STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
910 State Office Building, Portland, Oregon 97201

OPEN-FILE REPORT 0-86-17

MAP REVISION REQUIREMENTS OF OREGON STATE AGENCIES

Prepared for

State Mapping Advisory Committee
John D. Beaulieu, Chairman

By

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September 25, 1986

NOTICE

The Oregon Department of Geology and mineral Industries is publishing this paper because the subject matter is consistent with the mission of the Department. To facilitate timely distribution of information, camera-ready copy submitted by the author has not been edited by the staff of the Oregon Department of Geology and Mineral Industries.

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INTRODUCTION

WHAT KIND OF MAPS DO WE WANT TO HAVE AS WE START INTO THE 21ST CENTURY?

WHAT CAN WE ADD TO OR DELETE FROM OUR EXISTING MAPS WHICH WILL MAKE THEM A BETTER TOOL FOR THE YEAR 2000?

WHAT NEW PRODUCTS WILL WE NEED TO DEVELOP THAT WILL CARRY US THROUGH THAT POINT 14 YEARS AWAY?

The Oregon State Mapping Advisory Committee has been asking these questions. The questions have been directed to themselves and to the National Mapping Division (NMD) of the U.S. Geological Survey (USGS), which is the primary map production agency of the U.S. Government. Dr. John Beaulieu, Oregon State Mapping Advisory Committee (SMAC) Chairman, requested a report which would bring together the current and future requirements of the map producing or map using agencies of the State Government.

The USGS map series are nearing completion or are completed. Now is the time to look to the future to decide what kind of map products are needed. Are we satisfied with the products we have, or can we refine them slightly to make them better tools? Are there data bases collected by other agencies which could be used by the National Mapping Division? Are there cooperatives possible which might avoid duplication? What kinds of map needs is this new world of digital technology going to bring us? These and other questions were asked in preparing this survey.

Fourteen agencies were queried concerning their map requirements for the present and the future. Some of the suggestions received from the agencies may not be possible with the current mapping technology. Some of the requirements are for the future when there is an all digital map base. With a complete digital technology, requests such as revision cycles of 1-5 years may be possible.

The 1:24,000 scale map series was discussed most frequently because of its wide use. Information concerning this series was collected in such volume that categories of information are used to separate the subjects. A matrix was added to simplify the various comparisons, priorities, and responses.

This report is intended to inform the USGS National Mapping Division of the requirements of the State of Oregon. The Federal agencies make their requirements known through the Office of Management and Budget's A-16 process. The State Agencies express their requirements through the State Mapping Advisory Committee which is considered to be part of the A-16 process.

This study was not intended to definitively report on the digital

requirements or activities of the State agencies. Open-File Report 0-84-6, "Oregon Survey of Digital Requirements of State Agencies and Select Organizations," written in December 1984, studied the digital requirements. Questions were asked about topographic-bathymetric requirements but were not covered in detail. Open-File Report 0-85-3, "A Survey of Oregon Offshore Mapping," written in September 1985, covered the subject.

The State Resident Cartographer wishes to thank the participants in this Survey. Their willingness to share information is greatly appreciated.

EXECUTIVE SUMMARY

The Oregon State Mapping Advisory Committee Chairman requested this Report to provide information to the USGS National Mapping Division concerning the various map series produced by the NMD. Fourteen State agencies were queried for their requirements into the national mapping program. This Report describes the requirements concerning each map series and then the agencies' specific responses.

1:24,000 Scale Topographic Series

- This is the most used of any map series.
- Approximate revision cycle

Urban	3 years	Natural Resource	10 years
Suburban	4 years	Wilderness	14 years
Rural	7 years		

- Limited funding is available. Most agencies preferred cooperative workshares or contract specification assistance.
- Specific recommendations
  - + Eliminate UTM lines across the quadrangle.
  - + Add marginal forest roads.
  - + Produce more topographic-bathymetric maps.
  - + Portray clearcut areas as a break in the vegetation.
  - + Show section lines in Donation Land Claims.
  - + Depict Administrative Boundary of the National Forests.
  - + Portray public land survey protraction lines in unsurveyed areas.

1:24,000 Scale Orthophoto Map Series

- There will be more use of high resolution orthophotography by the natural resource agencies in the future.

1:100,000 Scale Topographic Map Series

- Schedule should be set to finish the series.
- Select agencies plan to maintain their own series once the USGS maps are complete.
- Road symbols should be made heavier weight or double line.
- Digitize the Public Land Survey System (PLSS) and boundaries for geographic information systems.

1:250,000 Scale Topographic Map Series

- Schedule a more active revision program using the 1:100,000 scale map series information.

1:500,000 Scale State Map Series

- Maintain on a 10 year cycle.

- Digitize with a topologic structure for GIS.

Land Use and Land Cover and Associated Maps

- Segregate out the irrigated and non-irrigated agricultural lands as separate classifications.
- Complete the State and Federal Ownership associated map layers for the State.

Table 1. 1:24,000 Scale Map Requirements

OREGON STATE AGENCIES	USGS MAP SERIES PRIORITY USE							1:24,000 SCALE MAP REQUIREMENTS																					
								Revision Cycle Years					Geographic Priority					Specific Requirements								Coop	
	1:24,000 Topo	1:24,000 Ortho	1:100,000 Topo	1:250,000 Topo	1:500,000 Topo	1:2,000,000 Atlas	Land Use Land Cover	Urban	Suburban	Rural	Natural Resource	Wilderness	Urban	Coastal	Rural	Forest	Other, See Text	Eliminate UTM Lines	Forest Boundary Type	Marginal Forest Roads	Protraction Surveys	Bathymetry	Contour Interval	Clearcuts Shown	Section Lines in DLCs	Funding Available	Workshare Available
Economic Development	-	-	-	2	1	-	-	3	5	5	10	20	1	3	2	-	-	Y	-	-	-	-	-	-	Y	N	N
Executive Department																											
Emergency Mgmt. Div.	1	5	2	4	3	-	-	2	5	5	8	10	2	4	3	1	-	Y	A	Y	Y	Y	L	Y	Y	N	N
Energy Department	1	-	2	-	3	-	4	1	3	5	10	15	2	1	-	-	X	Y	B	N	Y	Y	L	N	-	?	?
Environmental Quality	1	-	2	4	3	-	5	4	5	10	15	15	1	2	3	-	-	Y	A	Y	Y	Y	S	Y	Y	N	N
Fish & Wildlife Dept.	1	2	3	-	4	-	5	-	-	5	8	10	4	2	3	1	X	N	A	N	Y	Y	L	Y	-	N	N
Forestry Department	2	3	1	-	4	-	-	5	5	8	10	10	4	2	3	1	-	Y	A	Y	Y	-	S	N	-	?	Y
Geology & Mineral Ind.	1	-	2	-	3	-	-	5	5	10	10	10	-	-	-	-	X	Y	A	Y	Y	Y	S	Y	-	Y	Y
Land Conserv. & Devel.	2	-	1	-	3	-	-	3	3	5	10	10	1	2	3	4	X	Y	B	Y	Y	Y	S	Y	Y	N	N
Lands Division	1	4	2	-	3	-	-	5	5	8	10	15	4	2	1	3	X	Y	B	Y	Y	Y	S	Y	Y	N	N
Military Department	1	-	-	-	2	-	-	5	5	7	10	10	2	3	-	1	X	N	A	Y	Y	Y	S	N	Y	N	N
Revenue Department	1	-	-	-	-	-	-	1	5	10	15	20	1	2	3	-	X	Y	B	Y	Y	Y	S	Y	Y	N	Y
Transportation Dept.	1	-	4	3	2	-	-	2	3	5	10	10	1	3	2	4	X	Y	A	Y	Y	-	S	-	Y	?	Y
Water Resources Dept.	1	5	2	-	4	-	3	-	-	7	10	15	-	3	1	2	X	Y	A	Y	Y	Y	L	Y	Y	?	Y
Environmental Remote Sensing Applic. Lab.	1	-	2	-	4	-	3	5	5	8	10	15	4	2	1	3	X	N	A	Y	Y	Y	S	Y	-	?	Y

