ASSESSING VALUES AT RISK IN THE UNITED STATES FROM WILDLAND FIRE

FINAL REPORT

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June 7, 2002

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ABSTRACT

This project was proposed to consist of three phases. Phases I and II were to develop and build a working prototype of a value at risk (VAR) decision support system (DSS), known as VAR-DSS. These two phases were completed as of April 1, 2002. The competed project was presented by Doug Rideout at the San Antonio JFS conference. Phase III was to construct a final DSS model, based upon the prototype that would operate on an extensive database of valuation information from a nation wide survey as well as an extensive and systematic literature database. Upon completion of the three phases, available literature on fire effects as they relate to VARs, would be catalogued into a relational database that could be easily accessed from various user perspectives. Fire managers and planners would have ready access to a synthesis of scientific findings combined with results of a national survey of the general public, agency customers and fires managers. Upon query of the system, the DSS would provide the user with information of VAR effects by eco-region, customer, VAR type and management practice. The professionally programmed user interface will provide virtually seamless access to fire effects on VAR. It is crucial to recognize that the VAR-DSS is a "web-enabled" computer program to organize and display synthesized information based on analysis of the literature and survey results. It is not a library-related catalogue. It is not just a web-page; it is a web-enabled program. It therefore requires some training. The strength of the prototype is in the web-enabled program that has resided on the internet at http://www.vardss.info/ since mid April. Because the project (phases I and II) is complete, we can no longer promise that the site will continue. Further, it is infeasible to replicate the program in this report. Nevertheless, this report is intended to show key features of the program.

SUMMARY UPDATE

Phases I and II were funded to build a prototype VAR-DSS. The prototype has been completed beyond the original project specifications.

A database of literature results and focus group responses was constructed with the purpose of providing a working data base to demonstrate the prototype. Originally we had contacted several software vendors to facilitate the programming of the prototype. We decided to do our own programming through Jenna Stone. This was a crucial decision and facilitated the success of the prototype. This is a new type of software that is not common to the fire profession and required special considerations.

In sum, we have completed the project (phases I and II only) beyond original specification as a web-enabled dynamic data program was constructed. The program is user friendly and able to provide easy and remote access to data on values at risk by eco-region. Phase III has not been funded and we have received no indication of interest (one way or the other) by the JFS program.

INTRODUCTION

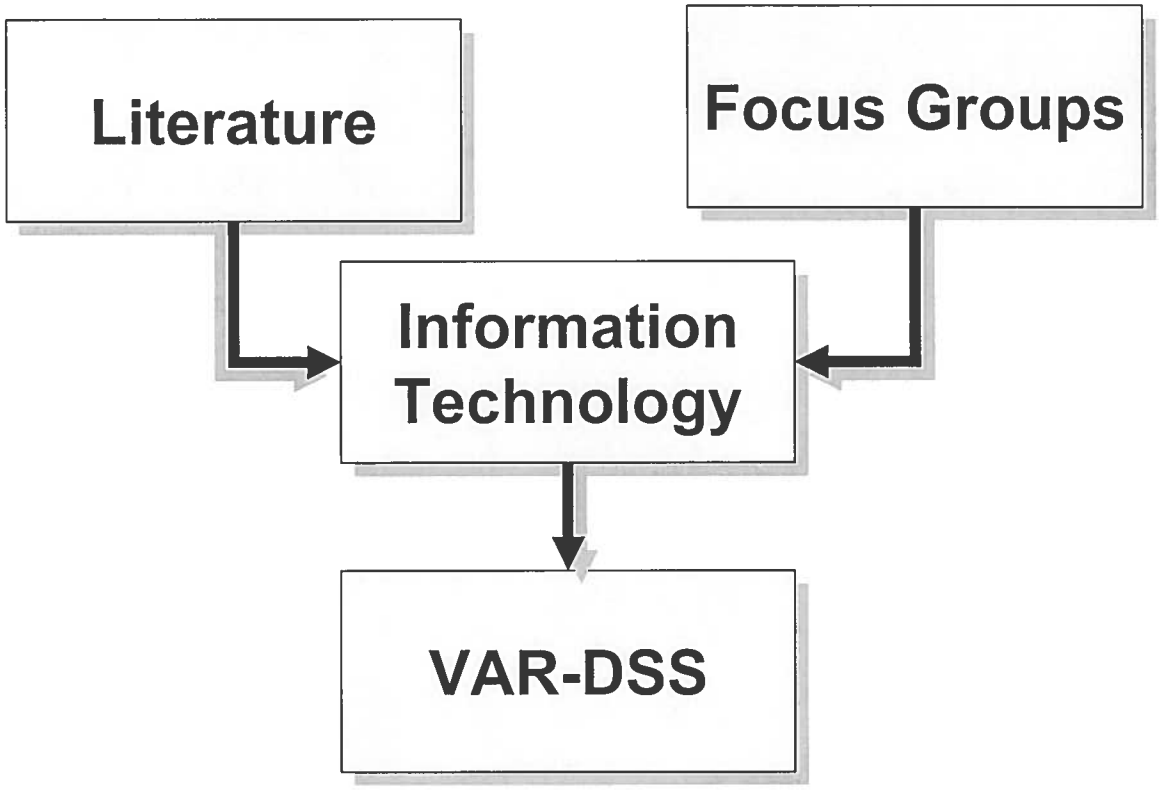
This is the final report for phases I and II of the Values at Risk (VAR) Decision Support (DSS) project, known as VAR-DSS. Phases I and II consist of constructing a fully functional prototype VAR-DSS that could be made whole through completion of phase III. Phase III is to support the DSS with a full literature and survey information. The purpose of the VAR-DSS is to provide a decision support system for fire managers and planners. Fire managers and planes would have ready access to a synthesis and analysis of scientific findings combined with results of a national survey of the general public, agency customers and fire managers. Upon query of the system, the DSS would provide the user with information on VAR effects by eco-region, customer classification, VAR type, and management practice. A professionally programmed user interface will provide virtually seamless access to fire effects on VAR. This is the final report on the completion of the fully functional prototype computer model. The computer model represents two new and important trends in software design.

- First, it is web-enabled; meaning that the program resides on the World Wide Web and can be readily access from virtually any site.
- Second, while supported by a traditional database, the data is accessed through an innovative interface that allows an intuitive approach to the data analysis.

Our prototype VAR-DSS provides a simple summary of analytic results from the database. This will be demonstrated in following sections of this report.

CONSTRUCTION OF THE PROTOTYPE VAR-DSS

Construction of the prototype is reflected in the figure immediately below:



While the final product would include a full sampling of the literature on VAR to be included in the model and results of a national survey, the prototype includes small databases on each to demonstrate the process of the working model. This provided a means of testing the viability of the VAR-DSS concept without incurring the expense of full data acquisition and analysis. Therefore, the prototype contains a fully functioning web-based VAR-DSS computer program accessing a limited data set. The web-based program can no longer be support as the project has ended and the Joint Fire Science program has indicated no interest, one way or the other, in the product.

Next are descriptions of the literature data base, the focus groups (that would be used for constructing a national survey) results used in the prototype.

