ATTACHMENT 5

REVIEW OF APPENDIX 14
PONDBERRY BIOLOGICAL ASSESSMENT

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Review of Appendix 14: Pondberry Biological Assessment
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COE Conclusion:

The COE has concluded that there is no relationship between variation in the density of Pondberry, an obligate wetland species, and variation in flood frequency. In other words, the abundance of Pondberry within a colony is a random feature in the BLH flood environment, where Pondberry is as abundant at sites that flood once every two years as at sites that flood only once every 100 years.

USFW Conclusion:

Contrary to the COE conclusion and rationale, the Service finds that the analysis of correlations between the densities of Pondberry plants in colonies at various sites to the current frequency of flooding at such sites is insufficient to discount any effect of flooding. More specifically, we disagree with the scope of the inferences made by which sites were selected for study, and the selection and measurement of certain parameters at these sites.

According to the COE report, fifty known Pondberry colonies within the DNF were surveyed. This is study, obviously, violates the assumption of randomness since the field team only visited locations within the DNF where Pondberry bush colonies were know to exist. Many studies arising other research areas typically violate this assumption and are referred to as quasi-random designs. Designs, such as these, still provide sufficient information for forming conclusions relative to study groups. In this study, no attempt was made to hide the fact that these were known Pondberry bush colonies. The COE used these colonies to formulate opinions about future alterations in flooding frequency. To do so, the COE measured several Pondberry bush characteristics in one of four flood frequency zones: 0-2, 2-5, 5-10, and >10. The characteristics measured in this study were the number of clumps, the number of stems, the number of dead stems, the number of female plants, numbers of mature fruit, the stem height and the average stem diameter within the colony. If there is an optimum flooding frequency, then the characteristics as measured from this survey should be optimal in that zone.

The Pondberry characteristics of number of clumps, number of stems, number of dead stems, number of females and numbers of mature fruit are represented by count data. Count data arising from biological studies, typically, are best represented by the Poisson distribution, and as such, data such as these are subjected to the square root transformation prior to any hypothesis testing. Utilizing the square root transformation stabilizes the variances and the resulting sample obeys the properties of the normal distribution. The other two characteristics of interest are stem height and average stem diameter. The data arising from these latter two characteristics do not need to be subjected to any transformations.

The primary emphasis of this survey is the effect of flooding frequency on the Pondberry bush colonies as measured by the biological characteristics mentioned in the above paragraph. According to the literature generated from this survey, the only Pondberry bush colonies surveyed were the colonies whose locations were know. No randomization appears to have occurred in this study. Designs arising in this manner are called quasi-random design and they typically arise in research areas more closely associated with psychological and educational research. As such, the model of interest is a one-way design, which assumes these characteristics are affected only by the frequency of flooding and random errors. Unless otherwise noted, the significance level for this analysis is assumed to be 0.05. Wilk's lambda, a multivariate F-test that simultaneously tests all seven Pondberry characteristics, indicates no difference among flood zones (F=1.0664, p-value=0.3857). Ancillary to this procedure individual analysis of variances (ANOVA) are performed to further substantiate this simultaneous finding. The power of the test, which measures the probability of detecting a minimum detectable difference between population means, is computed for each characteristic. The minimum detectable difference for a characteristic is taken as the difference between the characteristic's largest and smallest observable means.

Number of Clumps

Table 1 displays the summary statistics by flood zone frequency for the characteristic of number of clumps. The results of the analysis of variance indicate that differences in this characteristic among flooding zones are not present (F = 0.6494, p-value = 0.5877). The minimum detectable difference for the transformed data is 0.43774. The power, that is, the probability of being able to detect a difference of this size given the observed variation is 0.8911. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect on the number of Pondberry bush clumps.

Table 1
Number of Clumps

Zone	N	Average	Std Dev	Transformed
0-2	7	2.14	1.21	1.54640
2-5	21	4.24	3.91	1.97949
5-10	9	3.22	2.33	1.80663
>10	9	4.22	4.02	1.98414

Number of Stems

Table 2 summarizes the characteristic of number of stems per flood zone. The analysis of this data, as with the number of clumps, does not provide of enough evidence to say the flooding frequency affects the number of Pondberry bush stems within these zones (F = 1.7019, p-value = 0.1825). The power of being able to detect the minimum detectable difference of 5.5555 is 0.9852. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect on the number of Pondberry bush stems.