Key
Y = Yes ? = Maybe
N = No - = No opinion expressed

Forest Boundary Needed
A = Administrative
P = Proclamation
B = Both

Contour Interval
S = Sufficient
L = Lesser

MAP SERIES REVISION REQUIREMENTS

1:24,000 SCALE TOPOGRAPHIC MAP SERIES

The 1:24,000 scale topographic map series will be completed for Oregon and the nation in 1991. Each of the 7-1/2 minute quadrangles are in some stage of progress towards completion. To meet this goal, a new map series was instituted. In 1980 the Provisional Map Series was inaugurated to streamline the office and field phases of the mapping program. New cartographic standards and procedures were instituted to produce this new series.

To map the Western States, where there was a great amount of uncompleted territory, the NMD assigned other regional mapping centers blocks of 7-1/2 minute quadrangles to complete. The Mid-Continent Mapping Center in Rolla, Missouri, and the Rocky Mountain Mapping Center in Denver have sent field crews into Oregon and are currently working in Eastern Oregon to complete the maps series. To further increase production, the Western Mapping Center (WMC) established semi-permanent field offices in Vancouver, Washington, and Grants Pass, Oregon, to focus the field and office procedures into one location. This eliminated the need to move the information gathered in the field to the WMC Regional Office in Menlo Park, California. These semi-permanent offices concentrated the mapping effort into three of the largest uncompleted areas, namely SW Oregon, NW Oregon and SW Washington.

There are 1,911 1:24,000 scale quadrangles in Oregon. There are approximately 1,350 completed at this writing. The last quadrangles are scheduled for publication in December 1991.

This series is used by the state agencies more than any other series. Each of the agencies had different uses of the maps. Some used the map as a base map on which to portray that agency's information. Some modified the series to produce a product more in line with their mission. All of the agencies had map files containing the published product. Generally these maps were used for orientation and for field work. This enormous use of the map series qualified the agencies to make suggestions to the NMD on how the series could be improved and what products would be used for the future.

PROVISIONAL MAP SERIES

The provisional series has been well received by the State agencies. They are very supportive of NMD's effort to accelerate and complete the 1:24,000 scale map series in Oregon and nationally. The reduction in the cartographic standards has been made up for by retaining the accuracy standards and finishing the map series. The agencies and private companies who use the 7-1/2

minute maps as base maps for their own map series want the conversion from Provisional to Standard maps to be as rapid as possible. The change in symbols and typo style from the Standard to the Provisional Series has meant that a lot of maps do not join cartographically. Agencies have complained that they are having to go to extra work to make the quadrangles join cartographically. Other problems that have been noted with the 7-1/2 minute maps are mentioned in "Specific Problems."

REVISION CYCLE

The agencies were queried as to what revision cycle they would prefer in urban, suburban, rural, natural resource, and wilderness areas. The matrix shows that the agencies, to perform their activities, need a revision cycle of one to five years in urban areas and up to 10 to 20 years in wilderness areas. The urban cycle may not be possible with current technology, but the agencies felt that with future technologies, the short urban cycle would be possible.

GEOGRAPHIC PRIORITY

Agencies were asked for their geographic priority. Urban, coastal, rural and forest areas were mentioned most frequently, but to assign a greater priority to one area than another would misrepresent the State's overall priority. Agencies generally put a higher priority on urban areas, but each agency had its own specific geographic priorities which are explained in the State Agencies' Requirements section of this report.

CONTOUR INTERVAL

The agencies were generally satisfied with the contour intervals displayed on the 1:24,000 scale map series. Several agencies said they were satisfied with the contours but elaborated by saying that they would not want the contour interval of any quadrangle in Oregon to be over 40 feet. Four of the agencies said that they wanted lesser contour intervals or more supplemental contour intervals. These agencies said that they wanted to see the finer topographic detail of tops, benches and flats even in 40 foot contour interval areas.

The State Fish and Wildlife Department asked for a smaller contour interval in the flat or wetlands areas. A contour interval of one to five foot elevation is necessary to manage the bird habitats. Generally, the contours should be within 1,000 horizontal feet of each other to depict the ground adequately.

SPECIFIC PROBLEMS

Revision Based On New PLSS Surveys:

Several agencies noted that the maps did not portray the most recent Public Land Survey System data. Resurvey or correction surveys had been performed which were not reflected on the older maps. The policy in choosing maps for revision should include consideration of the availability of new PLSS data. Several agencies including Revenue, State Forestry and Bureau of Land Management (BLM) said that they have data bases of section line locations which they consider better than the existing USGS maps. Investigations should be made to test this data and to incorporate this data into the USGS map series.

Section Lines Within Donation Land Claims:

The need for section lines to be shown within Donation Land Claims (DLC) was identified as a problem by several agencies. Legal section lines do exist within the Donation Land Claims, and property is described by the subdivision of these sections. The Department of Revenue shows these section lines on their large scale Tax Maps. The Department of Water Resources uses a well location system which is dependent on the subdivision of the sections within DLC's. Nine of the fourteen surveyed agencies used section lines in addition to the DLC lines. It was suggested that the USGS portray section lines within DLC's just as they show section lines within grant boundaries in the Southwest.

Marginal Forest Roads:

The location of marginal forest roads should be portrayed whether they are passable or not. Eleven of the fourteen agencies surveyed requested that marginal roads be shown for many reasons: predominantly access, orientation, fire control, emergency operations and reasons explained in the agencies' texts. The roads should be shown with a single dashed line, the same weight as a trail symbol. Recent provisional maps produced by the Grants Pass Field Office, NMD, were noted by the agencies as portraying the marginal roads realistically.

Standardization of Format:

Several agencies stressed the need for more uniformity within the map series. Cases were pointed out where map symbology, lettering type, or tint screening did not join from one map to another. Water Resources described a case where the screening on the water tint was not uniform on a series of quads showing the Columbia River. Where the USGS maps are used as a base, it is

important to the agencies to be able to join the individual quadrangles to produce a larger coverage map without having to modify a quadrangle to make it join the other maps.

Elimination of UTM Lines:

Eleven of the fourteen agencies surveyed requested that the UTM lines currently shown across the quadrangles be deleted. The UTM lines are confusing when the user is working the Public Land Survey System. Additional training of field personnel is necessary to teach them to ignore the UTM lines. Most of the agencies said that they did not use the UTM system. The state plane coordinate system or the latitude and longitude system were preferred if a numbered coordinate system was needed. Several agencies said that they would prefer that the UTM system be shown as ticks along the margin. This would allow use of the UTM system if there were a special project requirement.

Publication of 1984 Wilderness Boundaries:

Several agencies pointed out that the wilderness boundaries established by Congress in 1984 are not being shown on the 1:24,000 scale quadrangles. There are complete quadrangles which are within wilderness areas but do not indicate the presence of the wilderness. The maps which have been published since 1984 should be reprinted with the wilderness boundaries shown as soon as the Forest Service releases the detailed boundary location.