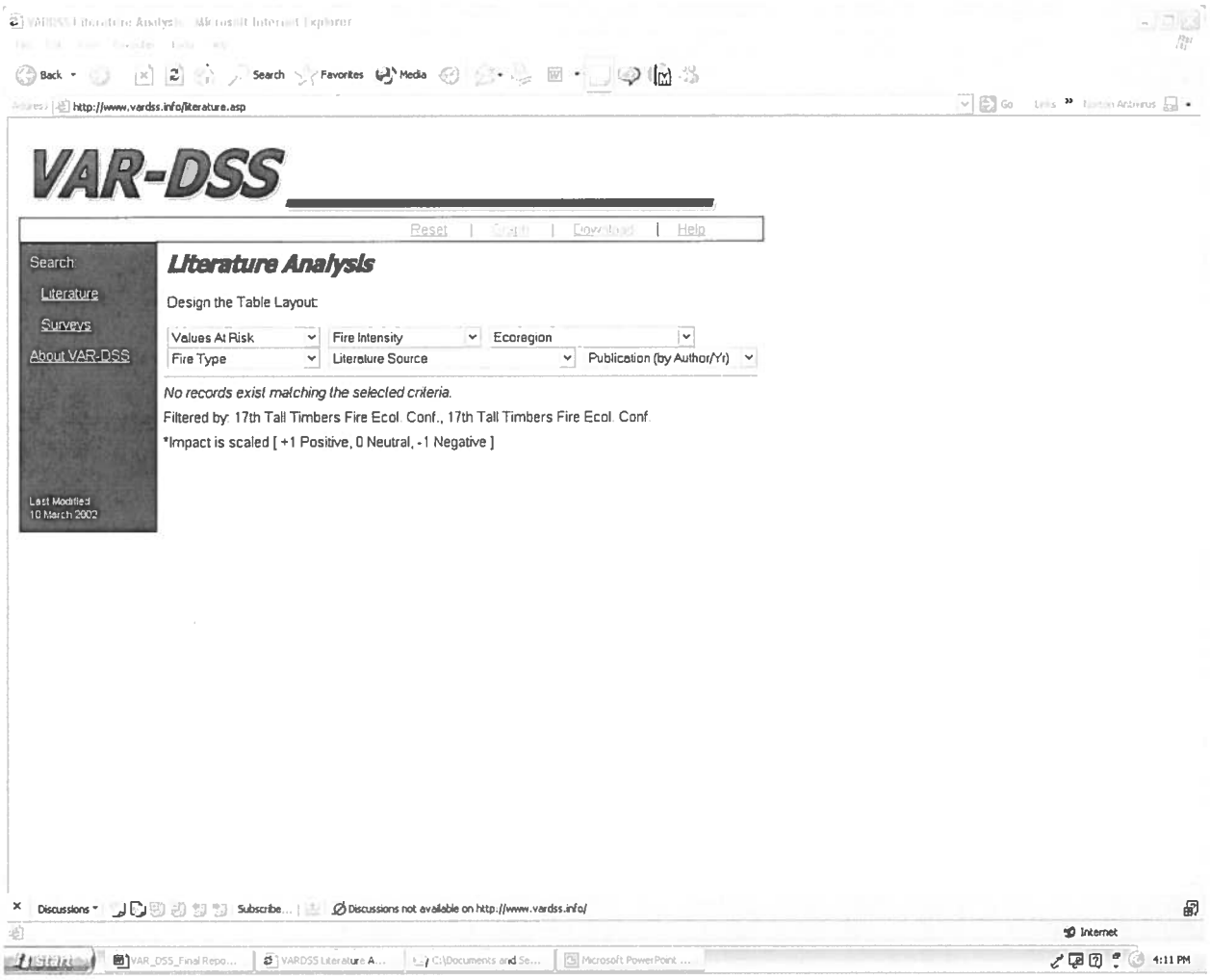
LITERATURE BASE

Data were collected through a variety of outlets:

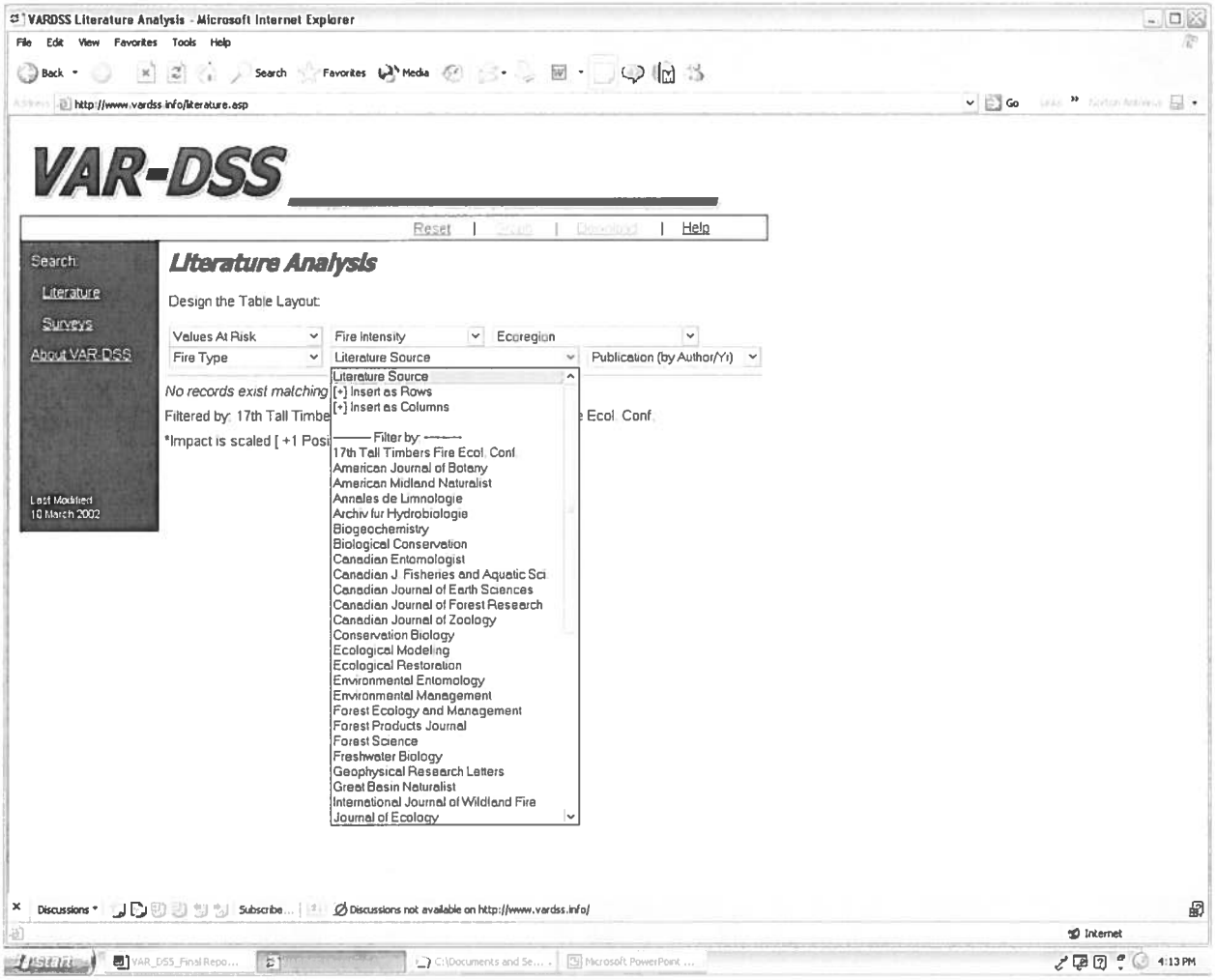
1. Several graduate students, at Colorado State University collected fire articles used for other fire projects.
2. Several large data studies were found through the USFS, Rocky Mountain Research Station.

