from the DLCD plan amendment database and discussions with staff suggest that the integrity of the highly protective estuary zones created in the initial round of planning have been maintained (recall from Figure 5.2 that 98 percent of intertidal areas were zoned Natural or Conservation). However, a more definitive answer to this question will require in-depth study of the many plan amendments/goal exceptions noted in Table 5.5. Department of State Lands records on Removal/Fill Law permits also offer some promise in tracking how estuary plans have been implemented with respect to site-specific land use actions—this is addressed in Question 5 below.

Table 5.5: Coastal County and City Plan Amendments and/or Exceptions Involving Goal 16 or Goal 17 (water-dependent/related shorelands only)

Jurisdiction	Estuary (Classification*)	# Goal 16 Plan Amendments	# Goal 17 Plan Amendments**
Clatsop County	Columbia (DDD)	7	3
Astoria	Columbia (DDD)	18	10
Warrenton	Columbia (DDD)	4	13
Tillamook County	Nehalem & Tillamook (SDD)	7	2
Wheeler	Nehalem (SDD)	2	1
Nehalem	Nehalem (SDD)	1	0
Garibaldi	Tillamook (SDD)	3	3
Bay City	Tillamook (SDD)	0	3
Lincoln County	Yaquina (DDD)	2	1
Newport	Yaquina (DDD)	4	14
Toledo	Yaquina (DDD)	1	4
Lane County	Siuslaw (SDD)	2	3
Florence	Siuslaw (SDD)	6	3
Douglas County	Umpqua (SDD)	1	4
Reedsport	Umpqua (SDD)	1	0
Coos County	Coos Bay (DDD) & Coquille (SDD)	18	5
North Bend	Coos Bay (DDD)	4	6
Coos Bay	Coos Bay (DDD)	6	3
Bandon	Coquille (SDD)	0	3
TOTALS		87	81

Source: DLCD Plan Amendment database, Rob Hallyburton, DLCD, personal communication 2008.

** Overall estuary classification for most intense level of development permitted: DDD-Deep Draft Development; SDD-Shallow Draft Development.*

*** Only Goal 17-related plan amendments involving water-dependent/water-related zones included.*

Question 4: Water-Dependent Shoreland Zoning

This question asks whether shorelands needed for water-dependent or water-related uses and meeting Goal 17 criteria were identified and reserved for such uses in plans. The follow-up question is whether those lands have been used for water-dependent land uses or, if not, do they continue to be reserved for such uses in the future? This question is based mainly on requirements in Goal 17, *Coastal Shorelands*, but is being considered here because of the direct links between estuarine areas zoned for development and adjacent shorelands designated for water-dependent uses. Goals 16 and 17 require that estuary-shoreland zoning be coordinated and consistent.

The Oregon Estuary Plan Book (Cortright et al., 1987) documents shoreland zoning for each estuary, including those lands set aside for water-dependent or water-related development (Table 5.6). A cursory analysis of plan maps in Cortright et al. (1987) suggests that shorelands so zoned were indeed adjacent to Goal 16 estuary management units designated for development. A more detailed assessment could be carried out to verify this.

Goal 17 was amended in 1984 (see Comprehensive Plan Requirements, Identification of Coastal Shorelands, item 3) to provide planning flexibility for redeveloping certain waterfront areas for a mix of water-dependent, water-related, and water-oriented non-dependent uses with public access. Revitalization plans could then be developed and implemented for these purposes; Newport's Bayfront District is a good example.

Goal 17 was amended again in 1999 to acknowledge the significant economic changes that have occurred in the demand for water-dependent shorelands since initial adoption of local comprehensive plans in the mid-1980s. However, the amendment and the more detailed rules developed at the same time (OAR 660-037 Water Dependent Shorelands) also underscored the need to maintain and protect adequate inventories of such lands for future use, citing both economic and environmental reasons for doing so. The Goal amendment and Rule provided detailed criteria for such designations and for determining minimum acreage needed. But it also provided local governments with opportunities to rezone shorelands no longer needed for water-dependent uses; further, if such shoreland changes were pursued, changes in adjacent estuary zoning also had to be considered (e.g., from Development to Conservation).

Based on a cursory review of the more than 80 Goal 17 plan amendments related to water-dependent shorelands in the DLCD plan amendment database (Table 5.5), many jurisdictions took advantage of the opportunity provided by the above Goal amendments to rezone their shorelands for mixed use or nonwater-dependent use, mostly for new waterfront residential and tourist commercial development. More detailed analysis of these plan amendments—beyond the scope of this report—would be needed to more certainly answer the question of the sufficiency of water-dependent shorelands for future needs.

Goal Effectiveness: HIGH, but with some uncertainty. Local jurisdictions identified significant lands for water-dependent development in their initial plans, but little of that was used for such purposes over the next two decades as demands changed and infrastructure was lost (e.g., rail lines serving Warrenton and Astoria on the Columbia). LCDC responded in 1999 with increased flexibility while requiring a minimum inventory of such lands be maintained. To draw more certain conclusions, a more complete assessment of Goal 17 (and 16) exceptions and plan amendments is needed.

Question 5: Permits for Significant Estuarine Alterations

Goal 16 Implementation Requirements 1 and 2 have to do with proposals for site-specific development projects involving fill, removal, in-water construction, riprap, or other significant estuarine alterations. They ask if such projects (1) are consistent with Goal 16 management unit criteria and allowed uses; (2) have obtained necessary local, state, and federal permits; (3) have been evaluated for potential adverse impacts as specified in the Goal; and (4) met the Goal tests for water-dependency, public need, alternatives evaluation, and impact minimization.

Table 5.6: Oregon Estuary Shoreland Area Designated for Water-dependent or Water-related Development (WDR), for Dredged Material Disposal (DMD), or as Potential Mitigation Sites in Estuary Plans.

Estuary by Classification Category	Total acres Shoreland	WDR acres Shoreland	WDR % of Shoreland	Potential Mitigation Acres	DMD site acres
Deep-Draft Development	21,233	3,336	15.7	1,041	1,316
Columbia River	11,762	866	7.4	244	763
Yaquina Bay	1,721	332	19.3	626	57
Coos Bay	7,750	1,494	19.3	171	496
Shallow-Draft Development	20,261	644	3.2	331	1,275
Nehalem Bay	3,020	80	2.6	88	256
Tillamook Bay	56,280	93	0.2	37	450
Siuslaw River	3,648	204	5.6	58	328
Umpqua River	6,415	207	3.2	93	196
Coquille River	727	12	1.6	55	32
Rogue River	1,993	31	1.6	0	8
Chetco River	178	18	10.1	0	5
Conservation	8,026	52	0.6	196	14
Necanicum	2,580	0	0	0	0
Netarts Bay	964	14	1.4	0	0
Nestucca River	1,421	0	0	0	0
Siletz Bay	1,754	15	0.01	115	5
Alsea Bay	1,308	22	1.7	81	9
Natural	1,861	0	0	40	0
Sand Lake	806	0	0	0	0
Salmon River	1,055	0	0	40	0
Total	51,381	4,032	7.5	1,608	2,605

Source: Data from Oregon Estuary Plan Book, Cortright et al., 1987

For all local jurisdictions, these requirements are addressed at the state and federal level, where permits are required for such actions and necessary expertise is available to evaluate them. Relevant laws are the Oregon Removal/Fill Law (ORS 196.795-990) and the federal Clean Water Act (Section 404) and federal Rivers and Harbors Act (Section10). State decisions on Removal/Fill permits must be consistent with local plans, as must federal permits, based on "federal consistency" provisions in Section 307 of the federal CZMA. Thus, under consistency provisions, if the local ordinance implementing an estuary plan does not allow a certain alteration or activity, neither the DSL nor the U.S. Army Corps of Engineers (Corps) can issue a permit for it. However, it is the applicant who "certifies" that a state Removal/Fill or federal Corps permit is consistent with the local plan; local planners must sign off on that certification, but this determination may or may not be checked for accuracy at the state or federal level.

The only comprehensive data collection effort to examine estuary permit data associated with implementation of the Removal/Fill Law in Oregon's estuaries was conducted more than two decades ago (Fishman Environmental Services 1987). That study found that for Oregon's estuaries (excluding the Columbia River estuary), both tidal wetland and subtidal habitat losses (Figure 5.3) declined from the period 1971-1976 (pre-OCMP) to

the period 1983-87 (when most estuary plans had been approved). Fill alterations declined from 6.3 acres/year to 5 acres/year (21 percent decline) from 1971-1976 to 1983-87, while dredging acres declined from 63 acres/year to 9 acres/year (86 percent decline). Most of the areas filled were wetlands adjacent to estuary shorelines, whereas dredged areas were mostly subtidal navigation channels. These are very small numbers in comparison to total estuarine wetland areas (e.g., 5 acres of fill is about 0.02 percent of Oregon estuarine wetlands). Similar data were not available from DSL for 1988-95 (Good, 1996), mainly because the "area" field in the DSL database contained no entries.

Fishman also found that shore protection installation for erosion control (usually large rocks or "rip-rap") along estuarine shorelines is a much more prevalent activity and probably more damaging of habitat, particularly where shoreline vegetation is effected. Although there was a gradual decline in lineal feet of shoreline rip-rapped from the 1971-76 period to the 1983-87 period (6809 lineal feet/year versus 5341 feet/year, a 22% decrease), that still represented more than a mile per year. More up-to-date data were not available for this study.