Publication of Erroneous Names on the Provisional Series:

The Oregon Board of Geographic Names has been having a problem because the provisional map series was being published before the geographic names can be approved by the State Board. In several cases an erroneous name has been rejected by the State Board after the provisional map has been published with the erroneous name. This means that the erroneous names are on a published series for a long time and may be picked up by other agencies and shown on their map series. An effort should be made to expedite the name proposal process in the provisional map series program. Future revision programs should plan on State Geographic Name Board review as part of the name proposal process.

Publication Date: Edit Date vs. Map Information Date:

Several of the map producing agencies are dissatisfied with the practice of using the completion of the edit phase as a publication date. The agencies point out that the completion of the field phase is a more appropriate date to be indicated on the

map. The map users want the publication date to represent when the map information was current.

ADDITIONAL INFORMATION REQUIRED

Administrative National Forest Boundaries:

All agencies identified the need for the administrative boundary to be shown for National Forest boundaries. The USGS has been showing the Congressional Proclamation Boundary as the outline of National Forest lands. Four of the agencies requested that both proclamation and administrative boundaries be shown. The agencies requesting the administrative boundary wanted to know what lands are managed by the Forest Service. It was pointed out that there are large blocks of National Forest land not shown on the USGS map series because the land was acquired through some other process than Congressional proclamation. The proclamation boundary is being interpreted as an ownership boundary, which it is not. As more agencies digitize from the USGS map series and use the boundaries as ownership in geographic information systems, this will continue to be a problem.

Need For Protraction Surveys:

Each of the agencies surveyed requested the Public Land Survey System protraction surveys be shown on the 1:24,000 scale map series. The BLM has produced protraction diagrams for all of the unsurveyed areas of the state. State and Federal agencies use the protraction grid for location in fire control, emergency situations, timber management and recreation. The 1:100,000 scale map series and all of the U.S. Forest Service map series show the protraction lines.

Need For Bathymetric Contours:

All the agencies which had activities involving bodies of water, fresh or salt, requested bathymetric contours. A need was expressed for one meter contours within the 3 mile limit and larger contour intervals on the Continental Shelf and out to the 200 Mile Limit. Several of the agencies noted that the 1985 revised topo-bathy quadrangles in the vicinity of Astoria met the requirements satisfactorily. These agencies noted that the new provisional quadrangles along the coast did not contain bathymetric contours. More details concerning agency needs can be found in Department of Geology and Mineral Industries Open-File Report 0-85-3, "A Survey of Oregon Offshore Mapping," written by this author in 1985.

COOPERATION, SHARING DATA BASES AND WORKSHARE

Several agencies are receptive to sharing data bases which they have collected. The State Departments of Forestry, Transportation, Water Resources, Revenue, Geology, and Energy have information which can be shared with the USGS. Several agencies, including the Departments of Transportation, Forestry, Energy, Revenue and Water Resources, are implementing new programs or equipment which will allow the agencies to increase the accuracy of the data bases without increasing the cost. Efforts should be made within NMD to accept other agencies' data.

1:24,000 SCALE ORTHOPHOTO MAP SERIES

The State of Oregon is approximately 90% complete in the orthophoto series. Most of the orthophotos were made in the 1975 to 1979 period with other than current technological methods. This vintage of orthophotos are now considered out-of-date by most of the natural resource agencies.

The U.S. Soil Conservation Service (SCS) has a nationwide project to produce orthophotography. In Oregon 10 quadrangles in Sherman County have been authorized for orthophoto production by the NMD in cooperation with the SCS.

The BLM, U.S. Forest Service, and State Department of Forestry prefer to use larger scale orthophotography. There are several programs in Oregon in which agencies have joined with the NMD in the cooperative funding to produce high resolution 1:24,000 scale orthophotos. The agencies enlarge these 1:24,000 scale orthos to 1:12,000 or 1:6,000 scale. The agencies generally do not require collars, credits or disclaimers on the high resolution ortho products they use. Most of the time the image is combined with other information for use in the resource management program.

The U.S. Forest Service and BLM have made management plans which require the use of high resolution orthophotos. The Forest Service is planning to complete the 19 forests in Oregon and Washington on a 10 year cycle. The BLM is considering high resolution orthophotos for all of the west side districts in Oregon. These agencies plan to go ahead with the orthophoto production but do not want to duplicate an NMD program.

Both the Departments of Revenue and State Lands requested orthos with the imagery at high and low tides. These orthos would assist the agencies in determining what is within their jurisdiction.

1:100,000 SCALE TOPOGRAPHIC MAP SERIES

The 1:100,000 scale map series is becoming the second most used map series in Oregon. The 1:24,000 scale series is the most used. State Department of Forestry has built the Forest Protection Series of maps around the 1:100,000 scale NMD series. With the increased activity in the digital field, several agencies said that they would be using the map series as data layers in their geographic information system.

This map series is not complete in Oregon. There are 42 quadrangles, out of the total of 70 in Oregon, which have not been published. Of these 42 unpublished quads, 23 are available in a planimetric diazo format, and 19 are available in a topographic diazo format. The agencies would like to see some schedule set up for the publication of this map series.

Several agencies collect data which they would be willing to share with the USGS. The State Department of Transportation and Forestry both collect various levels of road location information. Department of Transportation collects city boundary information. Department of Forestry collects Public Land Survey System, resurveys, and new survey locations. Both agencies maintain correction files which would be useful in a revision program.

The Departments of Revenue and Emergency Services requested that the county format series be continued. These Departments do their planning or taxing on a county basis. The U.S. Soil Conservation Service, Oregon District Office, has been formatting its own county maps from the 1:100,000 scale quadrangle series. There are only seven counties in Oregon which have been compiled in the county format. All of these have a planimetric base, and none of them have been published.

Several of the agencies, including State Departments of Forestry and Land Conservation and Development, stated that they would not be depending on the NMD to revise the map series. These agencies said that they could obtain revision detail faster from other sources. As mentioned previously, Departments of Forestry and Transportation are currently collecting road detail for use in their own series of maps. These agencies congratulate the NMD for initiating the 1:100,000 scale series, but with the advent of digital technology and high altitude photography, the agencies plan to maintain their own series of the 1:100,000 scale maps.

The Departments of Geology and Water Resources requested digital contours from the 1:100,000 scale series. The contour interval was found to be generally satisfactory for showing the terrain. Several agencies commented on their dissatisfaction with the metric contours. Their field personnel had trouble determining elevations from the contours and translating them into English

units.

Several agencies, including BLM and State Departments of Geology and Forestry, have problems with NMD's portrayal of roads on the 1:100,000 scale series. The line weights for roads were not heavy enough for interpretion. Both the BLM and State Forestry have changed their map series to portray the roads with a heavier line weight. The Forest Service has said that one of the main factors in keeping it from using the 1:100,000 scale series as a base map was the lack of double line symbol for roads.

In responding to the question of digital use of the 1:100,000 scale series, the agencies said that they want the public land survey network and boundaries digitized. They feel that the NMD should take the lead in this effort. Most were aware that the transportation and hydrography are nearly completed. These four layers will be used in the geographic information systems of the State. The PLSS and boundaries would make the digital series complete.

1:250,000 SCALE TOPOGRAPHIC MAP SERIES

This map series is not used extensively by the State agencies. Most of this series was compiled in the 1950's. The quadrangles were revised in the 1970's. Most of the maps need extensive revision. It was pointed out by several agencies that the features on this series do not agree with larger scale maps or the State Base Map. Several agencies suggested that the 1:250,000 scale map should be revised using the 1:100,000 scale information. Most of the agencies suggested a 15-20 years revision cycle on this map series.

