



# Technical Appendix



### Attitudinal Segmentation

To identify how 10-999 acre family-forest owners “cluster” with regard to their land-related attitudes and goals, a number of multivariate, hierarchical cluster analyses were performed on the NWOS dataset. A four-segment solution produced the most coherent segments, statistically and in terms of face validity. The four segments are:

1. Woodland Retreat owners
2. Supplemental Income owners
3. Ready to Sell owners
4. Working the Land owners

The variables used in the segmentation included importance ratings (NWOS question 9): “People own woodland for various reasons. How important are the following reasons for why you own woodland in [state]?”

- Aesthetics
- Biodiversity
- Land investment
- Privacy
- Part of a family legacy
- Non-timber forest products
- Firewood production
- Timber production
- Hunting and fishing
- Recreation other than hunting and fishing
- Other reasons

Ratings go from “Very Important” to “Not important” on 1-7 point scale. Missing values in this battery were replaced by values using Multiple Imputation (Rubin). These data were rescored so higher values corresponded to higher importance. A mean of all items in the (Q9) importance battery was created, and then standardized across respondents. This standardized within-respondent mean was used as an input variable in the attitudinal segmentation.

Other input data included eight items from NWOS question 23 (“What are your plans for your woodland in [state] in the next five years? Check all that apply”).

- Harvest firewood
- Harvest sawlogs
- Sell forest land
- Pass forest land on to heirs
- Subdivide forest land
- Buy more forest land



- Convert forest land to another use
- Convert another land use to forest

Principal Component Exploratory Factor Analysis (equamax rotation) was applied to these items, and four factors were identified. Loadings with absolute values less than .25 are not shown.

Rotated Component Matrix(a)	Component			
	1	2	3	4
q23_8 What are you plans for the next 5 years: Plans to sell forest land	0.77			
q23_10 What are you plans for the next 5 years: Plans to subdivide forest land	0.74			
q23_5 What are you plans for the next 5 years: Plans to harvest firewood		0.71		
q23_6 What are you plans for the next 5 years: Plans to harvest sawlogs		0.66		
q23_12 What are you plans for the next 5 years: Plans to convert forest land to another use	0.33	0.53		-0.41
q23_13 What are you plans for the next 5 years: Plans to convert another land use to forest			0.81	
q23_11 What are you plans for the next 5 years: Plans to buy more forest land			0.67	
q23_9 What are you plans for the next 5 years: Plans to pass forest land on to heirs				0.85
Extraction Method: Principal Component Analysis. Rotation Method: Equamax with Kaiser Normalization.				
a	Rotation converged in 5 iterations.			

These four factor dimensions were used as input to the attitudinal segmentation analysis.

These data (10 q9 importance ratings, standardized mean of all q9 importance ratings, and q23 factor scores) were initially clustered using hierarchical clustering. Scores were ipsatized (standardized within respondent) and the Ward method was applied. Solutions with various numbers of clusters were inspected for intuitive appeal. The most promising were used to generate seed files for K-Means, using the same transformed input data (except that it was not ipsatized at this stage), yielding the final segmentation solution.



### Prime Prospect analysis

In addition to the attitudinal segmentation, NWOS respondents were segmented using a multivariate “Prime Prospect” discriminant function analysis.

A Prime Prospect analysis essentially divides respondents into 4 groups that can be profiled by demographic, behavioral, and attitudinal variables available in the dataset. The four groups are:

- Loyals: Owners who are currently practicing good land stewardship and show a strong interest in continuing to do so.
- Prime Prospects: Those not currently practicing good land stewardship but who indicate they would like to and share certain predictive demographic and attitudinal variables with Loyals.
- Write-offs: Persons not performing the desired behaviors and who have no interest or intention of doing so.
- Potential Defectors (44%): Those currently performing some of the desired behaviors, but who indicate they are losing interest in it or otherwise face obstacles, and share certain predictive demographic and attitudinal variables with Write-offs.

The first step of the analysis was to identify, a priori, “Loyals” and “Writeoffs” in the NWOS dataset, using a univariate scoring procedure.

As above, it was hypothesized that “Loyals” would be those who exhibit behaviors consistent with good land stewardship (“engagement”) as well as interests and attitudes consistent with sustainable management (“interest”).



Based on the data available in the NWOS survey, we operationalized these two dimensions as follows:

Engagement

- Have conservation easement
- Have lands currently green certified
- Used a cost share program in past 5 years
- Harvested trees using a professional forester
- Have a written management or stewardship plan
- Received advice in past 5 years

Interest

- Own land to protect nature and biologic diversity
- Own land for cultivation/collection of non-timber forest products
- Own land for production of firewood or biofuel
- Own land for production of sawlogs, pulpwood, other timber products
- Own land for hunting or fishing
- Own land for recreation other than hunting or fishing
- Plan to get a conservation easement
- Plan to get green certification
- Plan to harvest sawlogs or pulpwood

Loyals, according to our definition, have done two or more “engagement” *and* two or more “interest” activities. Writeoffs have done *none* of the above.

The next step of the analysis was to refine this intuitive scoring and to identify Prime Prospects and Potential Defectors. The following ratings were identified as most predictive and were used as input to this analysis:

“People own woodland for various reasons. How important are the following reasons for why you own woodland in [state]?” (NWOS question 9)

- Biodiversity
- Non-timber forest products
- Firewood production
- Timber production
- Hunting and fishing
- Recreation other than hunting and fishing

These ratings were converted to “top 2 box” ratings. Specifically, scores from “3” to “7” (i.e., low importance scores) were rescored to “0”, and scores of “1” or “2” (i.e., high importance scores) were rescored to “1”. These rescored importance ratings



were used as the input variables for the Discriminant Function Analysis. Discriminant function analysis was used to identify which category respondents resembled most closely on the 6 variables (see above).

As with the attitudinal segmentation, missing values in this battery were replaced by values using Multiple Imputation (Rubin).

The analysis yielded 4 groups,

- Loyals who resemble Loyals (“Loyals”)
- Writeoffs who resemble Writeoffs (“Writeoffs”)
- Non-Loyals and Non-Writeoffs who resemble Writeoffs (“Potential Defectors”)
- Non-Loyals and Non-Writeoffs who resemble Loyals (“Prime Prospects”)