DSL's new database, the Land Administration System (LAS), has detailed records for each permit DSL considers (Jo Ann Miles, DSL, personal communication 2008). At our request, DSL queried their LAS database to test its utility in providing information to evaluate estuary plan implementation as it relates to dredging, filling, and other alterations (Jo Ann Miles, DSL, personal communication 2008). We asked for a list of (a) fill and/or removal permits and (b) dock and pier permits issued for two estuaries—Yaquina Bay and the Siuslaw River estuary. Also, for fills, we asked for the area filled and area of mitigation required.

Because there are no standard reports for these data, DSL did custom queries and compiled the requested data in Excel spreadsheets, one for each estuary. Where data had not been entered, DSL went back to the paper permit files to fill missing data. Results were that there were a total of 81 projects for Yaquina Bay and 41 for the Siuslaw; most were from 2000 onward, but a few dated back as far as the mid-1970s, so it is clear that an effort has been made to add old data to the new database. Docks, wharfs, or piling were identified in one field, but were not compiled for this study, given no baseline for what might constitute "proliferation." Because very few projects involved compensatory mitigation, those data were sparse. We did not attempt to further organize the data DSL provided to get total area filled/year or dredged/year, but that should be possible. The bottom line is that much of the data needed to address this estuary plan implementation question is (or could be) available in DSL's LAS database, but extracting it is presently difficult, even to the point of having to retrieve data from paper permit files. Further, some desirable data fields or field entries are missing, such as the term "estuary" on the site screen, and zoning category in local comprehensive plans. Latitude and longitude and township-range-section location fields are provided, but not always entered correctly, making exact location difficult. Permit coordinators don't always enter other data useful for assessing plan implementation, such as the habitats affected (i.e., Cowardin classification), area filled, or area mitigated (Good et al., 1998). Further, it is unclear whether or not area, when entered, is "as submitted," "as permitted," or "as constructed." These issues make the reliability of the data problematic. Probably the only way to evaluate its accuracy would be to audit a sub-sample of all permits. Finally, based on an

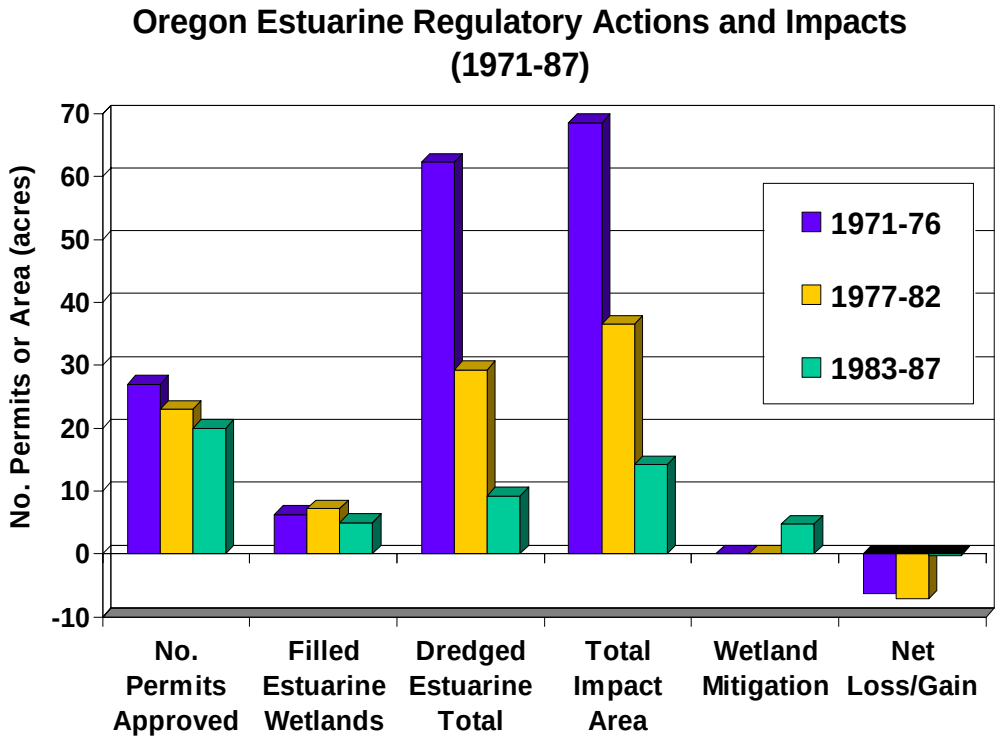

Figure 5.3: Changes in Number of DSL Permits (dredging) and Area (fill and mitigation) Associated with Implementation of the Removal/Fill Law (1971), Federal Approval of the Oregon Coastal Management Program (1977) and Implementation of DSL's Estuarine Mitigation Administrative Rule (OAR 141-085-0256)
(data from Fishman Environmental Services, 1987; compiled by Good, 1996)

examination of the database structure and fields, the LAS and associated data entry procedures may need to be modified to provide a standardized report on this question. These database issues also are cause to question the accuracy of DSL's wetland loss reporting for Oregon Benchmark 78 and KPM #9 (see Table 5.2).

The Corps of Engineers Section 10/404 permit database was not accessed or evaluated for this report, but earlier attempts to use this as a source of data for CZM evaluation were not helpful (Good et al., 1998). Given the decade since this study, however, examination of Corps records may be a productive avenue of inquiry. Finally, DLCD's Federal Consistency database could be a useful data source, but currently does not contain the detailed data needed to evaluate plan implementation (Jay Charland, DLCD, personal communication 2008). Perhaps that database could be redesigned to store and retrieve these sorts of data, but sources and reporting procedures would also need to be identified and implemented, not a trivial task given the distributed nature of data sources.

Goal Effectiveness: HIGH, but with some uncertainty. There is a general consensus among knowledgeable professionals involved in estuarine management in Oregon that estuary plans and implementation decisions involving dredging, filling, and in-water construction have greatly curtailed this class of environmentally harmful actions. Some data are available to support that assertion, but much of it is outdated or considered unreliable, even by those who maintain the data. Greater attention to record keeping and development of appropriate query-based reports are needed to increase accountability for, and understanding of, how well estuary plans are being implemented.

Question 6: Estuarine Water Quality

Goal 16, Implementation Requirement 3, addresses estuarine water quality and, based on the programs it cites, nonpoint source (runoff) pollution in particular. The Goal requires that "State and Federal agencies review, revise, and implement their plans, actions, and management authorities to maintain water quality and minimize human-induced sedimentation in estuaries." Local governments are told to recognize existing programs, rather than creating new ones. To what extent have state water quality agencies used their authorities to accomplish these objectives?

The Goal identifies a number of pollution monitoring and control programs in existence in 1976 when it was adopted. Some of these still exist, but in modernized form. In other cases, new federal and state laws and programs have been developed to more aggressively address chronic nonpoint source problems. Examples include the federal Clean Water Act's Section 319 Nonpoint Source Program and Section 320 National Estuary Program, both signed into law in 1987. Another particularly relevant to DLCD's role is the Section 6217 Coastal Nonpoint Pollution Control Program, part of the 1990 amendments to the federal CZMA. The Oregon Department of Environmental Quality (DEQ) is responsible for implementing many of these programs, including those under the federal Clean Water Act, but also works in partnership with other federal, state, and local agencies that have overlapping responsibilities. These monitoring, assessment, planning, granting, and regulatory activities are described below as they relate to Oregon estuaries.

Monitoring and Assessment

The DEQ maintains a water quality network of 144 monitoring sites, selected to provide representative statewide geographical coverage of major rivers and streams throughout the state, including estuaries. Data collected at these sites feed into the *Oregon Water Quality Index* (OWQI), which produces a score that describes general water quality. The OWQI integrates measurements of eight water quality variables—temperature, dissolved oxygen, biochemical oxygen demand, pH, ammonia and nitrate nitrogen, total phosphorus, total solids, and bacteria (**Table 5.7**). In the process, it helps managers understand how each parameter affects ambient water quality on a seasonal basis and what strategies are needed to maintain the best possible conditions. Unfortunately, periodic program cutbacks change the size of the network and make it difficult to do trend-based monitoring (Greg Pettit, DEQ, personal communication 2008). Nevertheless, it does provide an excellent tool where data are available.

Table 5.7: Water Quality Monitoring Program Information for Oregon Estuaries.

Estuary	Water Quality Parameters Monitored	When/How Often	Collected By	Data Source
Columbia	CEMAP[1]	2000	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
	temperature, turbidity, salinity, dissolved oxygen, pH	Annually	LCREP	LCREP website
	nutrients, productivity, emerging contaminants, toxics such as PAHs and PCBs, currently used pesticides, trace elements in water, abundance & health of aquatic organisms, habitat	unknown	LCREP	LCREP website
Necanicum	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Nehalem	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Tillamook	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
	Bacteria monitoring, sources & accumulation of sediments	5x/month for bateria; several studies of unknown dates for sedimentation	TEP	TEP website
Netarts	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
Sand lake				
Nestucca	CEMAP[1]	1999	DEQ	
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Salmon	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Siletz	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Yaquina	CEMAP1	1999	DEQ	Sigmon et al., 2006
	OWQI2	1986-1995, 1997-2006	DEQ	DEQ website
Alsea	CEMAP1	1999	DEQ	Sigmon et al., 2006
	OWQI2	1986-1995, 1997-2006	DEQ	DEQ website

Table 5.7: Water Quality Monitoring Program Information for Oregon Estuaries (cont.).