It was pointed out by the agencies that this map series is the base map for other NMD products, specifically the Geodetic Control Diagrams and most of the Land Use Land Cover maps. The agencies felt that for this reason that the series should be maintained.

This map is used generally as a regional location map to illustrate features covering a large area. There has been a complaint from the U.S. Environmental Protection Agency that this map series is not consistent on a national basis. It has been pointed out that there are just as many streams shown in the southern Arizona quadrangles as in the northwestern Washington quadrangles.

In querying the agencies whether this map series should be digitized or not, most agencies felt that it was not needed because the 1:100,000 scale was a more effective map series.

1:500,000 SCALE STATE MAP SERIES

The 1:500,000 scale state map series is used extensively by the State agencies. Most agencies use this as a base map to portray statewide information. The Oregon map was revised in 1982 using the cooperative efforts of several State and Federal agencies to assist in the revision and review process. Most of the agencies would like to see this map revised on a 10-15 year basis.

Several agencies have requested the digital data base for this map. NMD has not made this map series a part of its National Digital Cartographic Data Base. The BLM and State Department of Transportation have digitized some elements of this map series, but it is a graphic representation without topologic structure. The NMD should consider establishing this map series as part of the National Digital Cartographic Data Base. The State agencies could be interested in a cooperative project if the NMD would be willing.

1:2,000,000 SCALE NATIONAL ATLAS MAP SERIES

This map series has not been used by any of the State agencies. The coverage is too broad without enough detail. The series is used by the Federal agencies to illustrate regional coverage. Bonneville Power Administration (BPA) and the Bureau of Indian Affairs have used this map series in their activities. BPA has used the 1:2,000,000 scale digital data base in some of its activities.

LAND USE AND LAND COVER AND ASSOCIATED MAPS

The Land Use and Land Cover and Associated Maps in the basic thematic layer of land use and land cover is complete in Oregon. Sixteen quadrangles of this map series are at a 1:250,000 scale; 13 of the map series are at 1:100,000 scale. More than half of the total of 29 quads have the Political Units, Hydrologic Units and Census County Subdivisions compiled as associated maps. None of the maps in Oregon have the Federal Ownership or State Ownership associated map layers. Most of the quadrangles west of the Cascades are available in a digital format.

The largest problem the State agencies had with the Land Use and Land Cover series was that it did not separate the irrigated from the non-irrigated agricultural lands. If the data were separated, the information would be used by Departments of Water Resources, Environmental Quality, Agriculture, Land Conservation and Development, and Environmental Remote Sensing Applications Laboratory (ERSAL). The Department of Water Resources makes its own land use map series using satellite imagery to separate out the irrigated from the non-irrigated agricultural lands.

In the discussions with the agencies, one of the most asked for layers of information for geographic information systems was the State and Federal Ownership. The NMD should consider continuing the land ownership associated map compilation in Oregon. Even though BLM has a map series of Surface Management Status, this series is not complete because it does not track the Federal ownership after it leaves BLM jurisdiction.

The general consensus of the agencies' opinion was that the Land Use and Land Cover and Associated Maps should be revised on a 10-15 year cycle.

STATE AGENCIES' REQUIREMENTS

OREGON

DEPARTMENT OF ECONOMIC DEVELOPMENT

The basic objectives of the Department are to maintain, improve, and diversify the economic base of the State. The Department has four divisions, each with its own set of programs. The Business Information Division, which responded to this survey, provides decision making data to prospective investors especially regarding available lands.

The Department's use of maps focuses on the urban areas and on those features which contribute to the conduct of business within the state. The map information considered essential includes the location of highways, railroads, airports, navigable rivers, and public land survey system. A more up-to-date road network was specifically requested.

The Department uses two types of maps. The first type is a small scale at 1:500,000 or 1:250,000 scales to identify general location. These maps orient the business person to a specific locality. The other type of map is a large scale map ranging from 1:31,680 to 1:24,000 scale.

The small scale maps are being satisfied by the NMD 1:500,000 and 1:250,000 scale map series. The revision cycle on these maps does not need to be as frequent as the large scale maps. A 10-20 year cycle was suggested for these series. It was observed that most of the 1:250,000 scale maps in Oregon published in the 1950's now exceeded the 10-20 year requirement. The cultural detail of the smaller scale maps did not agree with the larger scale maps. Most of the disagreement was attributed to the age of the smaller scale map series.

The larger scale maps in use by the Department are generally not supplied by the NMD. Larger scale maps are obtained from the State Department of Transportation and from Thomas Brothers, a private map producer. These maps are used because they are more nearly current and more detailed in the portrayal and naming of the road system.

Section lines and numbers have to be added to the Thomas Brothers maps by the Department. It was noted that section lines should be shown within the Oregon Donation Land Claim lines on the 1:24,000 scale series. The legal surveys do exist, and the Department has to add the lines to extend the PLSS.

If the NMD 1:24,000 scale maps were to be used, a 1-5 year mapping cycle would be needed to stay abreast of the urban changes.

The Department does not need topographic detail for any of its large scale maps. The transportation facilities serving an area is more important than the topographic detail.

Various types of boundaries are important to the Department. City, county, zoning, sewer and water district boundaries are all important map features. Many of these boundaries have to be obtained from the county or municipality for portrayal on the Department's maps.

The Department's primary digital need is to develop or share a system that would provide prospective industrial developers with a map showing available industrial locations within the State. In addition, another map is needed of each location showing the elements necessary for the utilization of that industrial site, e.g., property lines, highway and rail access, utility services. The proposed system would use data bases with geographic information from other agencies and match these bases with data collected within the Department's Oregon Business Information System (ORBIS) program. This new system would allow developers looking for new sites to review available areas and their advantages with a minimum of effort.

Currently, the Department and Oregon Department of Energy are discussing a geographic information system which will provide some of the above mentioned details. The digital system is expected to allow information to be updated more easily.

The Department has little or no funding available for cooperative mapping. Specific area maps are expected to be supplied by other agencies such as Department of Transportation. Cooperation between the Department and other agencies is a strong possibility.

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OREGON

EXECUTIVE DEPARTMENT, EMERGENCY MANAGEMENT DIVISION

The Emergency Management Division of the State Department prepares and maintains the Oregon State Emergency Operations Plan. The Division provides coordination in local, State and Federal emergency operations. The Division also administers the State 911 Emergency Telephone System.

This Division uses maps primarily in the management of emergency situations. Small scale maps at a 1:100,000 or 1:250,000 scale are used for preliminary assesment of a situation. As the emergency becomes more focused, larger scale maps of 1:24,000 or larger are used. Manpower and equipment are allocated to the situation based on large scale maps.

The large scale maps need to be current showing all possible roads into remote areas. The Division specifically requested that marginal forest roads to be shown for access in search and rescue operations.

County format maps are needed because response plans are drawn up on a county basis. These county maps need the level of detail as is portrayed on 1:100,000 scale maps.

The full UTM lines currently shown on the 7-1/2 minute series are confusing and should not be used. UTM ticks along the margin are preferable.

