

June 1, 2010

To: Oregon Forest Resources Institute (OFRI) and Oregon Department of Forestry (ODF)
From: Davis, Hibbitts & Midghall, Inc. (DHM Research)
Re: OFRI-ODF Oregon Forest Values and Beliefs 2010 Survey-MaxDiff Findings - Draft

I. INTRODUCTION & METHODOLOGY

Between April 8 and 15, 2010, Davis, Hibbitts & Midghall, Inc. (DHM Research) conducted two scientific online surveys of Oregonians on behalf of the Oregon Forest Resources Institute (OFRI) and Oregon Department of Forestry (ODF). The overall purpose of the research was to provide supplemental information and validation of the findings from a telephone survey conducted during the same time period about Oregonians' forest values and beliefs.

Research Methodology: The sample size for each survey was 300 Oregonians ages 18 and older. The surveys were hosted on a secure and independent DHM Research server and available to respondents 24 hours a day. Quotas were set by age, gender and area of state based on the total population of Oregon residents ages 18 and older to assure a representative sample. The data was weighted in order to adjust education to be more representative of the overall population.

One survey was comprised of a MaxDiff (description below) exercise to test residents' opinions about forestland issues. The other included a mix of traditional and MaxDiff questions assessing residents' values and beliefs as they relate to Oregon's forests.

MaxDiff: MaxDiff is an approach for obtaining importance scores for multiple items. It has been shown to deliver greater discrimination among items and between respondents than the more commonly used rating scale questions. MaxDiff is more effective for two reasons. First, respondents must make trade-offs in order to choose the best and worst of the displayed items. They do not rate items in isolation, but in competition. Second, the choices are made without the use of a scale. Scales can often introduce interpretation bias – different individuals could feel an item is equally important yet select a different number. For these reasons, MaxDiff results are able to demonstrate greater discrimination between items. Examples of a MaxDiff question from each survey are displayed below.

Diagram 1

One of Twelve MaxDiff Questions Displayed in OFRI-ODF Forestland Issues Online Survey

For the following issues related to Oregon’s forests, which one are you most concerned about and which one are you least concerned about?

	Most Concern	Least Concern
Jobs and revenue for communities	<input type="radio"/>	<input type="radio"/>
Climate change	<input type="radio"/>	<input type="radio"/>
Forests being converted to non-forest uses	<input type="radio"/>	<input type="radio"/>
Providing wood for homes and products	<input type="radio"/>	<input type="radio"/>
Replanting trees after harvest	<input type="radio"/>	<input type="radio"/>

Select one item for Most Concern and one item for Least Concern

Source: Davis, Hibbitts & Midghall, Inc. (DHM Research), May 2010

Diagram 2

One of Nine MaxDiff Questions Displayed in OFRI-ODF Forest Value & Beliefs Online Survey

Over the next 30 years, which one of the following do you think will be the biggest and least big problem affecting Oregon’s forests?

	Biggest Problem	Least Big Problem
Not having enough cool and clear water	<input type="radio"/>	<input type="radio"/>
More wildfires	<input type="radio"/>	<input type="radio"/>
Shortage of forest recreation opportunities	<input type="radio"/>	<input type="radio"/>

Select one item for Biggest Problem and one item for Least Big Problem

Source: Davis, Hibbitts & Midghall, Inc. (DHM Research), May 2010

Interpreting MaxDiff Data: The MaxDiff exercises were designed to determine Oregonian’s prioritization of the following:

- Twenty (20) issues related to Oregon forests
- Nine (9) problems affecting Oregon forests over the next 30 years

For the Forestland Issues Online Survey, the exercise presented a different group of five issues to each respondent a total of twelve times. From each group, respondents selected both the issue of “most concern” and that of “least concern.”

For the Forest Values and Beliefs Online Survey, the exercise presented a different group of three problems to each respondent a total of nine times. From each group of three, respondents selected both their “biggest” and “least big” problem “affecting Oregon’s forests.”