3. Several articles were located through the Internet using Yahoo and Infoseek searches.
4. A few articles were located through forestry professors' private collections at Colorado State University.
5. Most of the remaining articles were located through the Colorado State University library and through using the libraries' Cambridge Scientific Abstracts program to search through several databases including:
    a. Agricola
    b. Agricultural and Environmental Biotechnology Abstracts
    c. Aquatic Sciences and Fisheries Abstracts
    d. Biological Sciences
    e. Conference Papers Index
    f. Ecology Abstracts
    g. Environmental Sciences and Pollution Management
    h. Health and Safety Sciences
    i. Oceanic Abstracts
    j. Plant Science
    k. Sociological Abstracts
    l. Water Resources Abstracts

These data were compiled and analyzed as to their affect on VARs and programmed into the Literature Analysis web page as per the following screen print.

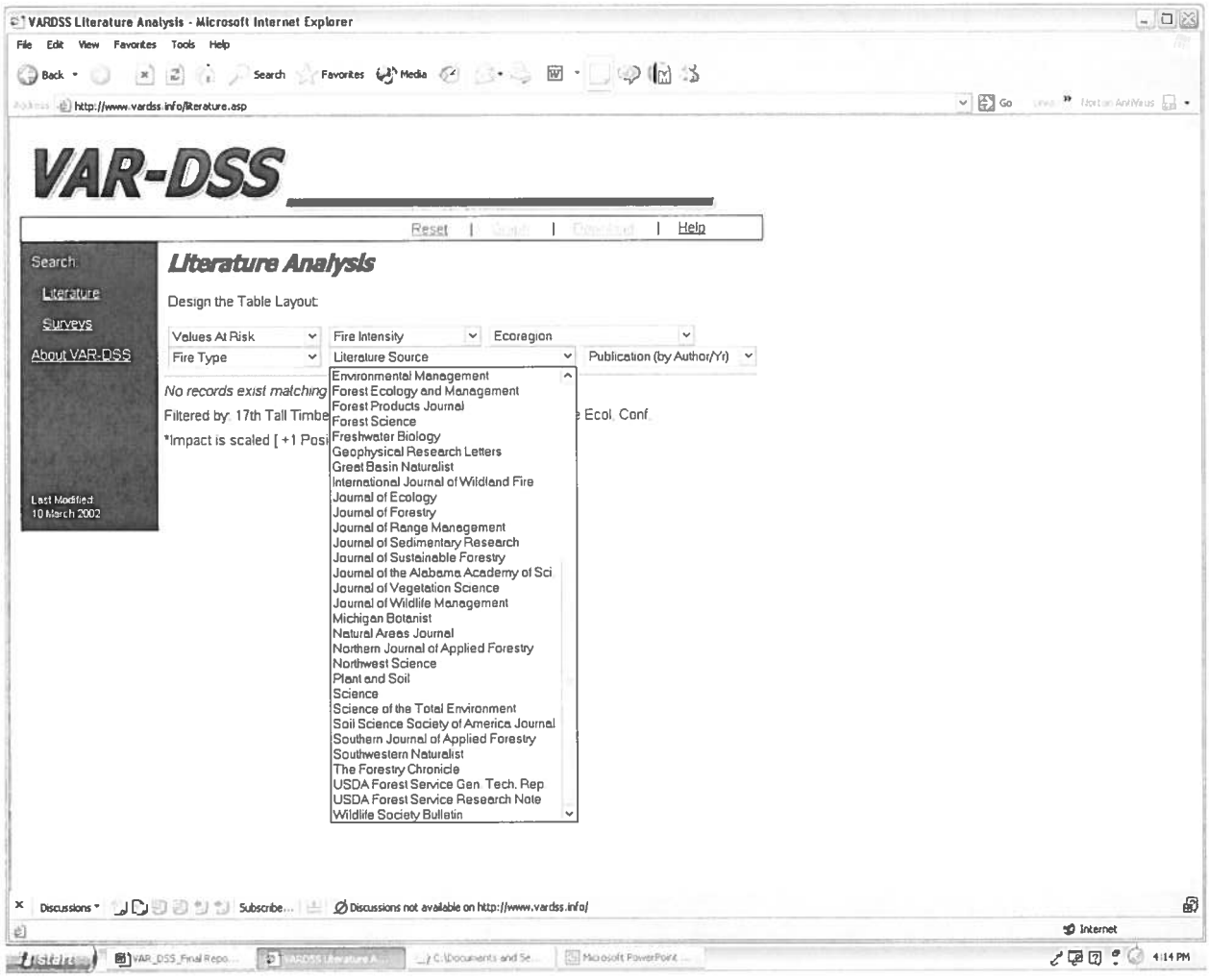


Literature sources available in the prototype are as per the following two screen prints:

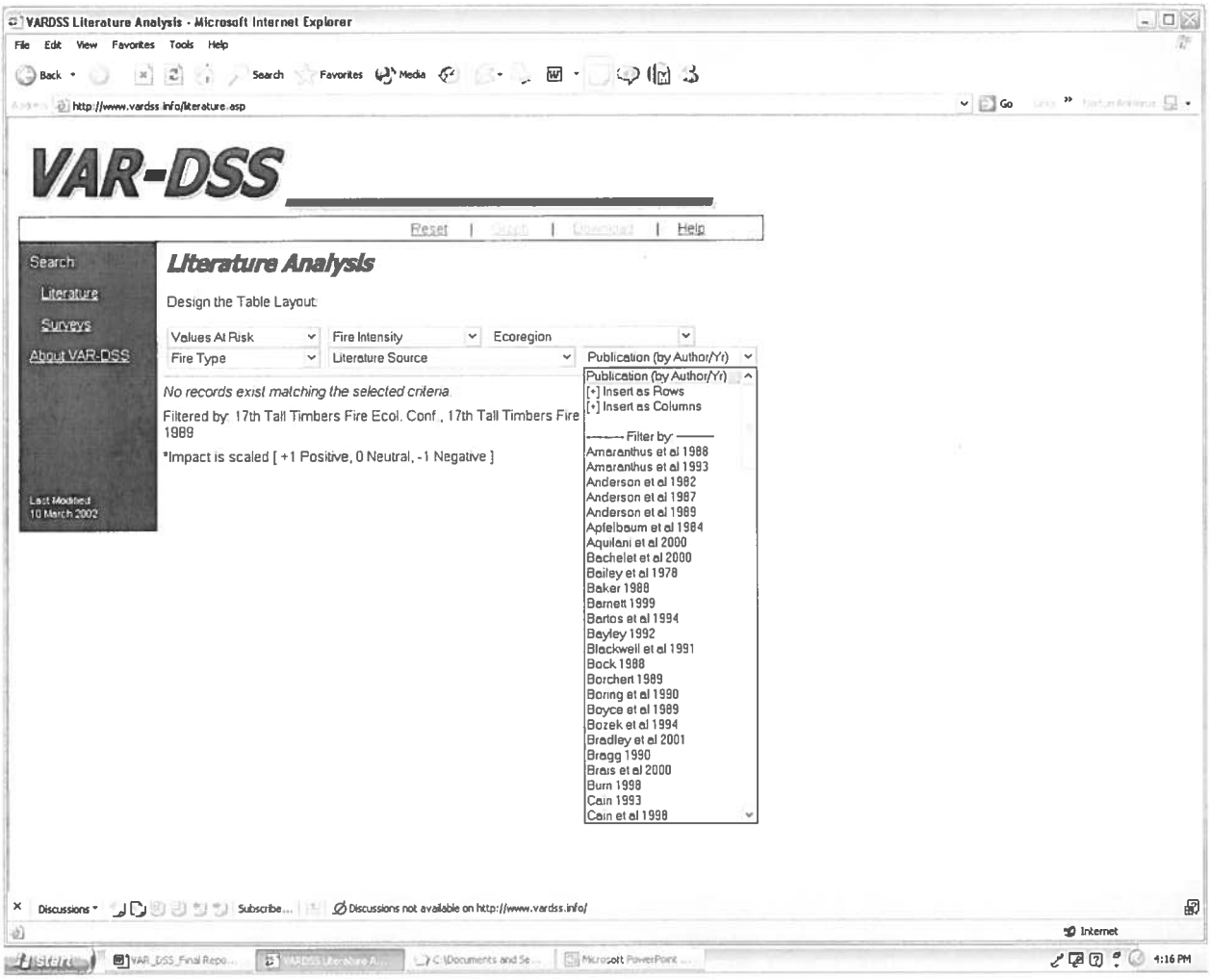


and

VAR-DSS

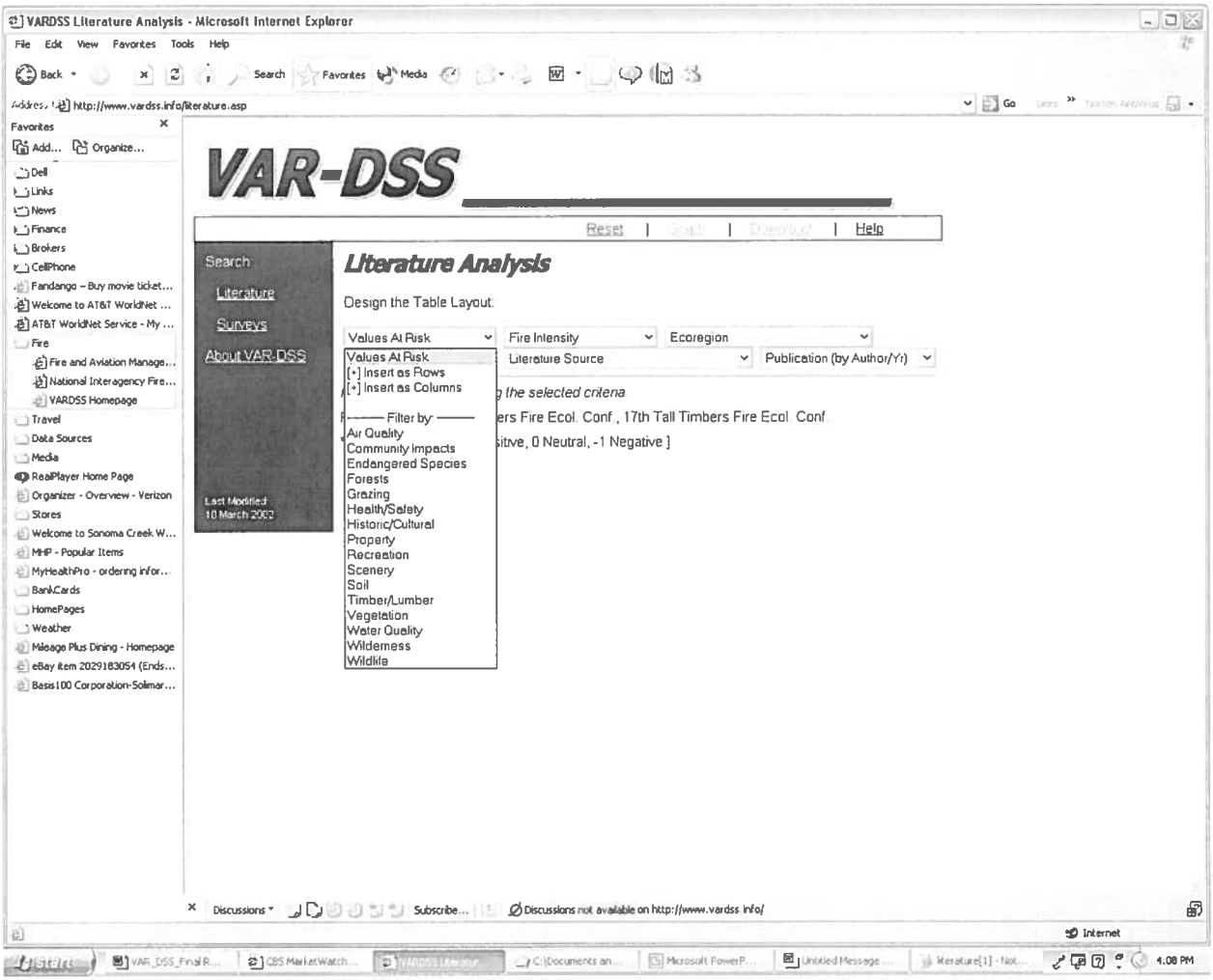

VARDSS Literature Analysis - Microsoft Internet Explorer
File Edit View Favorites Tools Help
http://www.vardss.info/literature.asp
VAR-DSS
Reset | Help
Search:
Literature
Surveys
About VAR-DSS
Last Modified:
10 March 2002
Literature Analysis
Design the Table Layout:
Values At Risk
Fire Intensity
Ecoregion
Fire Type
Literature Source
Publication (by Author/Yr)
No records exist matching
Filtered by: 17th Tall Timbe
Ecol. Conf.
*Impact is scaled [+1 Posi
Environmental Management
Forest Ecology and Management
Forest Products Journal
Forest Science
Freshwater Biology
Geophysical Research Letters
Great Basin Naturalist
International Journal of Wildland Fire
Journal of Ecology
Journal of Forestry
Journal of Range Management
Journal of Sedimentary Research
Journal of Sustainable Forestry
Journal of the Alabama Academy of Sci
Journal of Vegetation Science
Journal of Wildlife Management
Michigan Botanist
Natural Areas Journal
Northern Journal of Applied Forestry
Northwest Science
Plant and Soil
Science
Science of the Total Environment
Soil Science Society of America Journal
Southern Journal of Applied Forestry
Southwestern Naturalist
The Forestry Chronicle
USDA Forest Service Gen. Tech. Rep
USDA Forest Service Research Note
Wildlife Society Bulletin
Discussions
Subscribe...
Discussions not available on http://www.vardss.info/
Internet
4:14 PM

Literature data could also be sorted by author and year as per the following example:

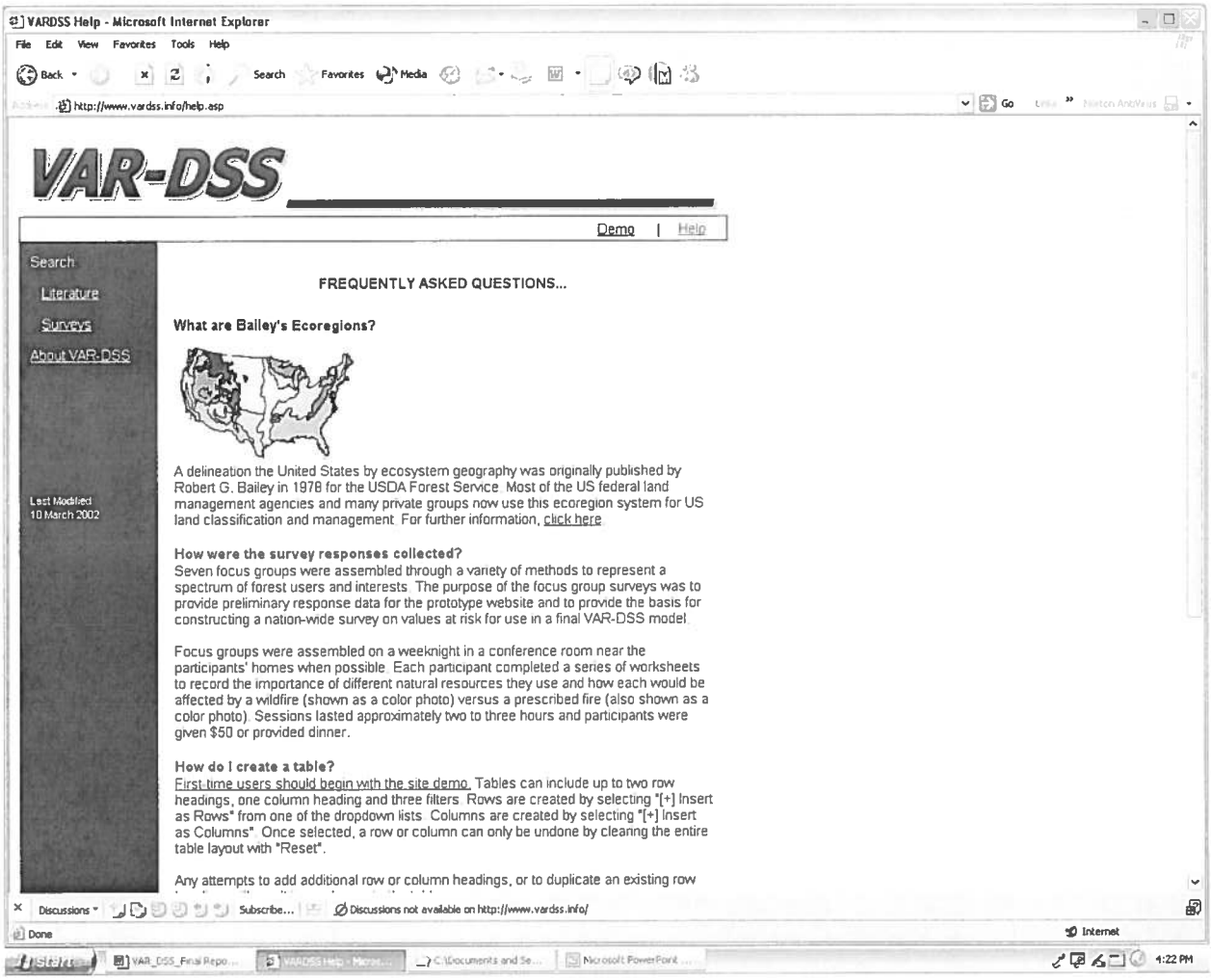


VAR-DSS

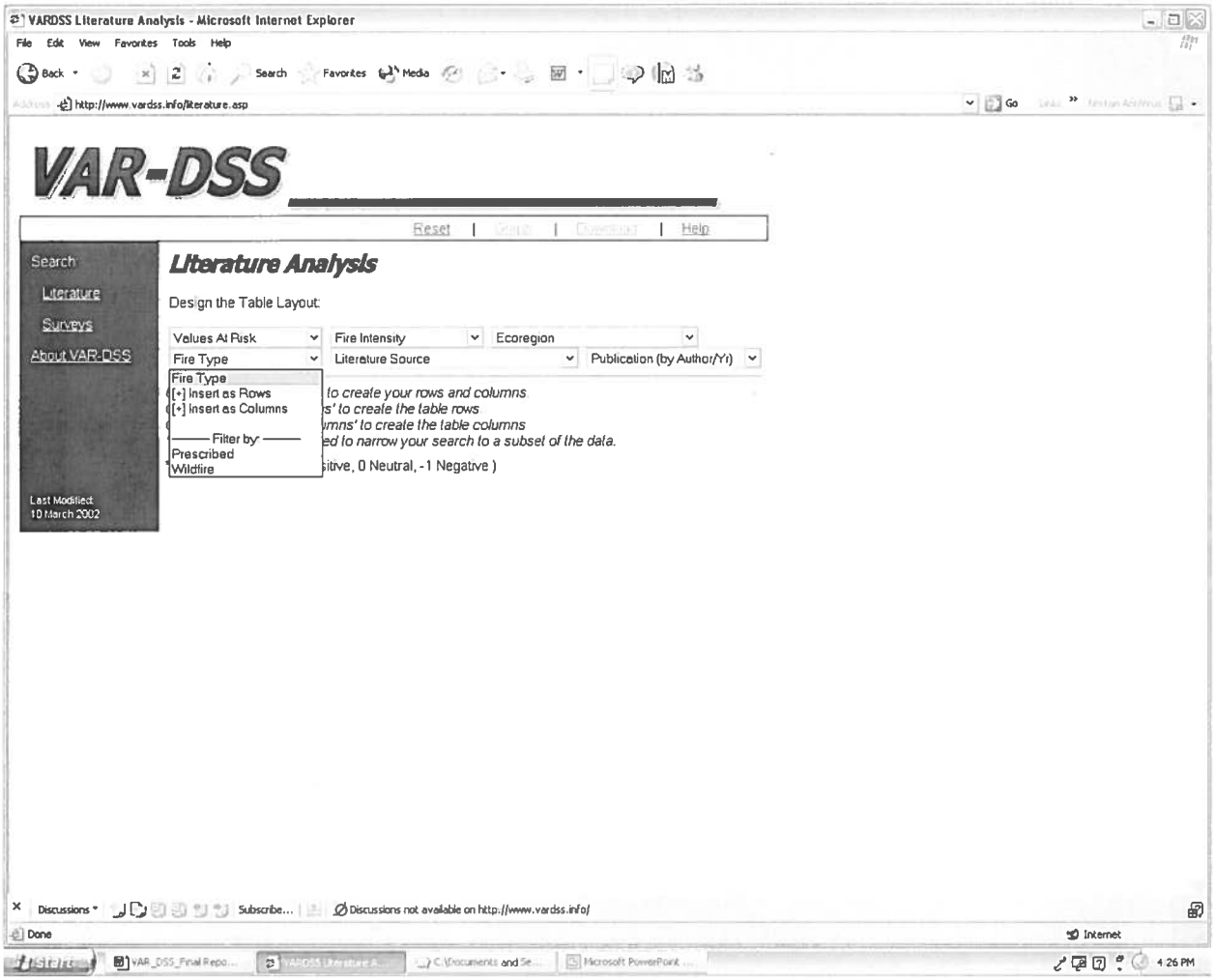
Literature is also sorted and analyzed by VAR as per the classifications in the VAR-DSS table:



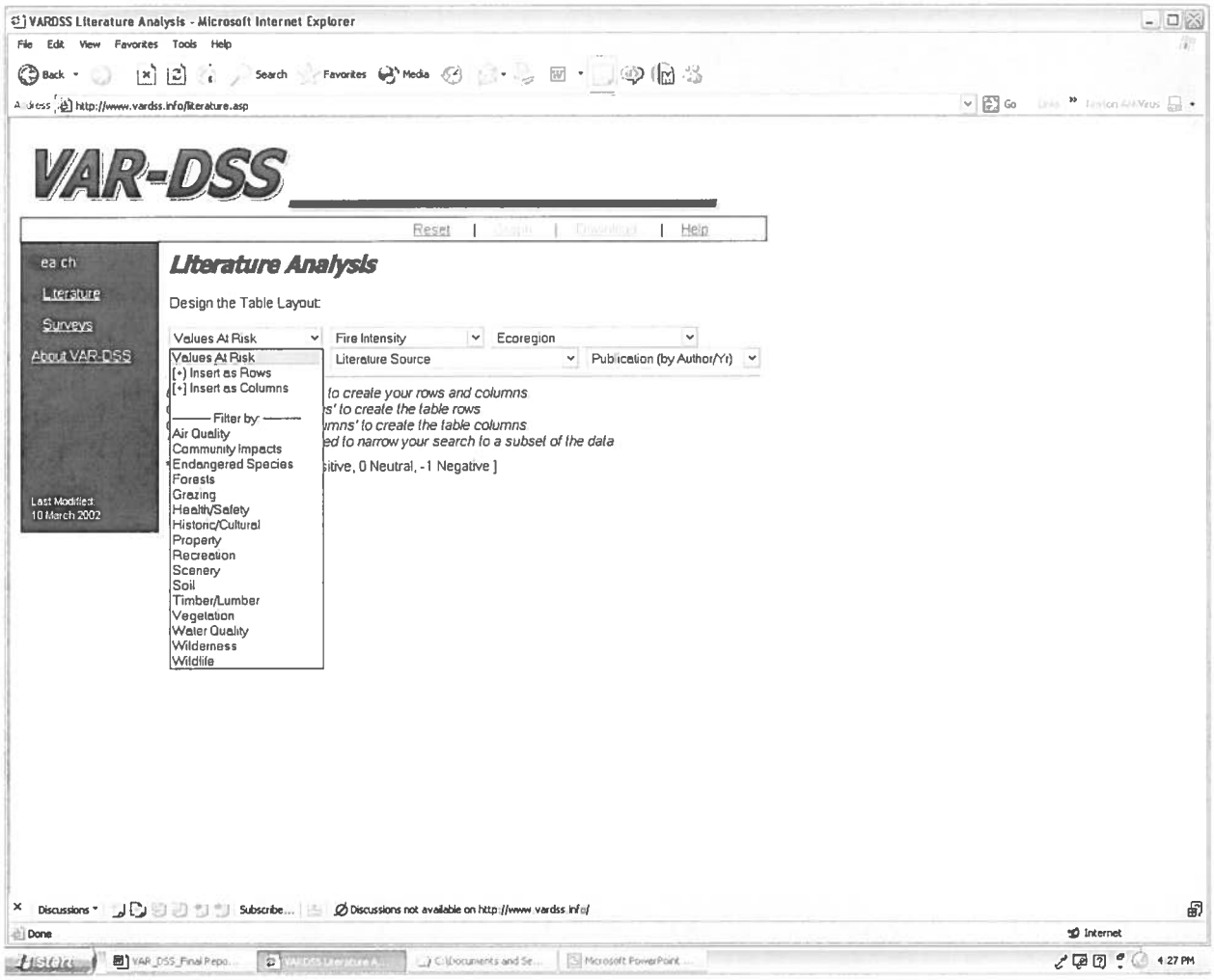
The literature data were also managed by Bailey's Ecoregion as explained on the web page. This page from the help section provided an interactive link to http://www.fs.fed.us/earthcare/ecolink.htm where the user could find much additional information on ecoregion definition.



Literature data were also available for analysis by fire type: prescribed and burned as per the following screen:



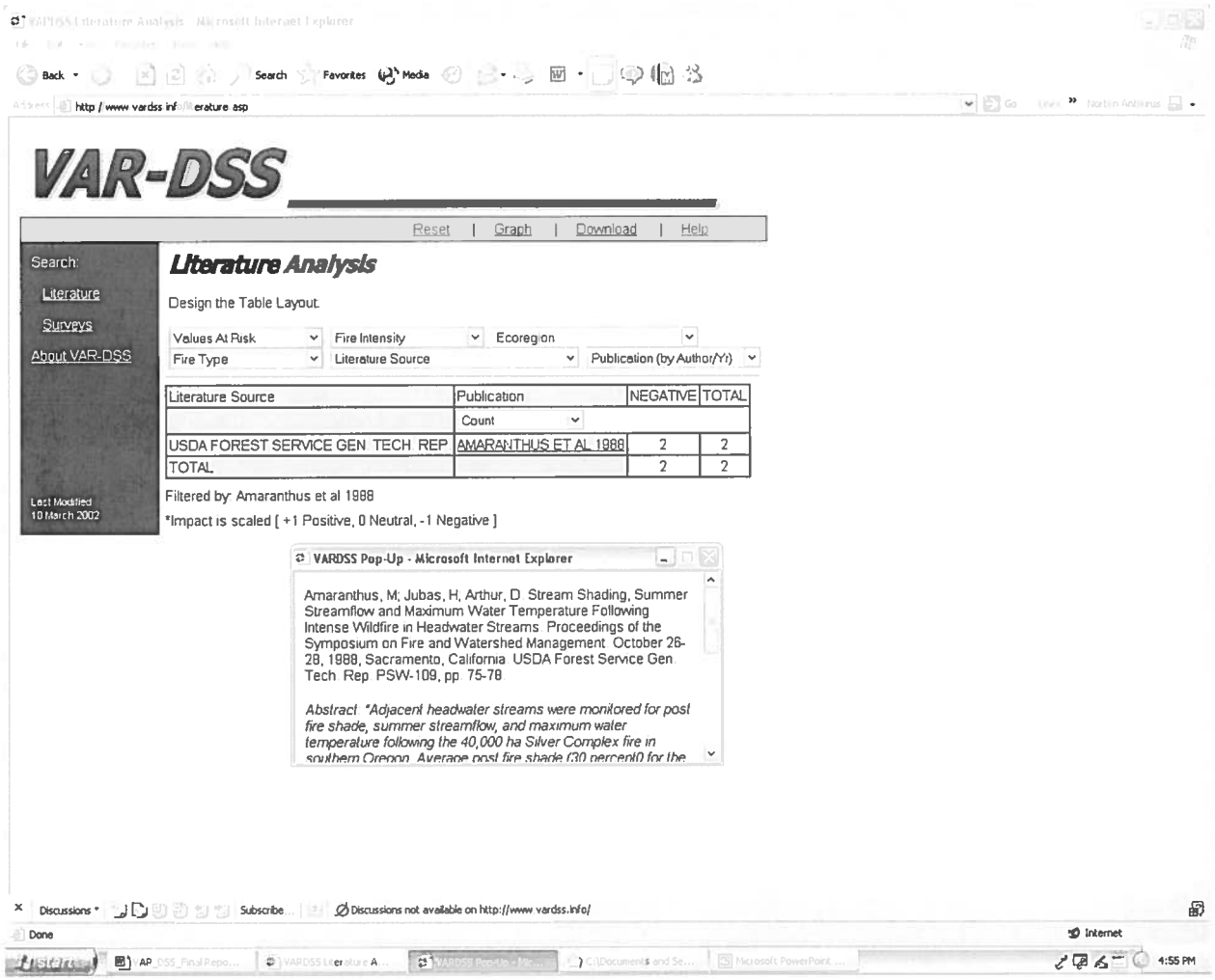
Literature were also available for analysis by VAR as per the following print screen:



and by a similar menu structure by high and low fire intensity (not shown to save space).