Table 2
Number of Stems

Zone	N	Average	Std Dev	Transformed
0-2	6	41.50	26.786	6.0949
2-5	19	216.68	412.629	10.9364
5-10	9	37.33	48.539	5.3809
>10	9	55.44	64.977	6.1551

Number of Dead Stems

Table 3 summarizes the characteristic of number of dead stems per colony within the flood zones. The analysis of this data does not provide of enough evidence to say the flooding frequency affects the number of dead Pondberry bush stems found within these zones (F = 2.7525, p-value = 0.0555). The power of being able to detect the minimum detectable difference of 2.01004 is 0.9996. If the significance level is lowered to 0.10, one could say that flooding frequency did have an effect on the number of dead Pondberry bush stems, and that the largest average number of dead stems occurred in the 2-5 year flood zone. Using the 2-5 flood zone as a control and comparing all other means with this level indicates the average number of dead stems in the 0-2 year flood zone and the 2-5 year flood zone where not different; however, the 2-5 year flood zone average is significantly larger than both the 5-10 and >10 year flood zones.

Table 3
Number of Dead Stems

Zone	N	Average	Std Dev	Transformed
0-2	6	4.00	6.197	1.67784
2-5	19	17.21	26.626	3.08060
5-10	9	1.78	3.898	1.16289
>10	9	1.11	1.692	1.07056

Number of Females

Table 4 summarizes the characteristic of number of females per flood zone. The analysis of this data does not provide of enough evidence to say that flooding frequency affects the number of female plants found in these colonies within the zones ($F = 0.9450$, p-value = 04267). The power of being able to detect the minimum detectable difference of 1.21515 is 0.9324. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect on the number of female plants found in the Pondberry bush colonies.

Table 4
Number of Females

Zone	N	Average	Std Dev	Transformed
0-2	6	3.80	9.402	1.38639
2-5	19	11.182	30.359	2.05413
5-10	9	2.0	4.975	1.11609
>10	9	0.556	1.333	0.83898

Numbers of mature fruit

Table 5 summarizes the characteristics of numbers of mature fruit per colony within each flood zone. The analysis of this data does not provide of enough evidence to indicate that flooding frequency affects the numbers of mature fruit found in the colonies ($F = 0.7241$, p-value = 0.5428). The power of being able to detect the minimum detectable difference of 2.23809 is 0.9626. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect the Pondberry bush characteristic of numbers of mature fruit.

Table 5
Numbers of Mature Fruit

Zone	N	Average	Std Dev	Transformed
0-2	6	7.10	13.254	1.86005
2-5	19	16.27	34.707	2.65281
5-10	9	45.33	119.063	3.35837
>10	9	2.44	6.966	1.12028

Stem Height

Table 6 summarizes the characteristics of stem height per flood zone. The analysis of this data, as with the preceding conclusions, does not provide of enough evidence to say that flooding frequency affects the average Pondberry stem heights found within these zones ($F =$

1.3596, p-value = 0.2669). The power of being able to detect the minimum detectable difference of 5.6778 is 0.9980. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect on the average stem height of Pondberry bush as observed in these zones.

Table 6
Stem Height

Zone	N	Average	Std Dev
0-2	10	22.90	6.9194
2-5	22	20.86	8.2825
5-10	9	18.00	5.3657
>10	9	17.22	5.1908

Average Stem Diameter

Table 7 summarizes the characteristic of average Pondberry bush stem diameter by flood zone. The analysis of this data does not provide of enough evidence to say that flooding frequency affects the stem diameters within these zones (F = 0.6277, p-value = 0.6008). The power of being able to detect the minimum detectable difference of 0.091603 is 0.8819. One can, thus, conclude with confidence that the data does not provide enough evidence to indicate that flooding frequency has an effect on the average Pondberry bush stem diameters.

Table 7
Average Diameter

Zone	N	Average	Std Dev
0-2	10	0.3050	0.1828
2-5	22	0.2778	0.1622
5-10	9	0.3694	0.1949
>10	9	0.3125	0.1432

Summary and Conclusions

The data, collected from this survey, reflects measurable characteristics of the Pondberry bush colonies found within the DNF. The proposed project by the COE would have the tendency to shift the flood frequency zones upward from their current levels. That is, after the proposed pumping station has been installed on the Yazoo River, a Pondberry bush colony located in the 2-5 year flood zone may be shifted to the 5-10 year flood zone, etc. Obviously, one would like to assess the impact of such a movement on the colonies; however, such an assessment can only be made after the project has been completed. As such, the best one can do is to compare the Pondberry bush characteristics at the present-day flood zone levels to see if there are any indications of healthier colonies at the different levels.