By breaking up the twenty and nine items into groups of five and three, the exercises become easier for respondents and thereby increase validity. At the same time, exposing each respondent to different combinations of five issues or three problems ensures the experiment is balanced. Each issue/problem item is displayed an equal number of times and it is displayed in each position (top thru bottom) the same number of times as every other item. This ensures that each item has an equally likely chance of being selected Most Concern/Biggest Problem and Least Concern/Least Big Problem.

This method reveals each respondent's rank order of the items along with their relative strength (score) for each item. In analysis, a Hierarchical Bayes algorithm is employed to determine the relative strength of each item for each respondent. These scores are then converted to a 100 point scale to most clearly show the relative strength of each item. The result from this procedure provides individual item scores for each respondent that add up to 100. Next, these individual scores are weighted, to match the population's demographics (in terms of gender, age, location, ethnicity and income) during the creation of cross tabulation tables. The weighted individual respondent scores for each issue/problem item are then divided into categories (banner points) and then averaged (mean) across those subgroups to show differences between population segments.

A good way to interpret MaxDiff results is to consider them analogous to those that would be obtained if we asked respondents to allocate points among all the items so that their summed total equaled 100. The expected score for each of:

- the twenty issue items is 5.00 (100/20)
- the nine problem items is 11.11 (100/9)

In other words, if all twenty/nine items are equally important to the population, than each item would receive a score of 5.00 and 11.11, respectively. Thus, items with scores above 5.00 (issues) and 11.11 (problems) are above average to the state population. Conversely, items with scores below 5.00 and 11.11 are below average in amount of concern and size, respectively.

II. FORESTLAND ISSUES ONLINE SURVEY

The MaxDiff Concerns Exercise reveals that nine of the twenty items tested had above average scores that range from 5.47 to 8.71. Eleven below average items range in score from 1.00 to 4.42. In general, the exercise found (and this result is validated by a separate rating scale exercise) that there is only a small amount of separation between all of these forestland issues. Except for three exceptions, the separation between every item and its nearest competitor is less than a point.

First tier issues which Oregonians considers **most concerning**, in priority order, are:

- **Replanting trees after harvest**
- **Wildlife habitat**
- **Jobs and revenue for communities**
- **Water quality**
- **Clearcutting**
- **Forests being converted to non-forest uses**

All of these issues received scores that are a minimum of two points above the expected score of 5.0.

The second tier of items, which we label as issues of **concern** to the public include:

- **Over harvesting timber**
- **Air quality**
- **Wildfires**

Each of these issues scored just slightly higher than the expected 5.0. The remaining eleven items all received scores below 5.0 and have therefore been labeled in the category of **less concern**. See Table 1 for a complete list of all items' scores and rankings.

**Table 1
FORESTLAND ISSUES RELATIVE RANKING**

Forestland Issue Description	Total Score
First Tier	
1. Replanting trees after harvest	8.71
2. Wildlife habitat	7.77
3. Jobs and revenue for communities	7.72
4. Water quality	7.59
5. Clearcutting	7.36
6. Forests being converted to non-forest uses	7.25
Second Tier	
7. Over harvesting timber	6.23
8. Air quality	5.47
9. Wildfires	5.40
Third Tier	
10. Insect infestations	4.42
11. Fish habitat	4.34
12. Invasive species	4.19
13. Natural beauty	4.15
14. Not enough old growth forests	3.84
15. Reduced federal government timber harvest payments to county and local governments	3.65
16. Herbicide use	3.32
17. Climate change	3.27
18. Providing wood for homes and products	2.72
19. Landslides	1.60
20. Harvest age	1.00

Source: Davis, Hibbitts, & Midghall, Inc. (DHM Research) June 2010

In addition to providing the individual scores for each item, a segmentation analysis was conducted to better understand the level of concern for these issues among individual demographic subgroups. Differences among these subgroups are highlighted below in Table 2.