Estuary	Water Quality Parameters Monitored	When/How Often	Collected By	Data Source
Siuslaw	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Umpqua	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
Coos	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
	temp, depth, salinity, pH, dissolved oxygen, turbidity	15-minute intervals at 4 locations within the South Slough NERR	South Slough NERR	South Slough NERR website
Coquille	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Sixes	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Elk	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Pistol	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Rogue	CEMAP[1]	1999	DEQ	Sigmon et al., 2006
	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Chetco	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website
Winchuck	OWQI[2]	1986-1995, 1997-2006	DEQ	DEQ website

[1]CEMAP water clarity, dissolved oxygen, dissolved nutrients, total suspended particles, sediment silt-clay content, sediment contaminants, sediment toxicity, benthic organisms, and fish-tissue contaminants

[2]OWQI temperature, dissolved oxygen, biochemical oxygen demand, pH, ammonia and nitrate nitrogen, total phosphorus, total solids, and bacteria

Based on a review of OWQI scores for the coast, Oregon's estuaries are generally in good condition (Greg Pettit, DEQ, personal communication 2008). However, high levels of bacteria have been found in Coos, Yaquina, and Tillamook estuaries resulting from agricultural runoff. For example, in a study that looked at tributaries of the Wilson River, no violations were found in watersheds upstream, but after passing through dairy lands to reach Tillamook Bay, there were violations of standards 80 percent of the time. DEQ has a good data set for toxics in sediments, fish, and tissue samples for all estuaries. Most of the estuaries are relatively low in toxics, probably due to limited industrial development. Exceptions are Tillamook Bay and Youngs Bay (an arm of the Columbia estuary), which have high levels of dioxins, probably owing to historic wood treatment facilities. Most of the major estuaries are addressed in the DEQ trends reports and can be found on their

website (DEQ, 2008). The 2006 summary report serves as an example—http://www.deq.state.or.us/lab/wqm/docs/OWQISummary06.pdf.

Another more in-depth, snapshot in time, monitoring effort in estuaries was conducted in 1999-2000. That effort, the *Coastal Environmental Monitoring and Assessment Program* or CEMAP, had several purposes:

- Describe the current ecological condition of Oregon's estuaries based on indicators of environmental quality
- Establish a baseline for evaluating the condition of estuaries in the future
- Develop and validate improved methods for use in future coastal monitoring and assessment efforts in the western coastal states
- Build a strong program of water monitoring for better management and protection of estuaries (Sigmon et al., 2006).

Chemical, physical, and biological data were all collected as part of CEMAP; selected ecological indicators included: water clarity, dissolved oxygen, dissolved nutrients, total suspended particles, sediment silt-clay content, sediment contaminants, sediment toxicity, benthic organisms, and fish-tissue contaminants (Table 5.7) (Hayslip et al., 2006). Skelton (1999) examined water quality for nine estuaries using CEMAP data. For all nine estuaries, temperature and dissolved oxygen tend to track expected seasonal patterns – warm with low dissolved oxygen in late summer, and cold and higher in the winter. Estuaries surrounded by significant agricultural land uses (i.e., Tillamook Bay and Coquille estuary) were found to have relatively high to moderate fecal coliform concentrations. Periods of high runoff led to high coliform concentrations in other estuaries as well. Although data were limited, it appeared that, in general, nutrient levels were low and decreasing over time in estuaries classified for management as *Natural* or *Conservation* systems, while increasing in *Development* estuaries.

The above data and analyses are enhanced by another key assessment and reporting requirement. As part of its responsibilities for implementing the federal Clean Water Act (CWA) for Section 305(b) and Section 303(d), DEQ assesses water quality and reports to EPA on the condition of Oregon's waters. CWA Section 305(b) requires a report on the overall condition of State waters; Section 303(d) requires identifying waters that do not meet water quality standards where a Total Maximum Daily Load (TMDL) needs to be developed. Oregon's final 2004/2006 Integrated Report with the Section 303(d) list is available online at http://www.deq.state.or.us/wq/assessment/rpt0406.htm. Eleven of Oregon's estuaries are on the 303(d) list and considered water quality limited for one or more parameters and all are scheduled or due to be scheduled for TMDL establishment in the next few years.

Three other monitoring and assessment programs bear mentioning as well. First is the *South Slough National Estuarine Research Reserve* (SSNERR). South Slough is part of a national system of 28 reserves; each monitors physical and chemical parameters—temperature, depth, salinity, pH, dissolved oxygen, and turbidity—in order to understand habitat quality needs for diverse estuarine species and criteria to maintain human health (Table 5.7).

Oregon also has two National Estuary Projects—one on the Lower Columbia River Estuary and the other at Tillamook Bay. Both were initiated under the federal Clean Water Act's Section 320 National Estuary Program, receiving funding to characterize key water quality problems and then develop Comprehensive Conservation and Management Plans. These action plans are now being implemented through private-public partnerships.

The Lower Columbia River Estuary Partnership is a two-state effort and serves as a regional framework to support and enhance local efforts, including funding and technical assistance. Through volunteer efforts as well as Bonneville Power Administration support, the Partnership has implemented water quality and juvenile salmonid monitoring, focusing on nutrients, productivity, emerging contaminants, toxics such as PAHs and PCBs, currently used pesticides, and trace elements in water; as well as the following for juvenile salmonids: PCB congeners, DDT's, Organochlorine pesticides, and PBDE's. The Partnership has also initiated habitat monitoring through the collection of data on tidal channel area, total edge of tidal channels, elevation, bathymetry, channel cross sectional profiles, large woody debris, water elevation, lateral extent of flooding, velocity, temperature, turbidity, salinity, dissolved oxygen, pH, and abundance and health of aquatic organisms (Table 5.7).

The primary goal of the Tillamook Estuaries Partnership (TEP) is to help guide local watershed restoration and protection by providing data to measure the effectiveness of these efforts over time. The TEP has addressed water quality information needs by completing numerous bacteria monitoring and research projects to assess the severity and extent of watershed pollution, identify the most important bacteria sources, and document improvements in response to pollution-abatement measures. TEP combines volunteer citizen monitoring, routine and storm-based sampling, and DNA tracking methods (Table 5.7). Additionally, TEP has conducted several studies researching the sources and accumulation of sediments in the Tillamook Bay basin.

Nonpoint Pollution Control Programs

Oregon has come a long way since 1976 in addressing nonpoint source pollution problems, owing mainly to new federal programs, funding, and other initiatives. In addition to the monitoring, assessment, and planning programs discussed above, two programs are particularly important. The first is the Clean Water Act (CWA) Section 319 Nonpoint Source Management Program, passed in 1987 at the same time the National Estuary Program was established. The second is the Coastal Nonpoint Pollution Control Program (CNPCP), passed by Congress in 1990 as part of the Coastal Zone Act Reauthorization Amendment (CZARA).

Congress established the Section 319 program because it recognized the need for greater federal leadership to help focus State and local nonpoint source efforts. Under the program, State, Territories, and Indian Tribes receive grant money which support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. Grants under Section 319 have funded a variety projects in coastal watersheds, particularly related to sedimentation problems (see 2006 report at http://www.deq.state.or.us/wq/nonpoint/docs/annualrpts/rpt06.pdf).

The CNPCP is the principal program for regulating and enhancing Oregon's estuarine water quality. This federally mandated, state implemented program is unique in that it attempts to integrate traditionally voluntary "best practices" under the CWA with regulatory authorities of state coastal management programs under the CZMA. It establishes a set of management measures for states to use to control runoff from the following sources: forestry practices, agricultural activities, urban areas, marinas, hydro-modification, and wetlands and vegetated shorelines, or riparian areas. The planning, outreach, regulatory, and permitting programs and requirements of DEQ, DSL, Department of forestry (DOF), Department of Agriculture (DOA), and the Water Resources Department (WRD) all contribute to the state's compliance with CNPCP requirements. Examples of some programs funded through CNPCP opportunities include: "Rainstorming" outreach program of Oregon Sea Grant; "Clean Marina" certification through the Oregon State Marine Board; and "All Systems Go" through the OCMP, DEQ, and Oregon Onsite Wastewater Association. Much remains to be done to fully implement the Oregon CNPCP, but it has set up an institutional framework to tackle difficult polluted runoff problems using an integrated approach.

Goal Effectiveness (HIGH for monitoring, assessment, and planning; MODERATE for implementation). State and federal planning and management through programs such as CNPCP and the Clean Water Act provide strong frameworks for maintaining water quality in Oregon's estuaries. Federal and state agencies and nonprofit organizations put forth tremendous efforts and have collected a substantial amount of data for assessing and monitoring estuarine water quality. Estuarine wagers are judged to be in "good condition." Nevertheless, according to NOAA's National Estuarine Eutrophication Survey conducted in 2004 using DEQ data, 7 of 14 Oregon estuaries surveyed could not be assessed because data were insufficient; and of the seven that were evaluated, reliability and confidence of the ratings were considered low due to a need for more data and/or more complete data sets (Bricker et al., 2007). Although the institutional framework and physical facilities (the OWQI) are in place to increase reliability and completeness of Oregon estuarine water quality assessments, limited and unreliable funding for monitoring poses a challenge to consistently collect and analyze appropriate data sets.

Question 7: Estuarine Habitat Mitigation

In 1976, Oregon became the first governmental jurisdiction in the country to require compensatory mitigation for habitat damage associated with dredging or filling of estuarine intertidal areas and tidal marshes (Goal 16, Implementation Requirement 5). The goal also required that comprehensive plans identify and protect sites that could be used for mitigation, such as diked estuarine wetlands no longer used for agriculture.