The characteristics of interest in this survey are the number of clumps, the number of stems, the number of dead stems, the number of females, the numbers of mature fruit, the stem height, and the average stem diameter. Table 8 below shows the results of the F-test used to evaluate the effects of flood zones on these characteristics. As can be seen from this table, the p-values for all tests were non-significant at the 0.05 level and that the power of these tests for detecting the minimum detectable difference as shown is extremely high.

Table 8
Summary of F-Tests

Characteristic	F-Ratio	p-value	Minimum Detectable Difference	Power
Number of Clumps	0.6494	0.5877	0.43309	0.08789
Number of Stems	1.7019	0.1825	5.55555	0.9852
Number of Dead Stems	2.7525	0.0555	2.01004	0.9996
Number of Females	0.9450	0.4267	1.21515	0.9324
Numbers of mature fruit	0.7241	0.5428	2.23809	0.9626
Stem Height	1.3596	0.2669	5.67780	0.9980
Average Stem Diameter	0.6277	0.6008	0.09160	0.8819

Thus, one can conclude with a good degree of confidence that flood frequency does not effect these characteristics, and if these characteristics a good measures of the health of the Pondberry bush colonies, then the installation of the pumping station in the Yazoo Backwater Area should not have any serious future impacts on Pondberry bush colonies.

Multivariate Studies

To further investigate the USFW claim that the analysis of correlations between the density of Pondberry plants in colonies at various sites to the current frequency of flooding at such sites is insufficient to discount any effect of flooding, an in depth multivariate exploration did not support their claim. The COE in their survey of these sites not only measured the Pondberry bush characteristics, but also measured concomitant physical variables at each of these sites. Data on percent canopy cover and the diameter breast height (DBH) of the overstory species; the percent herbaceous cover, the iron-rod elevation and the average elevations were recorded.

To assist in the interpretation of the relationship between these two sets of variables, the multivariate technique of canonical correlation analysis (CCA) was used to find linearly combinations of the variables in each set that are correlated with each other. As such, CCA indicates that the largest canonical correlation is 0.672586 and is associated with the two linear combinations of

V1 = -0.1924*PB1 + 1.7542*PB2 - 1.4438*PB3 - 0.8483*PB4 + 0.6134*PB5 - 0.5315*PB6 + 0.6050 * PB7

and

W1 = -3.7031*V1 + 4.1569*V2 - 0.2334*V3 + 0.0762*V4 + 0.4968*V5
where

PB1 = Number of clumps
PB2 = Number of stems
PB3 = Number of dead stems
PB4 = Number of females
PB5 = Numbers of mature fruit
PB6 = Stem height
PB7 = Average Diameter

V1 = Iron rod elevation
V2 = Average elevation
V3 = Percent canopy cover
V4 = DBH
V5 = Percent herbaceous cover

Note: PB1 through PB5 were transformed via the square root transformation prior to CCA.

V1 is negatively correlated with number of dead stems and stem height (-0.3484 and -0.2630, respectively) and is positively correlated with average stem diameter (0.3743). W1 is positively correlated with iron rod elevation (0.3406), average elevation (0.4817) and percent herbaceous cover (0.5041). The second canonical correlation for this data is 0.42772. The linear combinations that exhibit this correlation are:

V2 = 0.2255*PB1 - 0.4301*PB2 + 0.2496*PB3 - 0.3701*PB4 - 0.5549*PB5 + 0.0529*PB6 + 0.4739*PB7

and

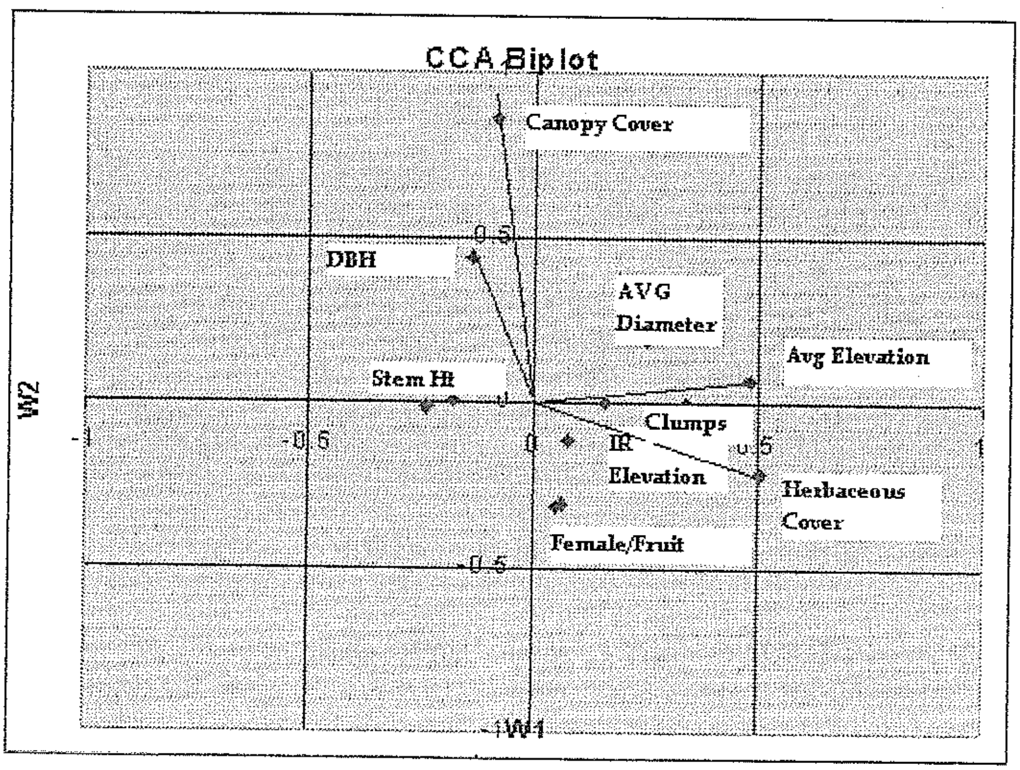
W2 = -1.5353*V1 +1.4156*V2 + 0.8366*V3 + 0.38889*V4 - 0.0787*V5

V2 is negatively correlated with number of females (-0.7220) and numbers of mature fruits (-0.7322) and positively correlated with average stem diameter (0.4569). W2 is positively correlated with percent canopy cover (0.8607) and DBH (0.4386) and is negatively correlated with percent herbaceous cover (-0.2123). A biplot describing the relationships is given in Figure 1. W1 axis represents an elevation and ground cover gradient; whereas, W2 represents an overstory gradient. Using these gradients, one can surmise that in areas with less canopy cover and overstory species with smaller DBH measurements more female and fruit was observed;

whereas, as sites, where the overstory species dominate, are associated with Pondberry bush colonies with the largest average diameters. On the elevation gradient, stem heights appears to be associated with sites that are lower in elevation; whereas, number of clumps and number of stems tends to be associated with sites in higher elevation more herbaceous zones.

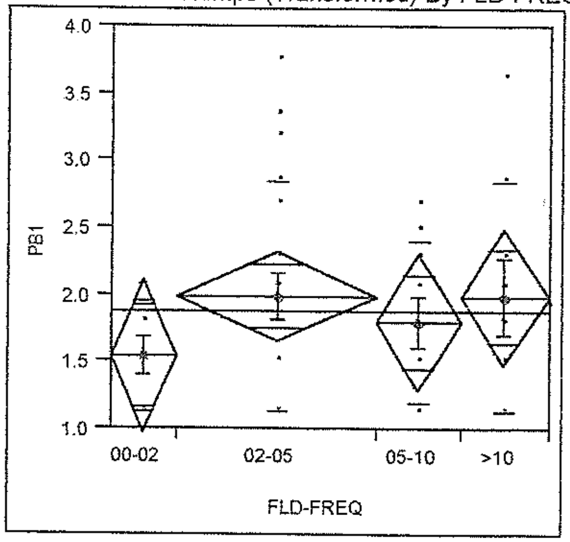
In summary, changes in elevation and changes in other ground cover species tend to affect different Pondberry bush characteristics, but not the occurrence of Pondberry bush colonies. Pondberry colonies occur in all elevation zones, and as such, it appears that the characteristics that describe the colonies tend to change. Whether it is a change in stem height to colonies with more clumps and stems or to changes in colonies that have more feminine characteristics to colonies with thick stem diameters is dependent on the gradient changes observed. What is apparent is that elevation and overstory characteristics joint effect Pondberry colonies, and that these effects are not detrimental, but are changes that effect changes in characteristics of the colonies.