Table 2
FORESTLAND ISSUES – SEGMENTATION ANALYSIS

* Statistically significant difference

Forest Issue Description	Total Score	Strongest Concern	Weakest Concern
Most Concern			
1. Replanting trees after harvest	8.71	Age 18-34 (9.41) Rural (9.27) Income ≥ \$100K (9.27)*	Rural-to-Suburban (7.52) Income \$30-50K (7.6)*
2. Wildlife habitat	7.77	Made Donation (9.32) Metro (8.65)*	Work in Industry (4.31)* Rural (6.15)*
3. Jobs and revenue for communities	7.72	Work in Industry (13.45)* Eastern (9.81)*	Made Donation (3.87)* Ed ≥ Coll. Deg (5.90)*
4. Water quality	7.59	Age 18-34 (8.61)* Metro (8.27)*	Work in Industry (5.68)* Eastern (6.95)*
5. Clearcutting	7.36	Made Donation (9.11)* Ed ≥ Coll. Deg. (8.74)*	Work in Industry (6.14) Rural (6.31)
6. Forests being converted to non-forest uses	7.25	Made Donation (9.11)* Gender Female (7.94)*	In OR 11-20yrs (5.68)* Work in Industry (6.4)
Concern			
7. Over harvesting timber	6.23	Made Donation (8.19)* Ed ≥ Coll. Deg. (7.88)*	Work in Industry (2.9) Ed Some Coll. (5.35)*
8. Air quality	5.47	Age 18-34 (6.81)* In OR <10yrs (6.26)*	Work in Industry (3.94) Rural (4.38)*
9. Wildfires	5.40	Work in Industry (8.33)* Eastern (6.71)*	Made Donation (3.29)* Ed ≥ Coll. Deg. (3.34)*
Least Concern			
10. Insect infestations	4.42	Work in Industry (6.18) Rural (5.41)*	Age 18-34 (3.17)* Urban (3.71)*
11. Fish habitat	4.34	Ed ≤ H.S. Deg. (4.93)* Metro (4.69)*	Work in Industry (2.03)* Rural-to-Sub. (3.55)
12. Invasive species	4.19	Gender Male (4.97)* Ed ≥ Coll. Deg. (4.69)	Inc. < \$30K (3.35) Gender Female (3.48)*
13. Natural beauty	4.15	Inc. ≥ \$100K (4.88) Gender Male (4.63)*	Age 18-34 (3.56) Inc. <\$30K (3.60)
14. Not enough old growth forests	3.84	Made Donation (6.14)* Ed ≥ Coll. Deg. (5.21)*	Work in Industry (1.44)* Rural (3.07)*
15. Reduced federal government timber harvest payments to county and local governments	3.65	Work in Industry (8.95)* Eastern (5.71)*	Made Donation (1.44)* Metro (2.10)*
16. Herbicide use	3.32	Age ≥ 55 (4.29)* Made Donation (4.08)	Work in Industry (2.27) Eastern (2.45)*
17. Climate change	3.27	Made Donation (4.99) Ed ≥ Coll. Deg. (4.44)	Work in Industry (0.70)* Rural (1.52)*
18. Providing wood for homes and products	2.72	Work in Industry (8.07)* Rural (4.38)*	Made Donation (1.06)* Metro (1.79)*
19. Landslides	1.60	In OR 11-20yrs. (2.61)* Ed = Some Coll. (2.20)*	Ed ≥ Coll. Deg. (1.18)* Made Donation (1.19)
20. Harvest age	1.00	Work in Industry (1.76)* Rural-to-Sub. (1.28)	Inc. ≥ \$100K (0.86) Age 18-34/≥ 55 (0.86)

Source: Davis, Hibbitts, & Midghall, Inc. (DHM Research) June 2010

The issue of most concern to the public, **replanting trees after harvest**, received a score nearly a full point higher than its nearest competitors, **wildlife habitat** and **jobs and revenue for communities**. The .92 differential between first and second place is greater than the separation between the next five items (.52) combined. For a set of issues with relatively small differences in the public's amount of concern, replanting trees is significantly of more concern than the cluster of issues in places two through six.