Adoption of the controversial mitigation requirement led to both scientific and political questions about how to implement it. A flurry of research and workshops ensued (e.g., Gonor et al., 1979; LaRoe, 1979). The political front was active for many years. In 1978, DLCD established an Estuarine Mitigation Task Force to develop recommendations for implementing the mitigation provisions of Goal 16 through the state Removal/Fill Law. The concept of "mitigation banking"—restoring large areas in advance and then selling off "mitigation credits" when the need arrived—was also introduced at this time. The State Legislature expanded and codified the estuarine mitigation requirements as part of the

Removal/Fill Law (196.830) in 1979, but it was not until 1984 that DSL adopted administrative rules (OAR 141-085-240 to 266) to implement the statute. The rules included a relative value matrix for habitat restoration/creation tradeoffs, a formula-based approach for making those tradeoffs, and further defined mitigation banking. This formula is still being used today, but is due for change in January 2009 by the same replacement ratios used for non-estuarine wetlands (Janet Morlan, DSL, Personal communication 2008). In 1987, the Legislature passed the Oregon Mitigation Bank Act, which expanded wetland mitigation requirements statewide and provided for establishment and operation of mitigation banks for any area in the state.

Mitigating the impacts of development through restoration, creation, or enhancement has been controversial for many years; the practice of habitat creation (where no wetland previously existed) has been particularly criticized, as has wetland enhancement, given the net loss of area involved (Race and Christie, 1982; Good, 1987). But how has the practice worked in Oregon estuaries?

Estuary plans developed in the late '70s and early '80s identified more than 1600 acres of potential sites for habitat mitigation (Table 5.6), mostly little-used pasture where dikes preventing tidal inundation could be removed to reestablish estuarine wetlands. With only about 1100 acres of intertidal habitat in development zones (Table 5.4), it is clear that not all of these would ever be needed, but it did provide options for developers to shop around for willing landowners. In practice, very few of these mitigation areas have actually been used, given the limited intertidal dredging and filling that has been permitted. But data are sparse. Fishman's 1987 study noted earlier focused on mitigation. They compared estuarine compensatory wetland mitigation data for the 1977-82 and 1983-87 periods [detailed estuarine mitigation rules were put in place in 1984]. The data show change from significant net loss of acreage to almost none (43 to 1.5 acres). However, they noted that little mitigation site monitoring was conducted to evaluate the success of these projects.

Similar data are not readily available for subsequent years, except that provided in response to the Oregon Benchmarks and KPMs, which are limited. It was noted earlier that little mitigation data were available from DSL's LAS database for projects queried in Yaquina Bay and the Siuslaw estuary. Benchmark #77b (now #78b), established in 2001, and DSL's KPM #9, call for a net gain of estuarine wetlands of 250 acres/year, or about one percent of historical losses per year (Good, 2000; Oregon Progress Board, 2007). The intent was that all estuarine habitat restoration projects be tracked and reported in a consolidated form by DSL, but the benchmark was changed to reflect only Removal/Fill permit data, and it would seem that little actual data was picked up. DSL reported a net gain of 20 acres of estuarine wetlands in 2007 and 10 acres in 2006; no data were reported for the three previous years (Oregon Progress Board 2007, 21).

Goal Effectiveness: MODERATE with Uncertainty. It has been said that the most significant conservation effect of habitat mitigation requirements has been to discourage wetland alteration in the first place—the first two steps in the process are "avoidance and minimization" of impacts; only after that has been done does "compensatory" mitigation for unavoidable impacts kick in. This difficult-to-test hypothesis seems to be true for Oregon estuaries where fill projects have been few with minimal area affected. However, it is unclear if those mitigation projects actually constructed are long-term success stories.

Many smaller mitigation projects, and most are small, have not been routinely monitored for success or for subsequent changes in use. Again, more effort devoted to record keeping and periodic studies like that of Fishman in 1987 would be valuable, relatively low-cost means to track progress and success.

Question 8: Dredged Material Disposal Planning

Goal 16, Implementation Requirement 6, directs local governments and state and federal agencies to identify adequate dredged material disposal sites that are consistent with overall estuary classifications, management unit designations, and avoid tidal marsh and intertidal areas. Three deep draft and six shallow draft estuaries on the coast have federally-authorized navigation channels that are maintained, funding permitted, by the Corps of Engineers. Each estuary has a dredged material disposal plan, updated as needed through local-state-federal collaboration. For the larger estuaries, this usually involves preparation of a federal environmental impact statement (EIS) mandated by the National Environmental Policy Act of 1969.

The initial round of estuary planning in Oregon provided the Corps with a built-in mechanism for updating their plans; in the process, they and their planning partners identified more than 70 sites totaling 2,605 acres (Table 5.6). Plans with these sites included were acknowledged by the LCDC, so the presumption is that they met goal requirements. Several have been updated since, although the issue is not without controversy, particularly for ocean disposal sites. The potential for use of dredged material to replenish eroded ocean beaches is a current hot topic.

Goal Effectiveness: HIGH. The estuary planning processes have provided an effective forum for all stakeholders to get involved and find consensus on acceptable dredged material disposal sites.

Question 9: Single-purpose Docks and Piers

Goal 16, Implementation Requirement 7, directs local governments and state and federal agencies to restrict proliferation of single-purpose docks and piers by encouraging community facilities and other alternatives. Because estuarine waters are designated critical habitat for Pacific salmon, permits must be obtained from DSL under the Removal/Fill Law for installation of piling and other in-water structures associated with such uses. The Corps also regulates docks and piers under its Rivers and Harbors Act, Section 10 permit program. It would also seem to be an activity that could be influenced by outreach to local government planners, developers, and waterfront property owners in general.

The data turned up on this topic were from the DSL queries of its LAS database discussed in Question 5 above. For Yaquina Bay, 14 of the 81 projects (17 percent) involved docks, piers, wharves, or piling installation, and just 10 percent of those in the Siuslaw, all after 2004 and all because of new regulations for critical salmon habitat. DSL did not require such permits earlier. Nevertheless, the DSL's LAS has good potential for tracking possible "proliferation" of such facilities, given their present regulatory oversight. Corps records on Section 10 permits may also provide useful data, but this was not accessed for this report. Anecdotal data could also provide a sense of the extent to which this is an issue for

Oregon's estuaries, so selected interviews with local planners, DLCD field representatives, and DSL regulatory staff could sort out this question and help determine if further study is needed.

Goal Effectiveness: UNCERTAIN. Although DSL records now include data on docks and piers constructed in Oregon's estuaries and other waterways, no data on the nature and purpose of the structures (e.g., single purpose versus community) is available from the database, nor is it possible to determine how many are too many without further study. That may or may not be worth the effort, but deserves further examination.

Question 10: Estuarine Restoration

Goal 16, Implementation Requirement 8, required state and federal agencies to assist local governments in identifying areas for restoration. A number of restoration possibilities were cited in the Goal, but the principal type of project identified both during initial estuary planning in the late 1970s and early 1980s, as well as in more recent work done by watershed councils, are former high tidal marshes that were diked and drained in the past for agriculture and other uses. Today, many of these areas are abandoned or poorly managed pasture and can be restored simply by removing all or portions of dikes to reestablish tidal inundation. Wetland plants reestablish themselves within a few years, former tidal channels deepen, and fish, invertebrates, and wildlife re-colonize their favored habitats (Frenkel and Morlan, 1990; Cornu and Sadro, 2002; Bottom etal., 2005).

During the initial round of estuary planning, local governments identified more than 50 potential restoration sites or projects comprising more than 1600 acres (Table 5.6), focusing on their potential as mitigation sites (see Question 7 above). However, a number of studies (e.g., Hofnagle et al., 1976; Thomas, 1983; Boule and Bierly, 1987; Good, 2000) have put historic losses of Oregon estuarine wetlands at much higher numbers—more than 50,000 acres or roughly two-thirds of pre-Euro-American settlement numbers (Figure 5.4). In the Columbia, Thomas (1983) documented a 65 percent loss of tidal swamps and marshes; in Coos Bay, Hofnagel et al. (1976) found similar proportions of wetland conversion. Some of these historically filled and diked lands are irretrievably committed to urban development or are well-managed farms and dairies. However, a large percentage of them do have potential for restoration, if conditions are right and property owners willing. Local watershed councils, with support from OWEB, the US Fish and Wildlife Service, and other agencies are identifying and prioritizing former estuarine tideland sites that could be restored and work with property owners to undertake projects (e.g., Brophy, 2005a-d). One implemented example is a two-site, 75-acre project undertaken by the Mid-Coast Watershed Council in the upper Yaquina estuary (Figure 5.5). It was preceded by a careful analysis and prioritization of the whole system (Brophy, 1999).

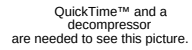

Figure 5.4: Change in Area of Vegetated Wetlands (tidal marshes and swamps) and Total Area for Oregon's 17 Largest Estuaries, due to Filling and Diking that Occurred from about 1870 to 1970 (Good, 2000).

Notes:

[1] Data for 1970 estimates from *The Oregon Estuary Plan Book* (Cortright et al., 1987), except for the Columbia, where estimates based on Thomas (1983).

[2] Fill data sources: filled state lands inventories (Oregon Division of State Lands 1972); for this figure, since the bulk of filled lands are adjacent to the shore, it was assumed that they were vegetated tidal wetlands. This may have resulted in a small error in totals and percent change.