Figure1
W1 vs. W2
Biplot



Appendix I
Output: Analyses of Variances

PB1: Number of Clumps (Transformed) By FLD-FREQ



Oneway Anova

Summary of Fit

RSquare	0.044332
RSquare Adj	-0.02393
Root Mean Square Error	0.762999
Mean of Response	1.880476
Observations (or Sum Wgts)	46

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	1.134244	0.378081	0.6494
Error	42	24.451019	0.582167	Prob>F
C Total	45	25.585263	0.568561	0.5877

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	7	1.54640	0.28839
02-05	21	1.97949	0.16650
05-10	9	1.80563	0.25433
>10	9	1.98414	0.25433

Std Error uses a pooled estimate of error variance

Power Details

Test 1-way Anova

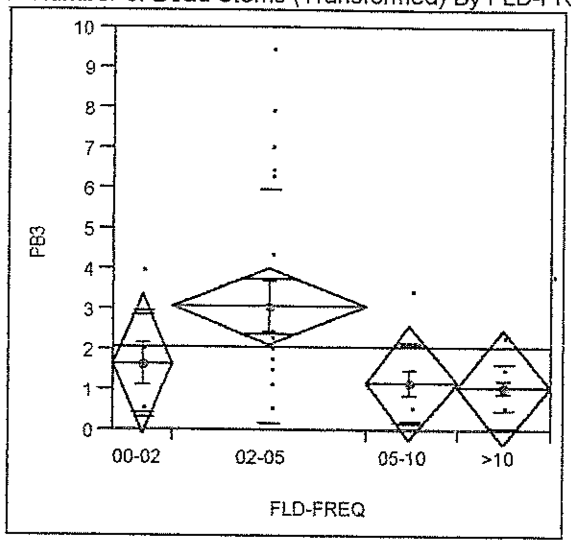
Power

Alpha	Sigma	Delta	Number	Power
0.0500	0.762999	0.157027	46	0.1746
0.0500	0.762999	0.43774	46	0.8911

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	7	1.54640	0.384172	0.14520
02-05	21	1.97949	0.854087	0.18638
05-10	9	1.80563	0.615670	0.20522
>10	9	1.98414	0.861961	0.28732

PB3: Number of Dead Stems (Transformed) By FLD-FREQ



Oneway Anova

Summary of Fit

RSquare	0.174732
RSquare Adj	0.11125
Root Mean Square Error	2.10881
Mean of Response	2.062781
Observations (or Sum Wgts)	43

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	36.72116	12.2404	2.7525
Error	39	173.43605	4.4471	Prob>F
C Total	42	210.15721	5.0037	0.0555

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	6	1.67784	0.86092
02-05	19	3.08060	0.48379
05-10	9	1.16289	0.70294
>10	9	1.07056	0.70294

Std Error uses a pooled estimate of error variance

Power Details

Test 1-way Anova

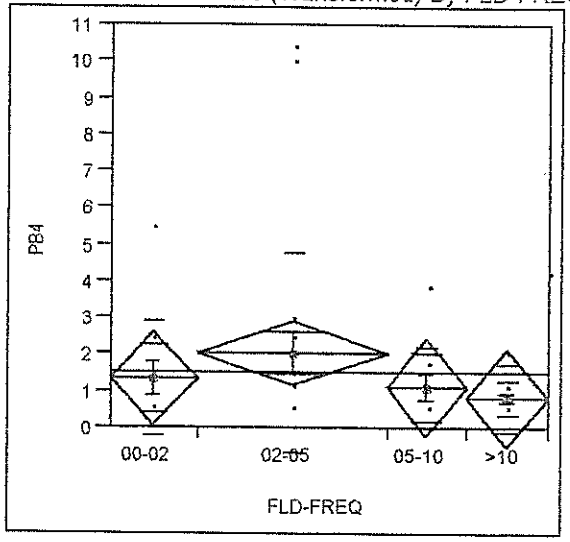
Power

Alpha	Sigma	Delta	Number	Power
0.0500	2.10881	0.924111	43	0.6209
0.0500	2.10881	2.01004	43	0.9996