Interestingly, the issues ranked two through six are not statistically different in terms of the population's amount of concern with each. In other words, the true ranking for **forests being converted to non-forest uses** might actually be second and the true ranking for wildlife habitat might actually be sixth if the entire population was actually included in this survey instead of just a representative 300-person sample.

The separation between forest issue #6 (**forests being converted to non-forest uses**) and #7 (**over harvesting timber**) is statistically significant. It therefore provides a logical separation point between the issues of **Most Concern** and those of **Concern** to the population. Similarly, the difference between the issues of **Concern** and **Least Concern** are also statistically significant.

A deeper analysis of the results helps explain why **replanting trees after harvest** was ranked #1 by the population. First, it was consistently selected as the item of most concern by the majority of all subgroups. Fifteen of the twenty-six subgroups chose this as their number one concern and second, unlike other issues, replanting trees was not pushed downward by any of subgroup. The level of broad based concern across subgroups for replanting trees after harvest attributes it being Oregonians top forestry concern. In addition, the lower variance of replanting trees after harvest provides increased confidence in the finding that this is the single issue of **most concern** to the population.

At the other end of the rankings, **harvest age** and **landslides** generated the **least concern** among the population. Neither of these issues scored above 2.6 with any subgroup indicating broad-based and consistently low concern.

As shown in Table 2, some of the other issues in the Most Concern category received very strong support from one or more population subgroups.

- **Jobs and revenue for communities** received a 13.45 score from those that work in the industry, a 9.81 from Eastern Oregon and a 9.58 from rural community residents.
- **Wildlife habitat** and **Clearcutting** received scores of 9.32 and 9.05, respectively, from respondents that had made a donation to an environmental or conservation group within the last year.

However, those high scores were counter balanced by especially low scores among other subgroups:

- **Jobs and revenue for communities** received a score of just 3.87 from those that had made a donation to an environmental or conservation group in the last year.
- **Wildlife habitat** received a score of just 4.31 from those that work in the wood products industry.

The issues with the greatest difference in amount of concern between the overall population and a single subgroup were:

- **Jobs and revenue for communities** received an overall score of 7.72 but a 13.45 from those in the wood products industry for a difference of 5.73

- **Providing wood for homes and products** received an overall score of just 2.72 but was scored 8.07 from those in the wood products industry for a difference of 5.35.
- **Reduced federal government timber harvest payments to county and local governments** received an overall score of just 3.65 but a score of 8.95 from those in the wood products industry for a difference of 5.30.

These three examples highlight the magnitude of the overall difference of opinion on forestland issues between the total population and those from the wood products industry. To a lesser degree, residents from rural areas and eastern Oregon showed similar differences between their scores and the total population's on these same issues thereby reflecting to some degree the wood products industry subpopulation.

In addition to the magnitude of differences, another way to better understand the results is to measure the number of times subgroups' scores (within a demographic group) are statistically different. (A statistically significant difference means the difference between subgroup scores is not just due to sample error.) In viewing the cross-tabulated tables, we discovered that three demographic groups had ten significant differences among their subgroups and one group had eight. The number of differences between its subgroups is reported below for each group analyzed.

- **Work in Industry: 10**
- **Gave to an environmental/conservation group: 10**
- **Area type (Urban/Suburban/Rural-to-Suburban/Rural): 10**
- **Area of state (Metro/Western/Eastern Oregon): 8**
- **Education: 8**

Significant differences among Gender, Years in Oregon, and Age subgroups were four each. Differences among subgroups based on Income occurred only once.

In Table 2 we report the two subgroups that showed the **Strongest Concern** and the two subgroups that showed the **Weakest Concern** for each forestland issue. This snapshot view provides a good indication of the subgroups that are most likely to be affected and/or vocal about each specific issue. Based on our segmentation analysis and the above table, those working in the industry and those donating to an environmental or conservation group are most often in opposition.

- The subgroup that **works in the wood products industry** has either the Strongest or Weakest Concern for 15 of the 20 items tested.
- The subgroup which **made a financial donation to an environmental or conservation group** in the last year organization has either the Strongest or Weakest Concern for 12 of the 20 items tested.
- For eleven of these issues, those who **work in the industry** and those who **made a donation** are on the opposite end of the spectrum in terms of their amount of concern.