[3] Diked lands data sources: Thomas (1983) for the Columbia estuary; S. Rumrill for Coos Bay (SSNERR, personal communication, 1999); Boule and Bierly (1987) for Yaquina and Alsea; for remainder of estuaries, data from unpublished, preliminary analyses of National Wetland Inventory maps, soil surveys, and aerial photos (C. Cziesla, S. O'Keefe, A. Gupta, and J. Good , unpublished data, 1999).

[4] 1870 area estimates were derived by adding area of filled land and diked land to 1970 area estimates.

Based on these and earlier site identification projects associated with Goal 16 planning, extensive tidal marsh restoration has occurred in recent years in a number of estuaries including the Salmon River estuary, under the auspices of the US Forest Service (Frenkel and Morlan, 1990); in the Nestucca, Siletz, and Coquille estuaries as part of the U.S. Fish and Wildlife Service's refuge restoration program, and in the South Slough National Estuarine Research Reserve managed by DSL (Rumrill and Cornu, 1995; Cornu and Sadro, 2002).

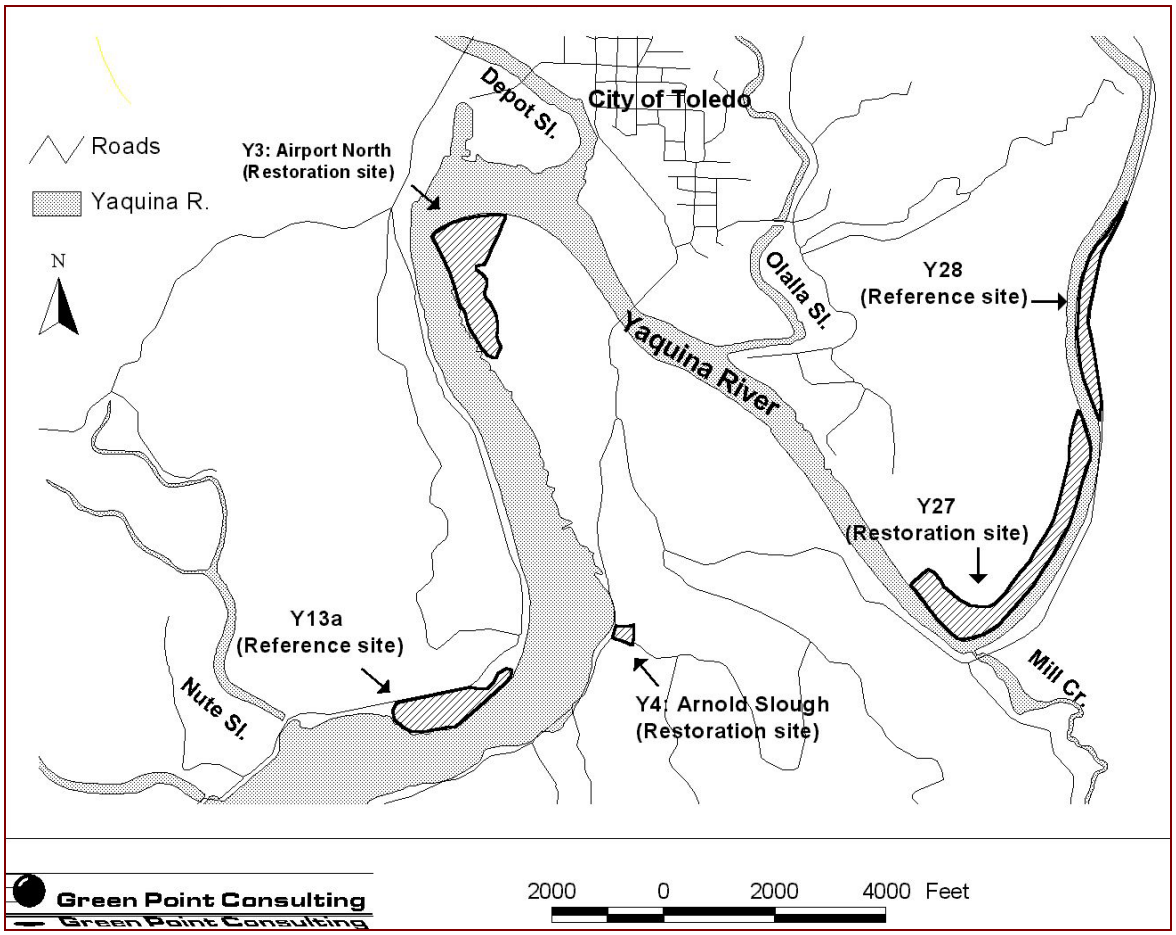

Figure 5.5: Yaquina Bay Tidal Marsh Restoration Project near Toledo, Oregon; Proposed in 2000 and Implemented in 2001-2002 (courtesy of Laura Brophy, Greenpoint Consulting, Corvallis, Oregon).

The database of restoration projects maintained by the Oregon Watershed Enhancement Board (OWEB) has good potential as a centralized system for monitoring progress in restoring estuarine habitat. That database has been characterized as "incomplete for estuarine restoration" by its manager (Bobbi Riggers, OWEB, personal communication 2008), yet it turns up an 82-acre estuarine wetland restoration project in Tillamook Bay in 2007, and in Coos Bay, 13 acres for 2003, 32 acres in 2004, and 86 acres in 2005. These data are apparently not included in DSL reporting on wetland gains for its Oregon Progress Benchmark 78 (no net loss of wetlands). Further OWEB does not include the Yaquina Bay project noted above. However, given active watershed councils all along the coast and other knowledgeable professions from local, state, and federal agencies, it would seem to be a relatively simple project to develop a more complete inventory of completed and planned projects, as well as procedures for annual updates. Good and Sawyer (1998) detail data requirements for such an inventory. Given the critical role estuarine wetlands play in the life cycles of marine, anadromous, and estuarine species, this would seem a high priority.

Goal Effectiveness: Moderate with High Potential. A good deal of estuarine habitat restoration is taking place up and down the coast through local watershed councils, individual property owner initiative, through OWEB and other state agencies, and through several federal agencies, who are among the largest landowners in the coastal zone. Although Goal 16 is not responsible for all this activity, its policy to identify sites was among the first state actions to recognize the potential and establish facilitating policy, thus providing needed impetus.

Question 11: State Agency Coordination and Policy Consistency

Goal 16 Implementation Requirement 9 requires state agencies with planning, permit, or review authorities to review their programs for consistency and alignment with Goal 16 requirements. This was accomplished early on through agency participation in estuary planning task forces along the coast and through State Agency Coordination agreements (SACs), required by ORS 197.180, with general procedures outlined in OAR 660-030 & 031. Authorities of the DSL, WRD, DEQ, DOF, and the Departments of Economic and Community Development (DECD), Energy (DOE), and Geology and Mineral Industries (DOGAMI) were indentified in the Goal as particularly relevant. With respect to estuary plan implementation, DSL's SAC agreement—updated in 2006—is most pertinent, detailing how state Removal/Fill permit decisions in estuaries (and other waterways and wetlands) will be certified as consistent with the Goals and local plans. SAC agreements with each of the relevant state agencies can be found online at http://www.lcd.state.or.us/LCD/about_us.shtml.

Goal Effectiveness: HIGH.

V. Overall Data Availability and Quality

Data and information needed to answer Goal 16 questions is excellent for those related to initial planning efforts, such as parts of Questions 1-4, 7, 8, and 10 (Table 5.8). This is primarily because of the thorough data compilation in the *Oregon Estuary Plan Book* (Cortright et al., 1987) and its subsequent online publishing through the *Oregon Coastal Atlas* (http://www.coastalatlas.net/). Data and information about how well those estuary plans are being implemented is fair to poor for a variety of reason (Table 5.8). Relevant data about amendments to local comprehensive plans, rezoning, variances, and specific development actions (e.g., Removal/Fill permits) are sometimes incomplete, inaccurate, or maintained only intermittently, or simply not part of databases.

Despite some gaps, data and information to answer other questions are excellent. Data on estuarine water quality (question 6), for example, are good, owing to the significant emphasis DEQ has put on water quality monitoring and reporting through its Oregon Water Quality Index and Clean Water Act requirements.

Table 5-8: Summary of Data Availability and Quality to Address Goal 16 Questions.

Secondary Question	Data Availability/Source	Data Quality
1. Overall Estuary Classification	Excellent/OAR	Excellent
2. Estuarine Inventories	Excellent/Published (late 1970s) Poor for new data – not synthesized	Excellent/but now much outdated
3. Estuarine Management Unit (zoning) Designations	Excellent/GIS-based from mid-1980s, published and online Poor subsequently/ zoning changes not documented	Excellent for historical data Poor subsequently/may be possible to extract from DLCD plan amendment database
4. Water-dependent Shoreland Zoning	Excellent/GIS-based from mid-1980s, published and online Poor subsequently/ zoning changes not documented	Excellent for historical data Poor subsequently/may be possible to extract from DLCD plan amendment database
5. Permits for Significant Estuarine Alterations	Excellent through 1987 Fair-poor since 1987/some available through DSL database, but incomplete and difficult to query Federal Consistency database not useful	Excellent through 1987 Fair-poor since 1987/DSL database incomplete and accuracy
6. Estuarine Water Quality	Excellent/online, but not broken out by estuary for this study DEQ Key Performance Measure reports	Excellent/depends on accuracy and assessments for key performance measures for DEQ
7. Estuarine Development Mitigation	Fair/some available through DSL database, but incomplete	Excellent through 1987 Fair-poor since 1987/DSL database incomplete and inaccurate
8. Dredged Material Disposal Planning	Excellent/Published and online or in Corps EIS documents	Excellent
9. Proliferation of Single-purpose Docks and Piers	Poor-fair/But may be able to access through DSL database using tailored queries	Uncertain/depends on database evaluation for completeness
10. Estuarine Restoration	Fair/But poorly organized, no one centralized source OWEB, DSL have relevant databases	Poor-Fair/OWEB and DSL databases inconsistent, incomplete, or inaccurate and use different definitions
11. State Agency Consistency	Excellent/DLCD records	Excellent/but may require more in-depth case analysis

VI. Conclusions

Has *the Oregon Land Use Program been effective in protecting and developing estuarine areas, consistent with Goal 16 requirements?* The answer to this primary question and many of the secondary questions we examined is "yes", but often with qualifications related to data availability or accuracy.