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	6	1.67784	1.36815	0.55855
02-05	19	3.08060	2.92321	0.67063
05-10	9	1.16289	0.94896	0.31632
>10	9	1.07056	0.61847	0.20616

PB4: Number of Females (Transformed) By FLD-FREQ



Oneway Anova

Summary of Fit

RSquare	0.058052
RSquare Adj	-0.00338
Root Mean Square Error	2.065003
Mean of Response	1.533012
Observations (or Sum Wgts)	50

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	12.08895	4.02965	0.9450
Error	46	196.15484	4.26424	Prob>F
C Total	49	208.24379	4.24987	0.4267

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	10	1.38639	0.65301
02-05	22	2.05413	0.44026
05-10	9	1.11609	0.68833
>10	9	0.83898	0.68833

Std Error uses a pooled estimate of error variance

Power Details

Test 1-way Anova

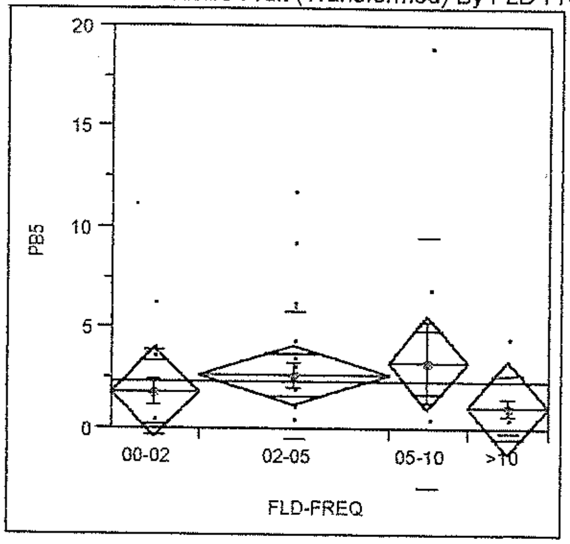
Power

Alpha	Sigma	Delta	Number	Power
0.0500	2.065003	0.49171	50	0.2418
0.0500	2.065003	1.21515	50	0.9324

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	10	1.38639	1.58216	0.50032
02-05	22	2.05413	2.77250	0.59110
05-10	9	1.11609	1.12717	0.37572
>10	9	0.83898	0.50497	0.16832

PB5: Numbers of Mature Fruit (Transformed) By FLD-FREQ



Oneway Anova

Summary of Fit

RSquare	0.045094
RSquare Adj	-0.01718
Root Mean Square Error	3.537149
Mean of Response	2.345406
Observations (or Sum Wgts)	50

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	27.17802	9.0593	0.7241
Error	46	575.52549	12.5114	Prob>F
C Total	49	602.70352	12.3001	0.5428

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	10	1.86005	1.1185
02-05	22	2.65281	0.7541
05-10	9	3.35837	1.1790
>10	9	1.12028	1.1790

Std Error uses a pooled estimate of error variance

Power Details

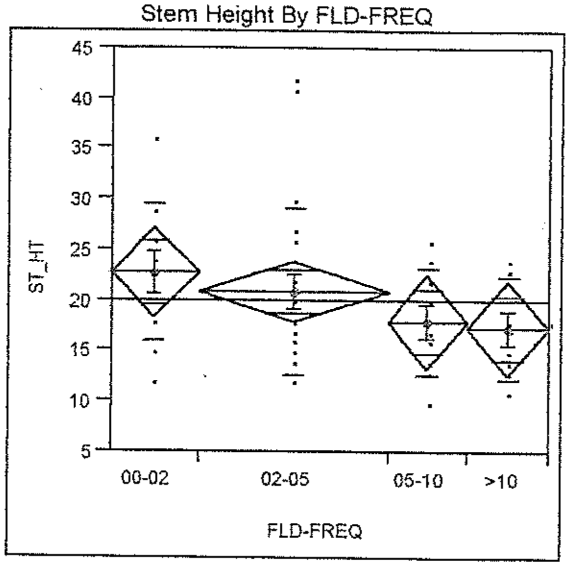
Test 1-way Anova

Power

Alpha	Sigma	Delta	Number	Power
0.0500	3.537149	0.737266	50	0.1921
0.0500	3.537149	2.23809	50	0.9626