Note that because of the small subgroup sizes – 50 respondents (16.7% of sample) gave a donation and just 15 respondents (5% of sample) work in the industry (or have a housemate or relative that does) – some caution should be made when interpreting these findings. While the results provide solid insights on key differences of opinion, the small subgroup sizes and unknown relationship to these true subpopulations warrant caution.

MaxDiff vs. Likert-scale comparison: A Likert-scale question within the same Forestland Issues online survey contained the same 20 items as the MaxDiff Concerns exercise. The question wording for each test measure was as follows:

- **MaxDiff Concerns Exercise:** For the following issues related to Oregon’s forests, which are you most concerned about and least concerned about?
- **Likert-Scale Concerns Question:** Following is a list of issues related to Oregon’s forests. For each one, indicate how concerned you are about it: 1-Not at all Concerned, 2-Not Very Concerned, 3-Somewhat Concerned, or 4-Very Concerned.

The below table summarizes the ranking each item received for each different test method.

**Table 3
MAXDIFF AND LIKERT SCALE COMPARISONS**

Forestland Issue Description	MD Concerns Ranking	Likert Ranking
1. Replanting trees after harvest	1	2
2. Wildlife habitat	2	3
3. Jobs and revenue for communities	2	1
4. Water quality	2	2
5. Clearcutting	2	5
6. Forests being converted to non-forest uses	2	3
7. Over harvesting timber	3	6
8. Air quality	4	4
9. Wildfires	4	5
10. Insect infestations	5	5
11. Fish habitat	5	5
12. Invasive species	5	5
13. Natural beauty	5	3
14. Not enough old growth forests	6	6
15. Reduced federal government timber harvest payments to county and local governments	6	6
16. Herbicide use	7	6
17. Climate change	7	8
18. Providing wood for homes and products	8	7
19. Landslides	9	8
20. Harvest age	10	8
21. Not having enough trees to harvest for wood products	NA	NA
22. Increasing conflict between forestland owners and their neighbors	NA	NA
23. Shortage of forest recreation opportunities	NA	NA

Source: Davis, Hibbitts, & Midghall, Inc. (DHM Research) June 2010

When sample error is factored into the scores, the positional rankings are consistent for all items except two – **clearcutting** and **over harvesting timber** which are off by one place. The consistency in results provides validation of the findings.

III. FOREST VALUES AND BELIEFS ONLINE SURVEY

The MaxDiff exercise revealed a first tier of three items which scored above average ranging in strength from 15.76 to 18.11 and therefore deemed **Big Problems**. A large 4.41-point gap separates the **Biggest Problems** from the tier two **Big Problems**. The other four items' scores ranged from 4.22 to 10.19, below the expected 11.11, and are therefore categorized in a tier three as **Least Big Problems** in Table 4 below.

**Table 4
OVER THE NEXT 30 YEARS - FOREST PROBLEMS RELATIVE RANKING**

Forest Problem Description	Total Score
First Tier	
1. Loss of fish and wildlife habitat	18.11
2. Forests being converted to non-forest uses	15.79
3. Not having enough cool and clear water	15.76
Second Tier	
4. More wildfires	11.35
5. Herbicide use	11.31
Third Tier	
6. Invasive species	10.19
7. Not having enough trees to harvest for wood products	6.84
8. Increasing conflict between forestland owners and their neighbors	6.43
9. Shortage of forest recreation opportunities	4.22

Source: Davis, Hibbitts, & Midghall, Inc. (DHM Research) June 2010

The **Biggest Problems** facing Oregon forests over the next 30 years in priority order are:

- **Loss of fish and wildlife habitat**
- **Forests being converted to non-forest uses**
- **Not having enough cool and clear water**

These problems' scores were about four-and-a-half to seven points above the expected score. The second tier, which we have labeled as **Big Problems** include:

- **More wildfires**
- **Herbicide use**

Each of these problems scored above, but very close to, the expected 11.11 score.