The success of Goal 16 estuary planning and associated Goal 17 planning for water-dependent shorelands is generally considered among the most significant accomplishments of Oregon's coastal management program. Intensive development has been limited to estuaries where it was already concentrated; important estuarine habitats have been identified and protected through zoning; and opportunities for water-dependent and other needed development have been provided with increasing flexibility. Despite these positive planning accomplishments, quality data and information about the results of plan implementation, particularly local land use actions and state agency permit decisions, are lacking and need further attention.

A summary of findings for each of the secondary questions follows.

- The overall estuary classifications (Question 1) were realistic and have provided an overarching framework for maintaining both environmental and economic diversity among estuaries.
- Inventories and mapping (Question 2) by ODFW and others met demanding Goal requirements and provided a sound scientific basis for the first round of planning through the mid-1980s. They do need to be updated.
- Planning efforts for individual estuaries (Question 3) were often highly complex and required significant investment of time and funding at all governmental levels, but have in general served well over the last 20-25 years. Ninety-eight percent of intertidal and tidal marsh habitat was zoned either Natural or Conservation, leading to near-full protection of those habitats that remain. Numerous estuary plan amendments have occurred and development projects have proceeded, but there is little record keeping for the latter, making plan integrity uncertain.
- Changes in Goal 17 provisions for water-dependent shorelands (Question 4) have kept pace with changing demands while preserving minimum inventories of such lands for future uses requiring access to water and associated backup land. To get definitive answers to questions about the extensive re-zoning of water-dependent shorelands, especially since 1999, a thorough study of plan amendments and exceptions would be necessary.
- Answers about the consistency of decisions on dredge, fill, in-water construction, and other alterations with respect to Goal 16's detailed standards and requirements (Question 5) suffer from a lack of readily retrievable data from DSL and DLCD databases. Again, both data availability and quality are concerns.
- Efforts to monitor and maintain estuarine water pollution (Question 6)—both point and nonpoint sources—have been significant. DEQ's efforts to monitor, determine trends and pollution sources for many estuaries are laudable, as are programs established through EPA's National Estuary Program (for the Lower Columbia and Tillamook Bay),

and the many-years-in-the-making Coastal Nonpoint Pollution Control Program are addressing pollution problems on many fronts. More remains to be done and funding shortfalls for monitoring and assessment are constant threats, but this is an area where present institutions and public engagement have made a difference. Despite this progress, NOAA reports cite poor water quality and/or inadequate data for making eutrophication assessments.

- Oregon programs requiring habitat restoration, creation, or enhancement as mitigation for development-related losses (Question 7) have their roots in Goal 16. That initial requirement has led to statewide adoption of wetland mitigation and mitigation banking. The success of this policy initiative is both the avoidance of estuarine and other wetlands and the compensation required. The on-the-ground success is less certain due to limited monitoring and follow-up.
- Dredged material disposal (Question 8) has been an integral part of estuary planning and management; Goal 16 spurred local involvement in these efforts, reducing potential conflicts when site-specific decisions were needed.
- Readily available data is not accessible to address the mandate to limit the proliferation of single-purpose docks and piers (Question 9).
- Estuarine restoration (Question 10), including site identification, prioritization, and on-the-ground actions were given a big boost by the Plan for Salmon and Watersheds produced in the 1990s and recent focuses on estuaries by federal and state agencies and non-governmental organizations. Better record keeping is needed to track restoration activities as it relates to Oregon Benchmarks.
- State agencies all have coordination agreements (Question 11) with DLCD regarding their actions effecting land use. DSL's agreement, probably the most important with respect to Goal 16 implementation, was recently revised; there could be a greater effort to provide permit-related data for tracking estuary plan implementation actions and restoration.

VII. Recommendations

Significant opportunities exist for improving the monitoring of plan implementation for estuaries and associated shorelands, including local plan amendments and land use actions, and state agency decisions on estuarine regulatory permits. Specific recommendations for improving such monitoring and reporting are outlined here. One caveat is that the recommendations are "idealized" and made without consideration of potential cost or of benefits compared to costs. However, it is expected that many of the costs could be absorbed because virtually all the needed structure—mainly agency databases—is in place for monitoring implementation actions or conducting case studies. Many of the data problems lie with the particular design of record keeping systems, lax follow-through on data entry and follow-up, and workload of staff. Although maintaining high quality, up-to-date, easily retrievable data is no one's favorite thing, program accountability and improvement demand it.

- DLCD and the State Legislature should provide funding to update estuarine inventories and maps of habitat and zoning
- DLCD should initiate a systematic review and evaluation of state agency databases useful for tracking various aspects of Goal 16 implementation
- DLCD should conduct periodic, estuary-specific case studies of plan amendments and goal exceptions to evaluate the integrity of Goal 16 estuarine zoning and Goal 17 water-dependent shoreland zoning.
- DLCD should evaluate the potential utility of both its Plan Amendment and Federal Consistency databases as a means to track via GIS estuarine zoning changes and development projects, as anticipated when the Estuary Plan Book was prepared in 1987. This could eliminate the need to depend on DSL for tracking of dredging, filling, and other estuarine alterations.
- DSL should consider tailoring queries of its Land Administration System to readily produce reports on dredging, filling, and other estuarine alterations; more effort needs to be invested in training staff to enter accurate, consistent data in a timely manner. This is a continuing problem, as evidenced by earlier studies.
- OWEB and DSL should coordinate to provide accurate, consistent data on estuarine habitat restoration and enhancement, including rationalization of definitions and accounting for losses and gains.
- OWEB, DSL, and DLCD should collaborate on a one-time (perhaps periodic) study to update estuarine restoration records and accurately report on Benchmark 78 with respect to the 250-acre/year net gain goal for estuarine wetlands.

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NOAA. National Estuaries Research Reserve System.
http://nerrs.noaa.gov/Monitoring/Water.html

NOAA. Findings for the Oregon Nonpoint Coastal Program
http://coastalmanagement.noaa.gov/nonpoint/docs/findor.txt

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Oregon Department of Land Conservation and Development. State Agency Coordination Agreements. http://www.lcd.state.or.us/LCD/about_us.shtml

Oregon Progress Board. Oregon Benchmarks.
http://www.oregon.gov/DAS/OPB/obm.shtml

Tillamook Estuaries Partnership. http://www.tbnep.org/index.html.

Recommendations

This intensive but highly time-limited research effort began with the question "Is the Oregon land use system, as designed, helping the state meet its land use goals?" Research teams asked the question as it relates to five of Oregon's 19 land use system goals. Research included identifying data gaps and providing suggestions to address identified gaps. Each chapter contains details regarding data gaps and suggestions for improving data collection. Following are overall observations and recommendations.

Evidence suggests that the land use system is meeting Oregon's land use goals—at least the goals evaluated. At the same time, various correlations are weak or difficult to get at; and in one case, there is no readily usable data. Problems include lack of data, lack of appropriate databases, scale issues and difficulty controlling and/or interpreting additional factors that influence goal success.

To overcome the foregoing problems, Oregon needs to develop a goals-specific, integrated system for data gathering, tracking and reporting. It should include the following process and elements:

1. The state needs to develop a set of *goal specific* performance measures. Existing Oregon Benchmarks and agency performance measures provide little value or guidance in answering the basic question.
2. The state needs to create an integrated tracking and reporting system across agencies and levels of government. It should convene a task force comprising the expertise to determine how measures should be developed to provide the clearest goal achievement evaluation, what appropriate data sources exist, what sources are needed, and what entities are best suited for data collection and reporting.
3. Performance measures for agencies needing to develop and report data should include measures specifically linked to carrying out those duties.

Oregon may also want to develop a modified benchmarking program for its land use system. The distinguishing feature of benchmarking is its comparative element: entities seek best-practice examples to increase performance in their own process or program. Appraising aspects of other states' land use strategies could provide information for improvements or provide compelling evidence that Oregon is, indeed, the exemplar for land use planning that maintains a range of desirable amenities and advantages.

The suggested process and structure can enhance planning system characteristics that different stakeholders, including citizens, decision makers, planners and agencies, have consistently advocated: clarity, flexibility and accountability; clarity in that stakeholders have ready access to information regarding goal achievement, flexibility as the system provides information on an ongoing basis that helps decision makers adapt how goals are

carried out or modified, and accountability in that the reasons for any suggested change processes are well documented and transparent.

The appraisal suggests Oregon's current land use system is sound. It does not answer questions about whether or how the system could be made less rigid and more responsive to regional and local needs. It does, however, suggest that, while recommended changes deserve full consideration, they need to be made with careful deliberation regarding how changes might affect the state's ability to maintain a system that, based in intensive, objective analysis, generally meets its goals.