Township, range and section notation is used almost exclusively as a location device in emergency situations. It was noted that protraction surveys should be shown on the 7-1/2 minute series to provide a grid in unsurveyed areas which would agree with U.S. Forest Service, Bureau of Land Management, and National Park Service maps. A recent search and rescue operation in the Mt. Jefferson area highlighted the need for protraction surveys to be shown on the NMD maps consistant with the U.S. Forest Service maps. In the operation mentioned, two rescue groups, one using NMD maps and the other using USFS maps, could not describe a location effectively.

Contour detail on the 7-1/2 minute series needs to be at a greater detail in the flatter areas of the 40 foot contour quadrangles. Supplemental contours are needed to portray the smaller undulations of the terrain.

A point was made for the more accurate portrayal of National Forest boundaries. The portrayal of proclamation rather than administrative boundaries was a key complaint about the USGS map series. The area actually managed by the Forest Service is desired.

The Division does not yet have any digital capability or immediate plans. The highest priority when a digital system is discussed is the transportation network used in the transport of hazardous material in urban areas. A state-wide digital data base at the 1:500,000 scale is necessary to consider overall plans. A level of detail equal to a 1:100,000 scale is needed for evacuation route planning. There is a desire to cooperate with other agencies in the production of mutually beneficial maps.

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OREGON

DEPARTMENT OF ENERGY

The Department of Energy was established to provide leadership on energy planning and forecasting, to support research on alternate sources of energy, to be a central repository for energy data and to educate the public about energy problems and conservation. The Department oversees four major programs: Energy Conservation, Renewable Resources Development, Planning and Siting, and Regulation.

The Department's map needs focus on regional studies which would involve 1:500,000 scale maps or site specific maps which would involve 1:24,000 scale maps or larger. Future digital efforts will utilize the 1:100,000 scale base. The Department will use the various map series in the following percentages:

1:24,000 scale	40 percent
1:100,000 scale	40 percent
1:500,000 scale	20 percent

The larger scale maps will need to be updated on an annual basis to fill the agency's needs. Smaller scale maps will need a five to ten year mapping cycle. In compiling a recent project with the Department of Land Conservation and Development in which various data elements pertaining to an estuary were digitized, 1:24,000 scale maps 13 years old were found to be significantly out-of-date.

A priority area exists along the coastal area of Oregon. Several activities of the Department focus on the coast. Wind energy development will require up-to-date maps. Offshore energy development involving pipelines will require detailed bathymetric contours. More coverage is needed in the one meter topographic - bathymetric map series.

The full UTM lines are not used by the Department in any of its activities. Latitude and longitude coordinates and/or state plane coordinates are used exclusively. It would be satisfactory to show the UTM ticks around the collar of the map.

The Department expressed a need for the protraction surveys on the 1:24,000 scale map series. When describing geothermal resources or well locations, it is customary to use township, range and section. The portrayal of section lines within Donation Land Claims was also requested.

The Department specifically requested the State and Federal Land Ownership be included on the 1:100,000 scale map series. The agency is aware that the BLM produces a map series with this information but contends that ownership is not tracked from one

agency to another as the land is transferred. There is an additional requirement that the administrative boundaries of National Forests, rather than the proclamation boundaries, be shown. The Department specifically requested that the Newberry Crater and Klamath Falls areas be kept up-to-date because of the geothermal potential and development.

The Department is active in the digital field. There is a request for detailed Digital Elevation Model information from either 7 meter scanned data or DLG contour.

With the increase in digital activity through the acquisition of a prime computer system and ARC INFO software, this agency is actively seeking cooperative and possibly joint-funded projects with other agencies.

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OREGON

DEPARTMENT OF ENVIRONMENTAL QUALITY

The Department develops comprehensive plans and programs for air and water pollution control and for solid and hazardous waste disposal. The DEQ establishes standards for quality and purity of air and water; maximum noise emissions; minimum treatment and control of wastes; and operation of water disposal facilities for liquid, solid and hazardous wastes. The DEQ examines and approves plans and issues permits for discharge of waste water and air contaminants, solid waste disposal sites, hazardous waste treatment or disposal systems, and subsurface sewage disposal facilities.

The activities noted above each require some form of map use. Small scale (1:500,000 - 1:250,000 scale) maps are used to study a regional impact. Mid scale (1:100,000 - 1:62,500 scale) maps will be used in a geographic information system, and large scale (1:24,000 scale) maps are used to study site specific problems. Of this map series, the 1:24,000 scale is used the most frequently.

The Department's greatest concern is in the metropolitan areas of Oregon, specifically Portland, the Willamette Valley, Medford and Bend. Current maps are needed in these areas to control the air and water quality and hazardous waste.

The area of the next greatest concern is in the agricultural lands of the State: the Willamette Valley, Boardman, Umatilla, and Ontario. The coastal area poses some unique monitoring problems: oil spills and the fragile ecological systems of the estuaries. One meter or less bathymetric maps are needed for the estuary studies.

The Department monitors outfalls or industrial waste discharges which take place along the coast. These ocean outfalls take place within the 3 mile State limit. Topographic-bathymetric maps with 1 meter contour interval are needed along the coast.

The topographic detail is sufficient on the USGS quadrangles. The Department's use of topographic detail includes the computation of the ground water gradient. The topographic detail of both the small scale 1:500,000 scale state maps and the large scale 1:24,000 scale maps is needed to track the ground water quality.

In future map revision the Department does want the marginal forest roads to be shown on the 7-1/2 minute series. These marginal forest roads are important in identifying mass wasting, landsides and non-point pollution sources. For these same

reasons the portrayal of clearcuts is important to the Department.

Future digital activities will require accurate Digital Elevation Model information to be linked with the ground and surface water investigations. Cultural features will be needed in a digital format in the metropolitan, agricultural, and coastal areas.

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OREGON

DEPARTMENT OF FISH AND WILDLIFE

The Department formulates the general programs and policies of the State concerning the management of the fish and wildlife resources and establishes seasons, methods and limits for recreational and commercial take of the resource.

The Department is headquartered in Portland with regional offices in Newport, Clackamas, Corvallis, Roseburg, Bend, La Grande and Hines. The Department operates a variety of facilities including 33 fish hatcheries, a game farm, several wildlife areas, public access sites and several research stations.

Present and future mapping needs of the Department will focus on habitat mapping, land ownership, orthophoto, Landsat data, and general reference use. Habitat mapping involves the coordination of 1:24,000 scale line maps and orthophotos with Landsat data to determine habitat boundaries.

At a minimum the Department will need the 1:24,000 scale line maps revised on a 5 to 10 year cycle. Orthophoto mapping will require a 5 year cycle west of the Cascades and 10 years east of the Cascades.

The UTM grid lines currently being added to the 1:24,000 scale maps are considered essential to referencing Landsat data with 1:24,000 scale line information.

The Public Land Survey System protractions would be considered helpful on the 1:24,000 scale map series. The Department is currently drawing in the protraction lines where ground surveys do not exist. Future revision series should include the PLSS protraction lines.

The administrative boundaries of the national forests should be portrayed on future maps. Many of the game laws are based on the boundaries of the land managed by the National Forest rather than the older proclamation boundaries as described by Congress.

The Department manages several refuges which include very flat or wetlands areas. These areas require a much smaller contour interval than what has been provided in the past. A contour interval of one to five foot elevation is necessary in these areas. Generally the contours should be within 1,000 feet horizontal distance of each other to depict the ground adequately.

The contours portrayed on the USGS map series in the higher relief areas are sufficient. In the future the Department plans

to convert this topographic data into slope and aspect maps of a digital format.