Another segmentation analysis was conducted to better understand the level of concern for these issues among individual population segment subgroups. Differences among these subgroups are highlighted below in Table 5.

**Table 5
FOREST PROBLEMS SEGMENTATION ANALYSIS**

* Statistically significant difference

Forest Problem Description	Total Score	Biggest Problem	Least Big Problem
Biggest Problems			
1. Loss of fish and wildlife habitat	18.11	Made Donation (21.38)* Inc. \$30-50K (20.07)*	Work in Industry (13.80) Income ≥ \$100K (16.57)*
2. Forests being converted to non-forest uses	15.79	Made Donation (18.92)* Ed ≥ Coll. Deg. (18.08)*	Income ≤ \$30K (13.21)* Income ≥ \$100K (14.00)*
3. Not having enough cool and clear water	15.76	Made Donation (17.58) Age 18-34 (17.56)	Rural (12.21)* Work in Industry (13.49)
Big Problems			
4. Herbicide use	11.35	In OR 11-20yrs. (14.21) Urban (13.65)	Work in Industry (9.46) Rural-to-Sub. (9.63)*
5. More wildfires	11.31	Rural (14.46)* Rur.-to-Sub.(13.49)*	Made Donation (8.46) Age 18-34yrs. (8.90)
Least Big Problems			
6. Invasive species	10.19	Western (12.66)* Rural (11.69)	In OR 11-20yrs. (7.29) Eastern (7.98)*
7. Not having enough trees to harvest for wood products	6.84	Eastern (8.6)* Ed Some College (7.85)*	Made Donation (2.43)* Ed ≥ Coll. Deg. (4.55)*
8. Increasing conflict between forestland owners and their neighbors	6.43	Work in Industry(13.54)* Ed ≥ Coll. Deg. (7.71)	In OR 11-20yrs. (3.52) Rural-to-Sub. (4.94)
9. Shortage of forest recreation opportunities	4.22	Work in Industry (6.93) Inc. < \$30K (5.42)	Inc. \$30-50K (3.29) Rural-to-Sub. (3.35)

Source: Davis, Hibbitts, & Midghall, Inc. (DHM Research) June 2010

Note: because of the small subgroup sizes – 35 respondents (11.7% of sample) gave a donation and just 13 respondents (4.3% of sample) work in the industry (or have a housemate or relative that does) – some caution should be made when interpreting these findings. While the results provide solid insights on key differences of opinion, the small subgroup sizes and unknown relationship to their true subpopulations warrant caution.

An in-depth analysis provides a deeper understanding for why **loss of fish and wildlife habitat** was judged to be the single biggest problem affecting Oregon forests over the next 30 years. An amazing twenty-five out of the twenty-six subgroups analyzed chose this problem number one, with only those that **work in the industry** not doing so. Its highest scores came from those who **made a donation to an environmental or conservation group** and those with **incomes in the \$30-50K range**.

Statistically speaking, **forests being converted to non-forest uses** and **not having enough cool and clear water** are tied for second place. Similarly, **herbicide use** and **more wildfires** are statistically tied for third place in the rankings. Fourth place is solely owned by **invasive species**. **Not having enough trees to harvest wood products** and **increasing conflict between forestland owners and their neighbors** are also statistically tied. In last place is **shortage of forest recreation opportunities**.

In this MaxDiff Biggest Problems Exercise only one problem was judged drastically differently by the overall population and in one particular subgroup.

- ***Increasing conflict between forestland owners and their neighbors*** received a score of just 6.63 (second lowest) by the total population. However, this problem received a very large 13.54 from those that ***work in the industry***.

Another way to analyze the results is to count the number of statistically significant differences between subgroups for each problem. This type of analysis helps flush out problems which may be more controversial. Below we report the problems with the most significant differences between subgroups.

- **Not having enough trees to harvest for wood products: 4**
- **Forests being converted to non-forest uses: 3**
- **Loss of fish and wildlife habitat: 3**

The other problems had either one or zero significant differences between subgroups.