Appendices

Appendix A: Draft Review Protocol

1. Background

Systematic, documented methods will be used to locate and review evidence (e.g. peer reviewed and non-peer reviewed literature, agency reports and existing data) concerning developing an objective foundation for understanding the performance of the land use program in meeting its core objectives (certain Statewide Planning Goals and Guidelines).

The review will employ a comprehensive, documented literature search and specific criteria for assessing study relevance and reliability. Results will be summarized in a narrative synthesis and tables illustrating commonalities and differences that might affect study conclusions. Gaps in research will be highlighted.

2. Objective of the Review(s)

2.1 Primary Research Question(s)

Has the Oregon Land Use Program has been effective in:

- Fostering citizen participation in land use planning (Goal 1)?
- Preserving farm and forest lands for farm and forest use (Goals 3 and 4)?
- Managing growth (Goal 14)?
- Protecting and developing estuarine areas, as appropriate (Goal 16)?

Agency-specific performance measures are possible measures for study outcomes.

2.2 Secondary Research Question(s)

The Goal Assessment Teams will develop secondary research questions.

3. Methods

3.1 Search strategy

Unlike general literature reviews, a key tenet of systematic review is use of a protocol that details in advance how the search will be conducted and how searches will be documented. This draft search strategy lists by name the electronic databases, meta search engines, and library collections to be searched, in addition to specified a list of key terms used to look for documents.

3.1.1 Databases, Search Engines, and Collections

Databases, search engines and collections may be added or dropped as the search progresses. In such instances, rationale and details will be documented. Initial electronic **databases** to be searched (listed by database name and host/administrator)

- AGRICOLA: USDA/NAL
- AGRICOLA: EBSCOhost
- Dissertation Abstracts: FirstSearch
- LexisNexis Academic: LexisNexis
- PapersFirst: FirstSearch
- ProceedingsFirst: FirstSearch
- Web of Science: Science Citation Index
- GEOBASE

The following **search engine**s will be searched

- Google Scholar

Also, the following **collections** will be searched

- Oregon State Library (OCLC)
- Oregon State University Library (OCLC)
- Portland State University Library (OCLC)
- University of Oregon Library (OCLC)

3.2.1 Search terms

Search terms may be added or dropped as the search progresses. In such instances, rationale and details will be documented. A record of the number of documents found with each search by search term(s) will be documented. Titles and abstracts will be assessed for relevance.

Publication searches will be undertaken on federal, state, and local government agency websites. Bibliographies of recent, relevant articles- primary peer reviewed papers and book chapters recognized by experts as seminal or important will be searched for further references. Recognized experts and practitioners will be contacted for further recommendations and relevant unpublished material or monitoring data.

Broad search terms include:

Oregon AND

- Comprehensive planning
- Land use
- Land use change
- Land use conversion
- Land use goals
- Land use laws
- Land use planning
- Land use policy
- Land use program
- Land use regulations
- Zoning
- Sprawl
- Urban sprawl

Additional "AND" **goal-specific search terms** might include, but are not be limited to the following:

- Goal 1: Citizen involvement: citizen participation, citizen involvement, citizen advisory committees, citizen involvement committees, public participation, public involvement
- Goal 3: Agricultural lands: agricultural lands, hobby farming, farmland preservation
- Goal 4: Forest lands: forestland preservation,
- Goal 14: Urbanization: urban growth boundaries, urbanization, sprawl, growth management
- Goal 16: Estuarine resources: estuaries, coastal development, wetlands, coastal growth management, coastal zone planning

3.3 Study inclusion criteria

Studies included in the review will meet the following criteria: *study descriptors*, *relevance*, and *source*.

3.3.1 Study Descriptors

Year of publication
1973-2008

Type of study
The type of study (qualitative or quantitative) will not be used to define inclusion or exclusion criteria. All information regarding the primary outcome will be collated qualitatively in tables and accompanying narrative synthesis.

Types of outcome
Studies will not be rejected on the basis of outcome and outcomes.

Exclusionary subjects
Exclusionary subjects might include habitat conditions, impact on water quality, etc.

3.3.2 Relevance to review questions

Quality assessment is a hallmark of traditional systematic reviews. Since ranking the relative quality of each piece of evidence has its problems, reviewers will rank each piece of evidence based on its relevance to the review question(s), and give greater weight to those of higher relevance.

The questions that will be used to determine relevance for this review are:

Does the study address the review question? No = not relevant

Was the study designed to answer the review question? No = low relevance

Is the study robust (statistically or qualitatively)? No = low relevance

Yes to all? = high relevance

If titles and abstracts provide insufficient information to make a decision regarding study inclusion, reviewers will view the full text of articles in order to determine their relevance and make decisions regarding inclusion in the review.

At least two reviewers will independently assess a random subset of 25% of articles read in full. Disagreement will be resolved by consensus.

3.3.3 Source

Peer reviewed articles, agency reports, and reports issued by advocacy groups, public interest groups could be seen as sources, or leads to sources. For all sources of studies, we first ask "*Can we find the reference*?" If so, then the reference must be verified:

c. Is the reference *peer reviewed*?

d. Is the reference from *grey literature*? If so,

- Does the grey literature paper *use a credible scientific method*? (Possibly redirect question to OUS faculty to make final call)
- *What* is the *source material* for the paper? (Does it reference peer-reviewed publications?)
- *Who funded* the paper? (Was it funded by an advocacy group or by an independent research initiative?)

For web-based sources of evidence, we need to specifically answer two questions: (1) *who hosts* the site, and (2) *who funds* the site?

a. *Public sector websites* (federal, state, and local agencies, academic institutions)

b. *Private sector and association websites*

c. *Public Interest/News* (Oregonian, OPB)

d. Advocacy-based (1000 Friends of Oregon, Oregon Taxpayers)

Examples

Reliable/Credible
A newspaper article in *The Oregonian* that references back to a recent study conducted by OSU researchers: The researchers were subsequently contacted and

confirmed that their work, mentioned in the recent media, had been accepted for publication in a peer-reviewed journal.

Little reliability/credibility
A topic taken from the 1000 Friends of Oregon website with no references: Further research may substantiate such work but it would be the original sources not the 1000 Friends of Oregon site we use. In this case the 1000 Friends of Oregon site would be a lead rather than a source.

3.4 Documenting the review

Example: Matrix Review Summary of an Article
The following items per study will be documented in an Excel file document.

- Document Citation
- Land use goal
- Relevance to review
- Where document was found?
- Document type
- Peer reviewed?
- How document is used
- Type of study
- Study dates/ Data duration
- Study location
- Purpose of study, research question(s), hypotheses
- Study methods
- Findings
- Other Comments?
- Abstract

Narrative Summary of a Review (findings)
- Introduction, search strategy, review process (from protocol)
- Focused response to review question(s)
- Evidence for answering the review question
- Significant evidence gaps, data gaps, and research needs

Appendix B: Citizen Participation

Contents

Appendix B.3: CCI Status

CITY CITIZEN INVOLVEMENT PROGRAM DOCUMENTS

	Original CIP	Date filed with DLCD
ALBANY	yes	1976
ASTORIA	yes	1976
BAKER CITY	no*	1976
BANDON	yes	1975
BEND	yes	1977
BROOKINGS	yes	1975
CORVALLIS	yes	1976
EUGENE	yes	1976
GRANTS PASS	yes	1976
HOOD RIVER	yes	1976
KLAMATH FALLS	yes	1976
LAKE OSWEGO	yes	1976
LAKEVIEW	no*	1976
MADRAS	no	n/a
MEDFORD	yes	1976
NEWPORT	yes	1981
ONTARIO	no	n/a
PENDLETON	yes	1976
PORTLAND	yes	1976
PRINEVILLE	yes	1975
ROSEBURG	yes	1978
SALEM	yes	1975
ST. HELENS	yes	1981
TILLAMOOK	yes	unknown

*** No original plan filed with DLCD, but there is proof one existed.**

COUNTY CITIZEN INVOLVEMENT PROGRAM DOCUMENTS

	CIP (2005)	Original CIP	Date filed with DLCD
BAKER	yes	yes	1978
BENTON	no	yes	1975
CLACKAMAS	yes	yes	1975
CLATSOP	no	yes	1976
COLUMBIA	yes	yes	1976
COOS	yes	yes	1977
CROOK	yes	yes	1975
CURRY	no	yes	1975
DESCHUTES	yes	yes	1976
DOUGLAS	yes	yes	unknown
GILLIAM	no	yes	1975
GRANT	no	yes	1976
HARNEY	no	yes	1975
HOOD RIVER	no	yes	1976
JACKSON	no	yes	1976
JEFFERSON	no	yes	Unknown
JOSEPHINE	no	yes	1976
KLAMATH	no	yes	1976
LAKE	no	yes	1976
LANE	yes	yes	1976
LINCOLN	no	yes	1977
LINN	no	yes	1976
MALHEUR	no	yes	1976
MARION	no	yes	1975
MORROW	yes	yes	1975
MULTNOMAH	yes	yes	1975
POLK	yes	yes	1975
SHERMAN	no	yes	1976
TILLAMOOK	no	yes	1977
UMATILLA	no	yes	1976
UNION	yes	yes	1975
WALLOWA	no	yes	1975
WASCO	no	yes	1973
WASHINGTON	yes	yes	Unknown
WHEELER	no	yes	1976
YAMHILL	no	yes	1975