VAR-DSS

Lastly we provided an on-line summary or abstract of each piece of literature so that users could clearly establish a sense of the original source and have the information to obtain a copy of the source if needed. An example is provided in the next screen.



FOCUS GROUP DATABASE

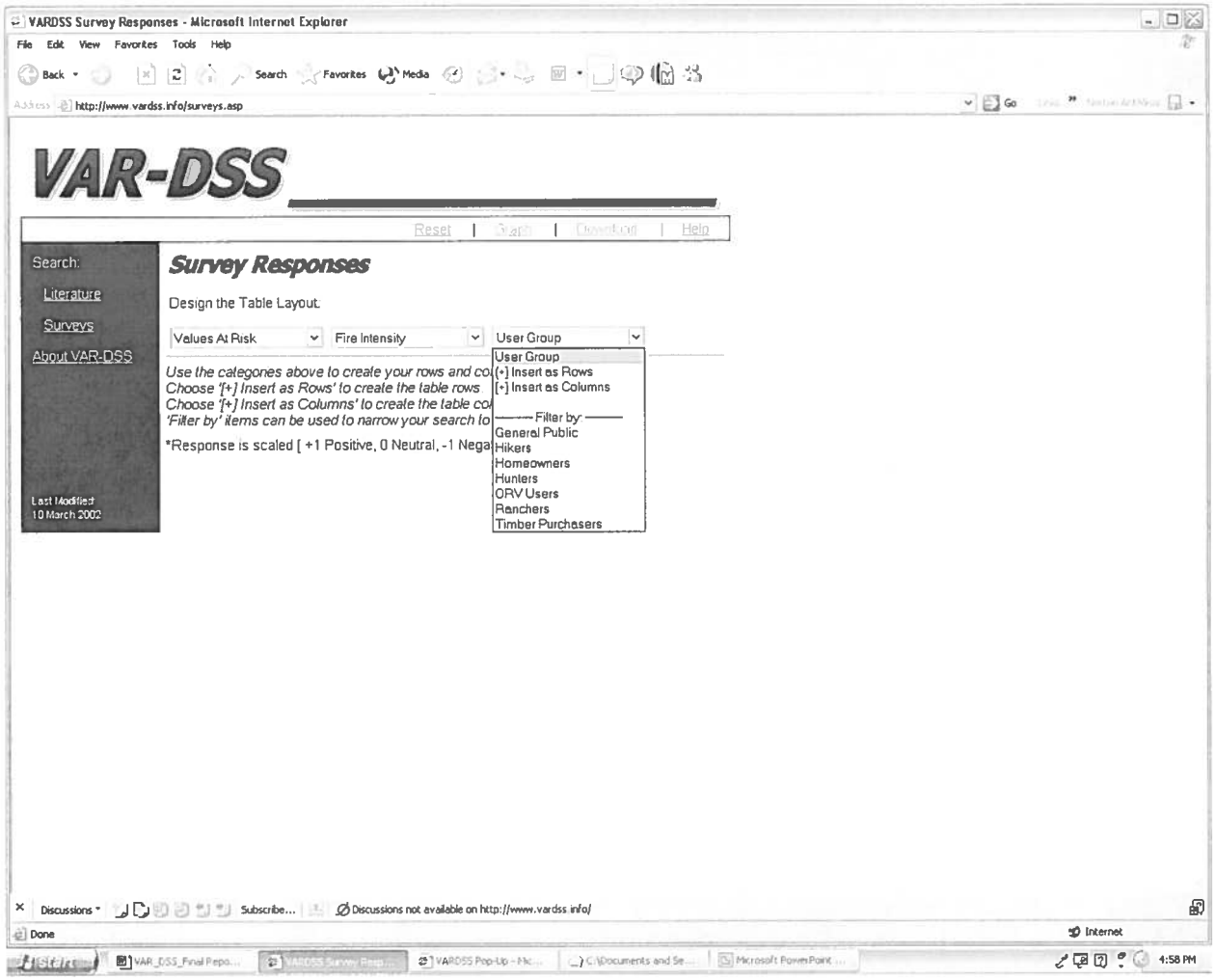
We conducted seven focus groups in various locations in the country representing a variety of interest groups. These were:

- Colorado Mountain Club –Fort Collins, Co (9 participants)
- General Public—Denver, Colorado (11 participants)
- Elk hunters – Loveland, Colorado (11 participants)
- Homeowners – Lake Tahoe (11 participants)
- Timber purchasers represented by the federal timber purchasers association – Charleston South Carolina (8 participants)
- Cattleman Association – Grass Valley, California (7 participants)
- Colorado Off Highway Vehicle Association – Longmont, Colorado (7 participants)

These groups were held on a weeknight in a conference room near the participants' homes except for the timber purchasers, who were attending a national meeting. Most of the groups were given $50 upon entering the conference room. The sessions were not video or audio taped. Each participant filled out a series of worksheets to record the importance of different natural resources they used how those would be affected by a wildfire (shown as a color photo) and a prescribed fire (also shown as a photo). The information from the worksheets was typed up after the focus group. This information was then summarized into the excel spreadsheets. In addition, discussion about the wildfire and prescribed fire were recorded on flip charts. The information on the worksheets and flip charts was used to make revisions to the worksheets for subsequent focus groups.

Various approaches were used with the focus groups. The homeowners in Lake Tahoe were contacted randomly through numbers in the phone book. Elk hunters' numbers were attained from Colorado Hunting and Fishing License information. The general public was contacted through a firm in Denver, Colorado. Numbers for all other groups were attained through their participating organizations.

Focus groups as made available in the prototype software are shown in the screen below.