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	10	1.86005	2.11219	0.6679
02-05	22	2.65281	3.17300	0.6765
05-10	9	3.35837	6.22361	2.0745
>10	9	1.12028	1.32664	0.4422



Oneway Anova
Summary of Fit

RSquare	0.081448
RSquare Adj	0.021543
Root Mean Square Error	7.097223
Mean of Response	20.1
Observations (or Sum Wgts)	50

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	205.4535	68.4845	1.3596
Error	46	2317.0465	50.3706	Prob>F
C Total	49	2522.5000	51.4796	0.2669

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	10	22.9000	2.2443
02-05	22	20.8636	1.5131
05-10	9	18.0000	2.3657
>10	9	17.2222	2.3657

Std Error uses a pooled estimate of error variance

Power Details

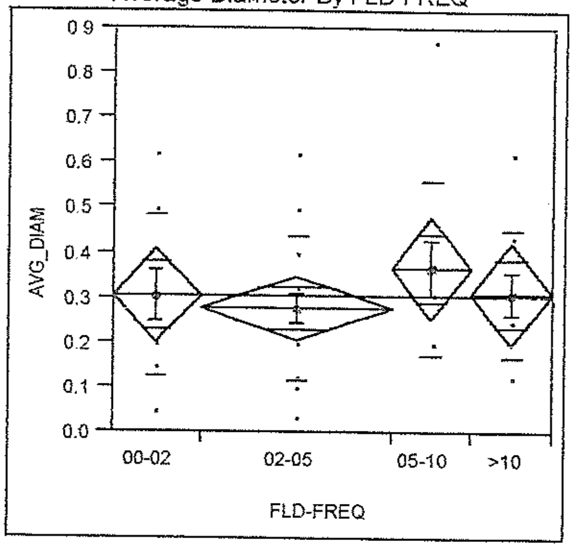
Test 1-way Anova

Power

Alpha	Sigma	Delta	Number	Power
0.0500	7.097223	2.027084	50	0.3376
0.0500	7.097223	5.6778	50	0.9980

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	10	22.9000	6.91938	2.1881
02-05	22	20.8636	8.28249	1.7658
05-10	9	18.0000	5.36190	1.7873
>10	9	17.2222	5.19080	1.7303



Oneway Anova

Summary of Fit

RSquare	0.039324
RSquare Adj	-0.02333
Root Mean Square Error	0.169443
Mean of Response	0.306
Observations (or Sum Wgts)	50

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	3	0.0540616	0.018021	0.6277
Error	46	1.3207009	0.028711	Prob>F
C Total	49	1.3747625	0.028056	0.6008

Means for Oneway Anova

Level	Number	Mean	Std Error
00-02	10	0.305000	0.05358
02-05	22	0.277841	0.03613
05-10	9	0.369444	0.05648
>10	9	0.312500	0.05648

Std Error uses a pooled estimate of error variance

Power Details

Test 1-way Anova

Power

Alpha	Sigma	Delta	Number	Power
0.0500	0.169443	0.032882	50	0.1709
0.0500	0.169443	0.091603	50	0.8819

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean
00-02	10	0.305000	0.182783	0.05780
02-05	22	0.277841	0.162153	0.03457
05-10	9	0.369444	0.194867	0.06496
>10	9	0.312500	0.143205	0.04774

Appendix II
Output: Canonical Correlation Analysis

Canonical Correlation Analysis

	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error	Squared Canonical Correlation
1	0.672586	0.561435	0.085525	0.452372
2	0.427772	.	0.127596	0.182989
3	0.419766	.	0.128655	0.176204
4	0.266064	0.198148	0.145118	0.070790
5	0.015098	-1.59116	0.156138	0.000228

Eigenvalues of INV(E)*H
= CanRsq/(1-CanRsq)

	Eigenvalue	Difference	Proportion	Cumulative
1	0.8261	0.6021	0.6163	0.6163
2	0.2240	0.0101	0.1671	0.7834
3	0.2139	0.1377	0.1596	0.9430
4	0.0762	0.0760	0.0568	0.9998
5	0.0002	.	0.0002	1.0000

Test of H0: The canonical correlations in the
current row and all that follow are zero