In the September 1985 "Survey of Offshore Mapping," several requirements surfaced for future USGS bathymetric mapping:

1. Within the 3 Mile Limit, 1:24,000 scale maps with 5 meter bathymetric contours.
2. Along the Continental Shelf, 1:24,000 scale maps with 10 meter bathymetric contours.
3. Offshore exploration such as the Gorda Ridge 1:250,000 scale maps with 100 meter bathymetric contours.

Cooperative funding is available for specific research projects. The Department plans to move towards digital geographic information systems by using other agencies' data bases in addition to its own.

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OREGON

DEPARTMENT OF FORESTRY

The activities of the Department involve all phases of Forestry including responsibility for the protection from fire for 16 million acres of private, State and Federal forests. The Department is responsible for the detection and control of harmful forest insect pests and forest tree diseases on 11 million acres of State and private lands and the rehabilitation and management of some 785,000 acres of State owned forest lands.

The mapping uses are as varied as the responsibilities of the Department. Maps are used for land management and timber sales, fire prevention and suppression, and other duties.

The Department produces its own 1:126,720 (1/2 inch = 1 mile) scale or 1:100,000 scale map series. The USGS 1:100,000 scale map series is used as a base for both scales of the State Forestry maps. There is generally extensive update required to bring this series up to State Forestry standards. The symbology on the USGS series is changed to fit field requirements. Roads of the various classes are given a larger line weight for field use.

The Department expects that once it has converted the USGS 1:100,000 scale map series to State Forestry standards, the in-house maps will be maintained by State Forestry. The Department would be willing to share this update information with the USGS.

Priority areas of the Department focus on the east and west foothills of the Cascades, the Cascades, and the areas in which urban sprawl has started to impact the forest lands. Examples of these latter area include southeast of Portland and in the vicinity of La Pine, Oregon.

In most of the timbered areas in Oregon, a 10 year revision cycle would be needed. In the areas where the metropolitan population borders on a forest area, the cycle would need to be in the 3-5 year range. In the northwest portion of the State, a revision cycle of 15 years could be tolerated because most of the area is held by private timber companies. These timber companies produce their own map products. It is expected that most of the revision would be performed from 1:80,000 scale high altitude photography.

The Department has found the full UTM lines to be confusing and overpowering on the 1:24,000 scale series. The UTM lines interfere with the recognition of the Public Land Survey System. There is a preference to the use of township, range, and section in field work or latitude and longitude if a digital system is

used. The Department does have some activity with the military which use the UTM. It is felt that the UTM ticks could be shown along the margin or the full lines screened back to less prominence.

In discussing grid networks, the Department felt that the PLSS protraction network should be shown for orientation where there were no ground surveys. The Department was aware of several cases where survey retracements had been performed which did not show up on the older USGS maps. It was suggested that part of the priority in choosing areas to be revised be determined by the location of retracement surveys or new PLSS surveys.

Where forest land is involved, the Department prefers the administrative boundary be used to portray forest ownership. The Department has responsibility for some of the private lands within the National Forest boundaries. These private lands would be identifiable if the forest's administrative boundary were shown.

The Department would like marginal forest roads to be shown on these 1:24,000 scale series. Even though public passage is not possible on these roads, there is a need to show the location of the road bed and the access that it provides into the more remote areas of the forest.

The 1:24,000 scale Provisional Map Series has been well received by the Department. It is felt that this series represents a good balance of cartography for the general public and information for the professional in the field. The hand notation on the Provisional Series is especially liked because of the additional information it provides over the standard series.

The Department is planning for the future by starting a digital program gradually with other agencies. A recent cooperative venture between the Department and the State Department of Transportation resulted in a digital data base for Columbia County. State Forestry is especially eager to develop cooperative projects with the USGS to advance mapping in its area of responsibility.

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OREGON

DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

The mission of the Department is to develop needed information about the geology of the State and to effectively store and disseminate this information so that it can serve as a basis for correct decision making in resource development and land management. The Department is recognized as the State's center for geological, mining, oil, gas, geothermal information and geological hazard data.

The Department's primary uses of USGS maps are as base maps to plot geologic information, as aids in the field collection of data, and as illustrations for reports and newsletters. The Department is aware of other agencies' maps, but the USGS maps serve its needs.

Most of the map use is at the 1:24,000 scale, with some work utilizing the 1:100,000 and 1:500,000 scale map series. The 1:500,000 scale series are used for general planning and statewide coverage. The 1:250,000 scale is generally not used because it is being replaced by the 1:100,000 scale series. It was mentioned that there might be more usage of the 1:250,000 scale map series if the standards were equal to that of the 1:100,000 scale map series. Generally the problem being studied will dictate the scale to be used.

The revision cycle will depend on the area in question. Urban areas will require approximately a 5 year cycle; rural and remote areas will require a 10-15 year cycle. The 1:100,000 scale maps are expected to be on the same cycle as the 1:24,000 scale maps. The 1:500,000 scale map series should be revised every 10 years.

Geographic priority for the State would first concentrate on the western half, and within that western half, the north half should receive the most attention. East of the Cascades, the northern third of the State is more critical to the Department.

The contours on most of the map series are sufficient. On the 1:250,000 scale maps, the contour interval should be somewhat less than generally used. A 100 foot contour interval was suggested as maximum for the 1:250,000 scale series. In the 1:24,000 scale series, the contour interval should never exceed 40 feet. On the 1:100,000 scale series, the interval is appropriate, but the metric units are a problem. The 1:100,000 scale series should be converted to the English system during the revision cycle. It was especially noted that on the 1:100,000 scale series, the contours and minor roads became quite confusing. It was suggested that roads should be shown with a heavy weight or double line symbol.

In the future, map revision series at the 1:24,000 scale should drop the UTM lines in favor of ticks along the margin. The UTM lines add clutter to the quadrangle and are not used extensively enough to justify the confusion. Marginal forest roads should be shown. These roads represent possible access into an area. The Department feels strongly that what is on the ground should be reflected on the map. Forest boundaries should be represented by the administrative boundary and not the proclamation boundary. The proclamation boundary represents a point in time which is no longer valid. PLSS protraction surveys should be shown for orientation. Bathymetric contours should be added to any quadrangle which includes the coastal area, waterways, or bodies of water.

Future digital activities of the Department are expected to utilize 1:100,000 scale digital contours and Public Land Survey Network. All levels of the 1:24,000 scale digital program will be used.

Through the State Mapping Advisory Committee, the Department facilitates cooperation between the State and Federal agencies. With the Deputy Director of the Department as SMAC chairman, State agencies have a focal point with which to coordinate their projects.

The Department is currently cooperating with the USGS Geologic Division in the production of a 1:500,000 scale Geologic Map of Oregon. Selected experts within and outside the Department have reviewed the preliminary map product. The Department has cooperated with the Geologic Division to avoid duplication of effort and assure full geologic mapping of specific areas.

For offshore mapping the Department envisions a family of maps to aid in resource development and management.

(a) At the scale of 1:250,000, bathymetric maps should by completed oceanward from the coast to the 200 Mile Limit.

(b) At a scale of 1:100,000, bathymetric maps should be produced on the Continental Shelf and directly over sea floor rises where mineral deposits are present.

(c) At a scale of 1:24,000, the topo-bathy series of maps should be expanded to cover the shoreline out to the 3 Mile Limit, harbors and estuaries.

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OREGON

DEPARTMENT OF LAND CONSERVATION AND DEVELOPMENT

The Department is responsible for coordinating comprehensive planning throughout the State which will provide for orderly growth and development while promoting management and use of the state's resources. LCDC is further charged with coordinating State and Federal agencies to ensure that their planning is implemented through city and county comprehensive land use plans.