2005 Information collected by CIAC

Appendix B.4: Key informants

Expert	Position	Conversation Date
Pat Wheeler	CIAC Chair	June 24, 2008
Sy Adler	Professor Portland State University/Land Use Historian	June 26, 2008
Ardis Stevenson	Former CIAC Chair/author of Clackamas County's CIP	June 27, 2008
Linda Macpherson	Vice President, CH2MHill	June 30, 2008
Doug McClain	Clackamas County Planning Director	July 1, 2008
John Borge	Principal Planner, Clackamas County	July 1, 2008
Arnold Cogan	Oregon's first planning coordinator/first director of DLCD	July 1, 2008
Keith Cubic	Planning Director, Douglas County	July 3, 2008
Pat Zimmerman	Former CIAC Chair	July 3, 2008
Jim Just	Executive Director, Goal One Coalition	July 3, 2008
Maggie Collins	CIAC original member (1974)	July 5, 2008
Peggy Lynch	Oregon League of Women Voters and Former CIAC Chair	July 5, 2008
Darren Nichols	DLCD Community Services Division Manager	July 5, 2008

Appendix B.5: Survey Instrument

Approaches to Goal 1 and Current Citizen Involvement Practices

1. About this Survey

This survey is being conducted to better understand 1) the effectiveness of the Oregon Land Use Program in fostering citizen participation in land use planning and 2) potential approaches to evaluating the efficacy of citizen involvement. The survey is being conducted by Professor ELLEN M. BASSETT and GEORGE ZANINOVICH of the School of Urban Studies and Planning at Portland State University in Portland, Oregon for the Land Use Project Team. The research is funded by the Department of Land Conservation and Development in Salem, Oregon and overseen by the Oregon State University Institute of Natural Resources in Corvallis, Oregon.

You were selected as a possible participant in this study because you are an implementer of Goal 1 at the county or city level.

If you decide to participate in the survey, you will be asked a series of questions intended to gather your citizen involvement program and opinions on Goal 1 performance. While you will not receive any direct benefit or payment for participating in the study, your opinions/answers will help increase our knowledge regarding citizen involvement as it pertains to Oregon's land use program, which will aid our understanding of Goal 1 and help inform the Big Look Task Force. Survey results will be disseminated in written form as part of a larger report to be produced by the Land Use Project Team for DLCD and the Big Look. You will be given an opportunity to formally request to receive research results at the end of the survey.

The survey contains 15 closed-ended questions and three open-ended questions. All required questions are marked with an asterisk. Completing this survey should take approximately 10 minutes.

Any information that is obtained in connection with this study and that can be linked to you or identify you will be kept confidential. In completing the survey, you will not be asked to give your name or the name of your organization.

If you have concerns or problems about your participation in this study or your rights as a research subject, please contact the Human Subjects Research Review Committee, Office of Research and Sponsored Projects, 600 Unitus Building, Portland State University, (503) 725-4288 / 1-877-480-4400.

If you have questions about the study itself, please contact Ellen M. Bassett at Portland State University, Nohad A. Toulan School of Urban Studies and Planning-USP, P.O. Box 751, Portland, OR 97207. You can also call (503) 725-5174, or send an email to her at bassette@pdx.edu.

By continuing to the next screen, you are indicating that you have read and understood the above information and agree to take part in this study. Please understand that you may withdrawn your consent at any time without penalty and that, by agreeing, you are not waiving any legal claims, rights or remedies.

Thank you for taking the time to complete this survey!

*** 1. Do you consent to take the survey?**

- ○ Yes
- ○ No

Page 1

Approaches to Goal 1 and Current Citizen Involvement Practices

2. Citizen Involvement Program Information

This section of the survey asks several questions regarding the citizen involvement program you implement.

2. Is there an updated citizen involvement program plan for your jurisdiction that is different from the original filed with DLCD?

- ○ Yes
- ○ No
- ○ Don't know
- ○ Refuse to answer

3. If yes, in what year was the last update completed?

_____

4. What is the mechanism for conducting citizen involvement?

- ○ Planning Commission

Other (please specify)

_____

5. Have you evaluated your citizen involvement program?

- ○ Yes
- ○ No
- ○ Don't know
- ○ Refuse to answer

6. If yes, when was it last evaluated?

_____

7. If yes, how often is it evaluated?

- ○ Quarterly
- ○ Bi-annually
- ○ Annually

Other (please specify)

_____

8. If yes, what is the evaluating body?

_____

Approaches to Goal 1 and Current Citizen Involvement Practices

3. Opinions on Goal 1 Performance

The next questions ask you to provide your opinions on the effectiveness of Goal 1.

9. Please indicate the degree to which you agree or disagree with the following statements.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
Goal 1 is effective in fostering citizen participation in land use planning in Oregon	○	○	○	○	○
Citizen participation in my jurisdiction provides frequent and adequate opportunities for involvement	○	○	○	○	○
Citizen participation in my jurisdiction provides for diverse groups of citizens to be involved in planning and decision-making	○	○	○	○	○
Citizens in my jurisdiction feel included in the planning process	○	○	○	○	○
Citizens in my jurisdiction feel their input is utilized in decision-making	○	○	○	○	○
There should be an institutionalized evaluation mechanism for citizen participation	○	○	○	○	○
There should be better enforcement of mandated local-level evaluation	○	○	○	○	○
Effective citizen involvement can lead to a better understanding of the land use planning program	○	○	○	○	○
Better understanding of the land use program can lead to less contention (i.e. LUBA cases, ballot measures)	○	○	○	○	○
Given more financial and human resources, my jurisdiction would put more effort in citizen involvement	○	○	○	○	○
Overall, citizen participation efforts are effective in my jurisdiction	○	○	○	○	○

Approaches to Goal 1 and Current Citizen Involvement Practices

10. Do you wish to clarify or expand on any of your answers to questions 14?

Approaches to Goal 1 and Current Citizen Involvement Practices

4. Measuring Effectiveness of Goal 1

This page consists of three open-ended questions about measuring the general effectiveness of Goal 1.

11. How would you measure the effectiveness of Goal 1 in the SHORT TERM?

12. How would you measure the effectiveness of Goal 1 in the LONG TERM?

13. If you were to rework or revisit this goal, what would you do to make citizen involvement as effective as it could be?

Approaches to Goal 1 and Current Citizen Involvement Practices

5. Organizational and Personal Information

These questions request basic information about the jurisdiction in which you work and your role. Recipients of the survey included the city and county planning directors.

*** 14. Which of the following best describes your jurisdiction?**

- City
- County

15. How many people live in your jurisdiction?

- Less than 1,000
- 1,001-5,000
- 5,001-15,000
- 15,001-50,000
- 50,001-200,000
- Over 200,000

16. How many years have you held your current position?

- Less than 1 year
- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- Over 20 years

17. What is your job title? (Please DO NOT include the name of jurisdiction.)

18. How many employees work at your agency?

- Less than 3
- 3-5
- 6-10
- 11-20
- Over 20

Approaches to Goal 1 and Current Citizen Involvement Practices

6. Thank you!

Thank you very much for taking time to help with this research.

If you would like to have a copy of the report that results from this survey, please send an email with the request to the Principal Investigator, Dr. Ellen M. Bassett at: bassette@pdx.edu

The request can also be made in writing to Dr. Ellen M. Bassett, Nohad A. Toulan School of Urban Studies and Planning, Portland State University, P.O. Box 751, Portland, OR 97207.

Thank you again for your time and input into this research!

Appendix B.6: Survey Results

Closed-ended questions	Less than 1,000		1,001-5,000		5,001-15,000		15,001-50,000		50,001-200,000		Over 200,000	
	City	County	City	County	City	County	City	County	City	County	City	County
How many people live in your jurisdiction?	0.0% (0)	0.0% (0)	15.4% (4)	5.6% (1)	38.5% (10)	16.7% (3)	34.6% (9)	33.3% (6)	11.5% (3)	33.3% (6)	0.0% (0)	11.1% (2)
	Less than 1 year		**1-5 years**		**6-10 years**		**11-15 years**		**16-20 years**		**Over 20 years**	
	City	County	City	County	City	County	City	County	City	County	City	County
How many years have you held your current position?	0.0% (0)	5.6% (1)	34.6% (9)	50.0% (9)	34.6% (9)	11.1% (2)	7.7% (2)	5.6% (1)	19.2% (5)	5.6% (1)	3.8% (1)	22.2% (4)
	Less than 3		**3-5**		**6-10**		**11-20**		**Over 20**			
	City	County	City	County	City	County	City	County	City	County		
How many employees work at your agency?	15.4% (4)	16.7% (3)	23.1% (6)	11.1% (2)	15.4% (4)	16.7% (3)	15.4% (4)	38.9% (7)	30.8% (8)	16.7% (3)		
	Yes		**No**		**Don't know**		**Refuse to answer**					
	City	County	City	County	City	County	City	County				
Is there an updated citizen involvement program plan for your jurisdiction that is different from the original filed with DLCD?	26.9% (7)	31.6% (6)	53.8% (14)	42.1% (8)	19.2% (5)	21.1% (4)	0.0% (0)	5.3% (1)				
Have you evaluated your citizen involvement program?	34.6% (9)	42.1% (8)	65.4% (17)	47.4% (9)	0.0% (0)	10.5% (2)	0.0% (0)	0.0% (0)				

Appendix C: Agricultural Lands

Contents

Appendix D: Forest Lands

Contents

Appendix E: Urbanization

Contents

Appendix F: Estuarine Resources

Contents


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