	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.34241116	1.0664	35	128.6284	0.3857
2	0.62526263	0.6565	24	109.3561	0.8823
3	0.76530526	0.6019	15	88.73931	0.8661
4	0.92899798	0.3095	8	66	0.9599
5	0.99977205	0.0026	3	34	0.9998

Multivariate Statistics and F Approximations

S=5 M=0.5 N=14

Statistic	Value	F	Num DF	Den DF	Pr > F
Wilks' Lambda	0.34241116	1.0664	35	128.6284	0.3857
Pillai's Trace	0.88258319	1.0411	35	170	0.4162
Hotelling-Lawley Trace	1.34033537	1.0876	35	142	0.3557
Roy's Greatest Root	0.82605798	4.0123	7	34	0.0027

NOTE: F Statistic for Roy's Greatest Root is an upper bound.

Canonical Correlation Analysis

Raw Canonical Coefficients for the 'VAR' Variables

	V1	V2	
PB1	-0.252380703	0.2957888058	Number of Clumps
PB2	0.2307197508	-0.056568726	Number of Stems
PB3	-0.640987177	0.1108272126	Number of Dead Stems
PB4	-0.532905759	-0.232489306	Number of Females
PB5	0.1826071343	-0.165209688	Numbers of Fruit
PB6	-0.105623955	0.0105198291	Stem Height
PB7	3.43863565	2.6933825146	AVG Diameter

Raw Canonical Coefficients for the 'WITH' Variables

	W1	W2	
V1	-1.819681666	-0.754439546	Iron Rod Elevation
V2	1.936462795	0.6594373911	Average Elevation
V3	-0.034688288	0.124354613	Percent Canopy Cover
V4	0.0122625005	0.0625642303	DBH
V5	0.0176085988	-0.002788325	Percent Herbaceous Cover

Standardized Canonical Coefficients for the 'VAR' Variables

	V1	V2	
PB1	-0.1924	0.2255	Number of Clumps
PB2	1.7542	-0.4301	Number of Stems
PB3	-1.4438	0.2496	Number of Dead Stems
PB4	-0.8483	-0.3701	Number of Females
PB5	0.6134	-0.5549	Numbers of Fruit
PB6	-0.5315	0.0529	Stem Height
PB7	0.6050	0.4739	AVG Diameter

Standardized Canonical Coefficients for the 'WITH' Variables

	W1	W2	
V1	-3.7031	-1.5353	Iron Rod Elevation
V2	4.1569	1.4156	Average Elevation
V3	-0.2334	0.8366	Percent Canopy Cover
V4	0.0762	0.3889	DBH
V5	0.4968	-0.0787	Percent Herbaceous Cover

Canonical Structure

Correlations Between the 'VAR' Variables and Their Canonical Variables

	V1	V2	
PB1	0.2361	0.0003	Number of Clumps
PB2	0.1201	-0.2725	Number of Stems
PB3	-0.3484	-0.0328	Number of Dead Stems
PB4	0.0961	-0.7220	Number of Females
PB5	0.0766	-0.7322	Numbers of Fruit
PB6	-0.2630	0.0169	Stem Height
PB7	0.3743	0.4569	AVG Diameter

Correlations Between the 'WITH' Variables and Their Canonical Variables

	W1	W2	
V1	0.3406	0.0006	Iron Rod Elevation
V2	0.4817	0.0662	Average Elevation
V3	-0.0802	0.8607	Percent Canopy Cover
V4	-0.1342	0.4386	DBH
V5	0.5041	-0.2123	Percent Herbaceous Cover

Correlations Between the 'VAR' Variables and the Canonical Variables of the 'WITH' Variables

	W1	W2	
PB1	0.1588	0.0001	Number of Clumps
PB2	0.0808	-0.1166	Number of Stems
PB3	-0.2343	-0.0141	Number of Dead Stems
PB4	0.0646	-0.3088	Number of Females
PB5	0.0515	-0.3132	Numbers of Fruit
PB6	-0.1769	0.0072	Stem Height
PB7	0.2518	0.1954	AVG Diameter

Correlations Between the 'WITH' Variables and the Canonical Variables of the 'VAR' Variables

	V1	V2	
V1	0.2291	0.0002	Iron Rod Elevation
V2	0.3240	0.0283	Average Elevation
V3	-0.0540	0.3682	Percent Canopy Cover
V4	-0.0903	0.1876	DBH
V5	0.3390	-0.0908	Percent Herbaceous Cover