Most of the Department's map use focuses on the USGS 1:100,000 scale and 1:24,000 scale map series. The 1:100,000 scale map series is used for zoning and land use planning. The base is used with additional information added by local governments submitting their comprehensive land use plans. The 1:24,000 scale maps are used to portray special use areas, estuaries, and urban areas.

The Department's revision requirements are minimal. Update for the 1:100,000 scale map series is expected to come from other sources within the State. The transportation update will come from the State Department of Transportation. Urban revision at the 1:24,000 scale will need current information of less than a year or two vintage to be effective. The urban data will probably come from other sources such as the counties or municipalities.

The Department has been active in the monitoring and land use development of estuarine environments. Twenty estuaries have been identified as having a critical habitat which needs to be monitored. The State Department of Energy is assisting LCDC in putting together management plans through the use of a digital geographic information system. To adequately map these estuaries, a map series with a scale of 1:6,000 with 1 meter bathymetric contours is needed. To monitor development on the Continental Shelf within the 3 Mile Limit, maps are needed at a 1:100,000 scale with 10 meter bathymetric contours.

The Department would like to see in future revision plans the addition of hydrologic units and State and Federal land ownership status.

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OREGON

DIVISION OF STATE LANDS

The Division manages the lands which were given to the State by the Federal Government when statehood was achieved. These include offshore lands, grazing lands, forest lands, coastal estuarine tidelands and submerged and submersible lands associated with navigable waterways. The Division is also responsible for State owned lands which are leased for exploration and production of oil, gas, minerals and geothermal resources. The Division issues archeological exploration and treasure trove permits for State Lands.

The Division uses maps to manage each of the above mentioned facets of State Lands. In the future, the areas which will require the most attention are the ownership of lands, leasing of surface and subsurface minerals, and the waterways and adjacent areas.

There will be some use of the 1:500,000 scale series to depict State Lands. The other map uses will depend on the 1:24,000 scale series. Locations within the State which will require the most intensive 1:24,000 scale coverage are the rivers, urban sprawl, the coast line out to the 3 Mile Limit, and the geothermal resource areas. The geothermal resource areas of Klamath Falls and Newberry Crater are especially sensitive.

Revision cycle for each of these areas will need to be less than 10 years. In 10 years a river can meander significantly to affect fill and removal lease operations along the banks. The Willamette, Santiam, and McKenzie Rivers are especially sensitive to meandering.

Looking towards the future, specific problems were discussed which should be addressed in the revision standards. Full UTM lines should not be drawn across the quadrangle because they interfere and add confusion to the use of the Public Land Survey System. Marginal forests roads should be shown, as they provide access to the development of oil, gas, or minerals. Protraction lines should be shown on the 1:24,000 scale series to provide a uniform grid pattern where ground surveys do not exist. Both the proclamation and administrative boundaries of the National Forests should be shown. Both are necessary in the determination of legal or lease ownership in oil, gas and mineral development.

To monitor the leasing of fill and removal of sand and gravel along rivers, estuaries and the coastline, topographic bathymetric mapping of 1:24,000, 1:12,000 and 1:4,800 scales is needed with bathymetric controls with two foot increments from 0-10 foot depth and five foot increments from 10-100 foot depth. Special features would include the high tide line, mean low

water, mean lower low water line, shipping lanes, harbor lines, river mileage, and all agencies' gauges. An orthophoto map with imagery taken at a low tide would also be important.

The Division is planning on developing a digital capability in the future to assist in the lands management. Incorporated into this digital capability would be the ownership status of all gas, oil and mineral lands, waterway usage, fill and removal locations, Public Land Survey System, boundaries and transportation.

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OREGON

MILITARY DEPARTMENT

The Department has general supervision of all matters pertaining to personnel, administration, supply and logistical support of the Oregon National Guard. The Department also supervises the Oregon National Guard Reserve and all State owned or leased armories, posts, camps, military reservations and rifle ranges.

The primary use of maps by the Department involves the movement of troops and equipment across the terrain. Maps are also used in the training of military personnel.

The 1:50,000 scale Defense Mapping Agency map series are standard for the Department but are not available for many of the areas in which the Department serves. A requirement of future map series is to be able to create a 1:50,000 scale map from the 1:24,000 scale digital data base on an as-needed basis.

The primary areas the Department is interested in are the Cascade Range, southwest Oregon, the northwest tip of Oregon, the populated areas for emergency response, and the Interstate 84 corridor. Each of these areas need to be revised on no more than a 10 year cycle with emphasis on secondary roads, structures, and ground cover.

Future map revision series should continue to have the full UTM lines across the quadrangle as a grid. Marginal forest roads should be shown to provide access. Administrative boundaries should be used to portray the National Forest boundaries.

Future digital data bases should include the hydrography, transportation, ownership, and topographic detail. Soil and vegetation classification will be needed for the accessment of emergency situations. In the case of floods, the soil type is needed to determine whether it will bear the weight of heavy equipment.

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OREGON

DEPARTMENT OF REVENUE

The function of the Department of Revenue is the supervision of various tax programs. In addition to personal income tax, the Department administers 27 other tax and non-tax programs.

The Department's primary use of USGS maps is for a reference for its own cadastral mapping efforts. The 1:24,000 scale series is used as a base for its index of maps. It is used to identify bodies of water, determine access for appraisal purposes, and occasionally to simplify a deed description where a topographic feature is noted.

The 1:24,000 scale map series is preferred over the other map bases. The 1:62,500 scale series is used where 1:24,000 scales are not available. The other smaller scales are used rarely by the Department.

Revision cycles should be a year or so in urban areas, but not longer than 5 years. In rural areas, the present mapping cycle practiced by the USGS is satisfactory. The highest priority should be given to the large population growth areas of the State, and second priority to the coastal areas.

Special formats should be considered at a 1:24,000 scale which would provide a combination of orthophoto imagery and line information. The imagery on these image-line maps should be keyed to the exact time of a representative high tide to delineate the high water line. Line information on these image-line maps should include the Ordinary High Water Line and the Ordinary Low Water Line. The Oregon Department of Transportation's Zone Line should also be shown. This Zone Line is a surveyed statute line at approximately 16 foot elevation which separates the public beach lands from private ownership. Land held seaward from the Zone Line is tax exempt.

On a revision series, section lines within Donation Land Claim lines should be shown with a different symbol. Property within Donation Land Claims is frequently described using subdivisions of sections. The maps produced by the Department show the section lines within the DLC's

The Department felt that the contour interval on the 1:24,000 scale maps was sufficient for their needs. They did request that on artificial bodies of water a line depicting the "Upper Limit of Flowage Easement" be shown. This line represents the maximum impoundment of an artificial body of water. Land is taxed at different rates above or below the Easement Lines.

Future revision of the 1:24,000 scale series should delete the

full UTM lines across the quadrangle. The Department uses the State plane coordinate ticks along the margin. In addition, it is felt that extensive training is needed to distinguish the UTM lines from the section lines. Marginal forest roads should be shown on the quadrangles. The Department's appraisers use these roads to gain access into the remote areas. In regards to bathymetric mapping, the Department does not have any jurisdiction below the Ordinary Low Water Line.

A new Intergraph System is being installed. As yet its digital requirements have not been defined. Much of the large scale cadastral mapping will be automated and may serve as a data base to be shared with other agencies.

The Department is open to proposals of cooperative mapping. Since most of its work is at an extremely large scale (1 inch = 100 feet), the Department is especially interested in multipurpose cadastre projects.

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OREGON

DEPARTMENT OF TRANSPORTATION

The Department uses nearly all of the USGS map series as base maps for its activities. The 1:24,000 scale maps are revised by the Department and published as an urban map series. The 1:250,000 scale map series for many years was the only base where larger scales were not available. The Department is now producing digital maps at various scales for its own and other agencies' benefit.

The Department needs a revision cycle of two to three years in the population centers, five years in the rural areas, and ten years in the remote areas. Currently, the revision is being performed using the best available map information. In the future, stereo compilation equipment will be linked to the computer system to automate and improve the revision process. Generally, the Department does not use the USGS contours. The Photogrammetry Branch provides the large scale topographic mapping for highway construction.

The USGS Provisional Map Series has been well received by the Department. The Provisional Maps provide more information and are being produced at a more rapid rate than the standard USGS edition.

Future revision series should not show the full UTM grid lines across the quadrangle. Some cooperative work is done with the Military Department, but having UTM ticks along the margin would be sufficient for those projects. Marginal forest roads should be shown. The old road bed is important historically and as a location device. Any maps along the coast, waterways and water bodies should include bathymetric contours.

In the digital area the Department is producing several digital products. The Urban Map Series, compiled and digitized at 1:12,000 scale, is scheduled for completion in 1989. A cooperative project with the State Department of Forestry involves digitizing the various DLG layers in Columbia County.

The Department is quite willing to share the revision information which it has acquired. Future discussions should center on cooperative digital production of the transportation network.

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OREGON

DEPARTMENT OF WATER RESOURCES

The Department is responsible for managing Oregon's water resources and for planning and recommending policy for water resource management. It issues and records permits, licenses, and certificates authorizing the use of public waters, including the generation of hydroelectric power. It adjudicates rights to use water and appoints and supervises District Watermasters for regulation and distribution of water. The Department determines critical ground water areas. It seeks to prevent pollution or impairment of the quality of ground waters.

Each of the above mentioned activities use maps or map information. The USGS topographic map series at 1:100,000 scale is used in the management, policy and planning of the various river basins. The watermasters use the 1:24,000 scale map series in their field activities. Water rights are plotted at a 1:24,000 scale for management purposes. Several of the map series are used as base maps. The Drainage Basin Map Series is direct reduction from the hydrographic layer of the 1:24,000 scale series. The 1:100,000 scale series is expected to provide a digital data base for a planned geographic information system.

Most of the Department's work is centered in the rural areas of the State. In these rural areas, a 5-10 year revision cycle is required. The Land Use Land Cover Series is used to determine water use within the State. This series should be revised on a 5 year or less cycle. A strong requirement came out for the Land Use Land Cover Series to differentiate between irrigated and non-irrigated agricultural lands. The identification of the irrigated areas consisted of tracking of water usage.

The Department's priorities for the State center on the most likely ground water and surface water problem areas. The following basins are planned for extensive study: Umatilla, Willamette, Deschutes, John Day, and southern Oregon.

The contour interval on the 1:100,00 scale map is considered to be too large. Small topographic details tend to drop out of the portrayal. The metric contours of the 1:100,000 scale series is considered to be awkward and confusing. The transfer of water level elevations in wells and surface water from a 1:24,000 scale series to the 1:100,000 scale series is considered difficult. The metric contours should be dropped before the topographic series is completed.

Future map revision series at the 1:24,000 scale should not have the full UTM lines across the quadrangle. In OWRD's digital program the corner ticks are digitized and converted to UTM coordinates without the UTM lines. There is a requirement to

show the 7-1/2 minute latitude/longitude ticks throughout the 1:250,000 scale map series. Marginal forest roads should be shown to provide access into the remote areas. Protraction surveys should be shown on the 1:24,000 scale series for use in locating wells and planning water diversion projects. Forest boundaries should be shown with the administrative boundary rather than the proclamation boundary. The ownership layer for future GIS projects will be important and should not include the conflicts of ownership which result from proclamation boundaries. Clearcut areas should be shown on the 1:24,000 scale series. These provide valuable information for watershed snowmelt and erodibility. Bathymetric contours should be shown in each of the lakes and reservoirs of the State. These underwater contours provide the necessary information to determine storage capacities.

The Department has recently acquired a MICRO VAX with ARC INFO software. With these new digital capabilities, the Department is planning on acquiring digital data covering hydrography, elevation detail, Public Land Survey System, Land Use Land Cover information, transportation, boundaries and ownership. The Department is willing to discuss cooperatively funded and workshare projects.

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OREGON

ENVIRONMENTAL REMOTE SENSING APPLICATIONS LABORATORY, OREGON STATE UNIVERSITY

ERSAL's primary function is remote sensing research and applications. Located at Oregon State University, its funding is primarily from grants and contracts with Federal and State agencies and private industry. Projects have been completed for most of the State agencies, but primarily with State Department of Fish and Wildlife, Oregon Water Resources Department and Department of Environmental Quality.

ERSAL uses the USGS 7-1/2 quads as base maps. They match Landsat data to the line information at the 1:24,000 scale in various research projects. The 1:100,000 scale series has been used in conjunction with Landsat RBV data to show the various high water levels of Malheur Lake.

Most of ERSAL's work covers the less populated areas of the State. In these areas fewer road changes take place. The revision cycle in these areas could be extended to a 10-15 year cycle. The 1:100,000 scale topographic map series needs to be completed in the State before any revision cycle can be discussed.

ERSAL has put a geographic priority on the northwest portion of Oregon, the coastal area, and the Cascade Range. Many of ERSAL's research projects are or will be centered in these areas.

Contour interval is an important research element. There should be no quadrangles with over 40 foot contour intervals. In some areas, 40 feet is too great to show benches and saddles in the terrain. The study of animal behavior focuses on their elevation habitat. Both slope and elevation affect the conflict or compatibility of game animals.

There is a special requirement for a photo-line map product where aerial photography would be combined with line map detail. With such a map product, the variability of shallow lake shorelines could be studied. The photo-line map product would be especially useful in studying the agricultural environment of the Willamette Valley. The field boundaries, which are not fenced, are fairly permanent and would yield important agricultural information. The urban and suburban sprawl could be studied with the photo-line map product. The area north of Madras to the south of Bend needs to be studied with a photo image map to determine the impact on the environment.

An image which could be used at the 1:100,000 scale would be useful for range management. It was suggested that the Large

Format Camera carried on the Space Shuttle or the Earth Terrain Camera be used to provide the 1:100,000 scale imagery.

In future revision series, more marginal forest roads should be shown. These roads provide an image which is useful in registering the Landsat data. Forest boundaries should be functional by showing the administrative boundary rather than the proclamation boundary. Clearcuts should be shown because the timber has a longer growth cycle than the map revision cycle. The clearcuts are not considered to be a transitory feature on the earth's surface. Topo-bathy should be added to any new revision maps. The channeling and subsurface features in the Columbia and other estuaries can only be shown with bathymetric contours.

ERSAL has several digital requirements. Digital Elevation Models are needed at the 1:24,000 scale. Ownership, which would include the administrative boundaries of the National Forest, is needed. The U.S. Fish and Wildlife Wetlands Inventory should be digitized.

ERSAL is willing to discuss cooperatively funded or workshare projects with any agency.

The Director's final comment was that "The USGS should never design a map series to have all the maps folded and unavailable in a flat format." This was a reference to the 1:100,000 scale map series.

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