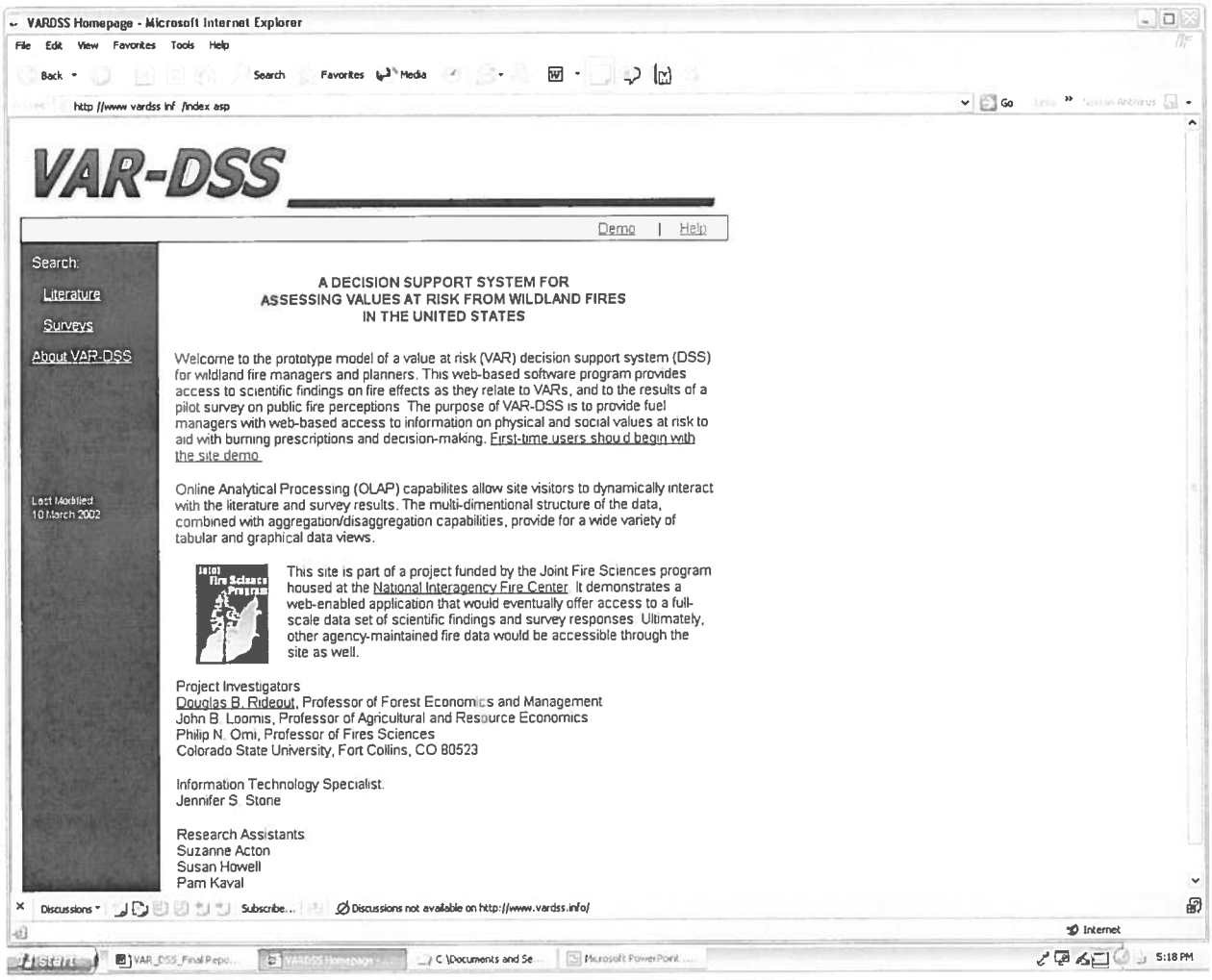


Prototype VAR-DSS

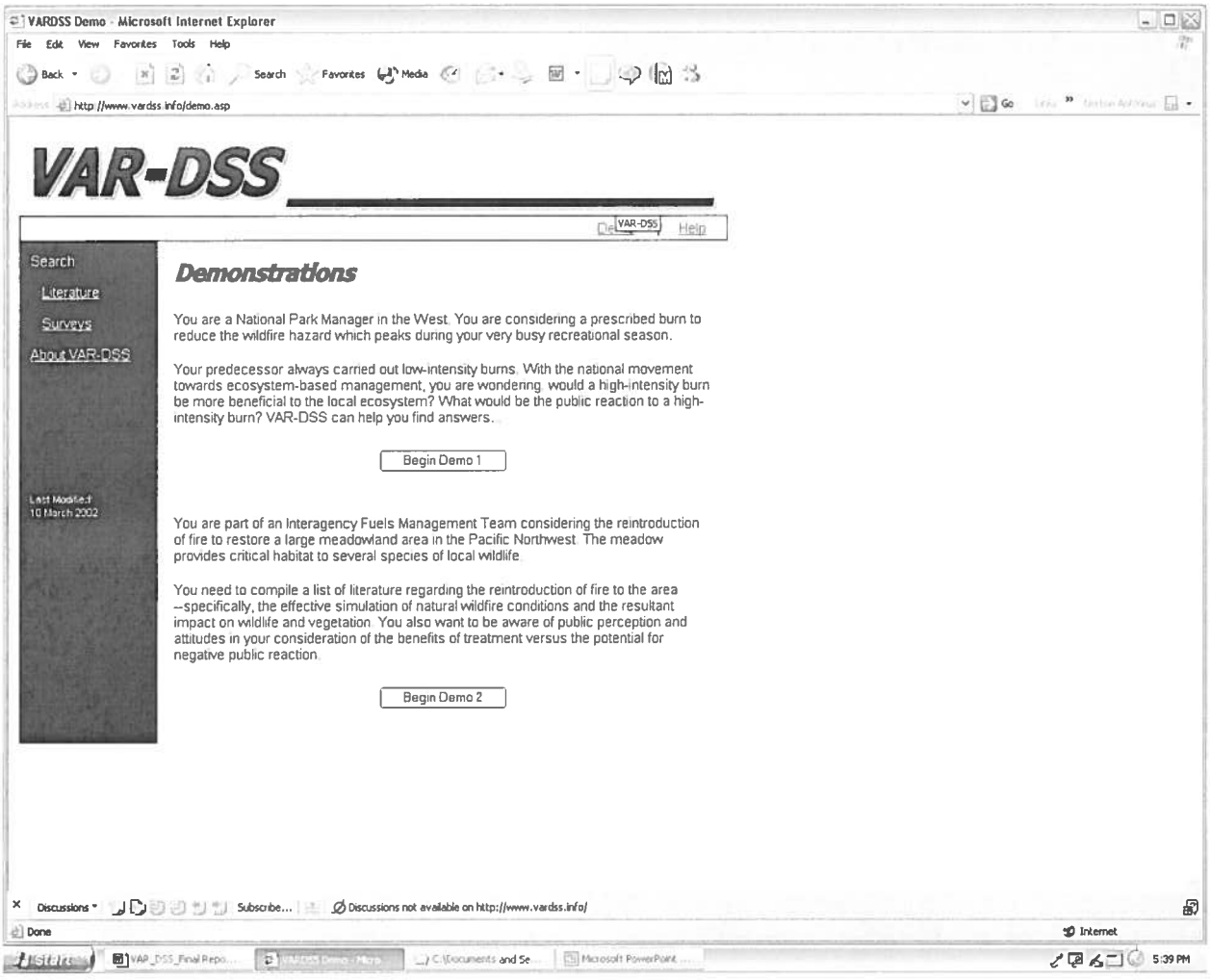
The fully functioning web-enabled prototype computer program is best explained by example. Here we will walk through the two demonstration examples accessed through the help menu provided with the program. The program is operated by four screens and each screen was designed to be compact and easily accessed. These consisted of the Opening Screen, the Literature Analysis screen, the Survey Response screen and the Help screen. The Opening Screen is shown below and the others are shown by through documentation of the tutorial. Each screen has been previously been displayed in this report.

VAR-DSS

The opening screen explains the program, provides access to the other screens, references the JFS program and shows the investigators and key project assistants. Additional assistants were also used.



Users were guided to the site demo. This was a key point in the opening screen because we found that most users of web sites expected to be able to just point and click through the program as if it were a series of pages to read. Instead, VAR-DSS is a complex computer program that required education of the user. The straight forward demonstrations provided a means of getting the user through the "learning curve." The following screen shows the opening menu for the two demonstrations. The short introduction to each provides a contextual example of the kind of question that could make use of the VAR-DSS.



The following will demonstrate the program by using the two demonstration examples provided in the VAR-DSS prototype.

DEMO #1

The first demonstration makes use of the literature analysis.

"You are a National Park Manager in the West. You are considering a prescribed burn to reduce the wildfire hazard which peaks during your very busy recreational season.

Your predecessor always carried out low-intensity burns. With increased emphasis on ecosystem-based management, you are wondering: would a high-intensity burn be more beneficial to the local ecosystem? What would be the public reaction to a high-intensity burn? VAR-DSS can help you find answers..."

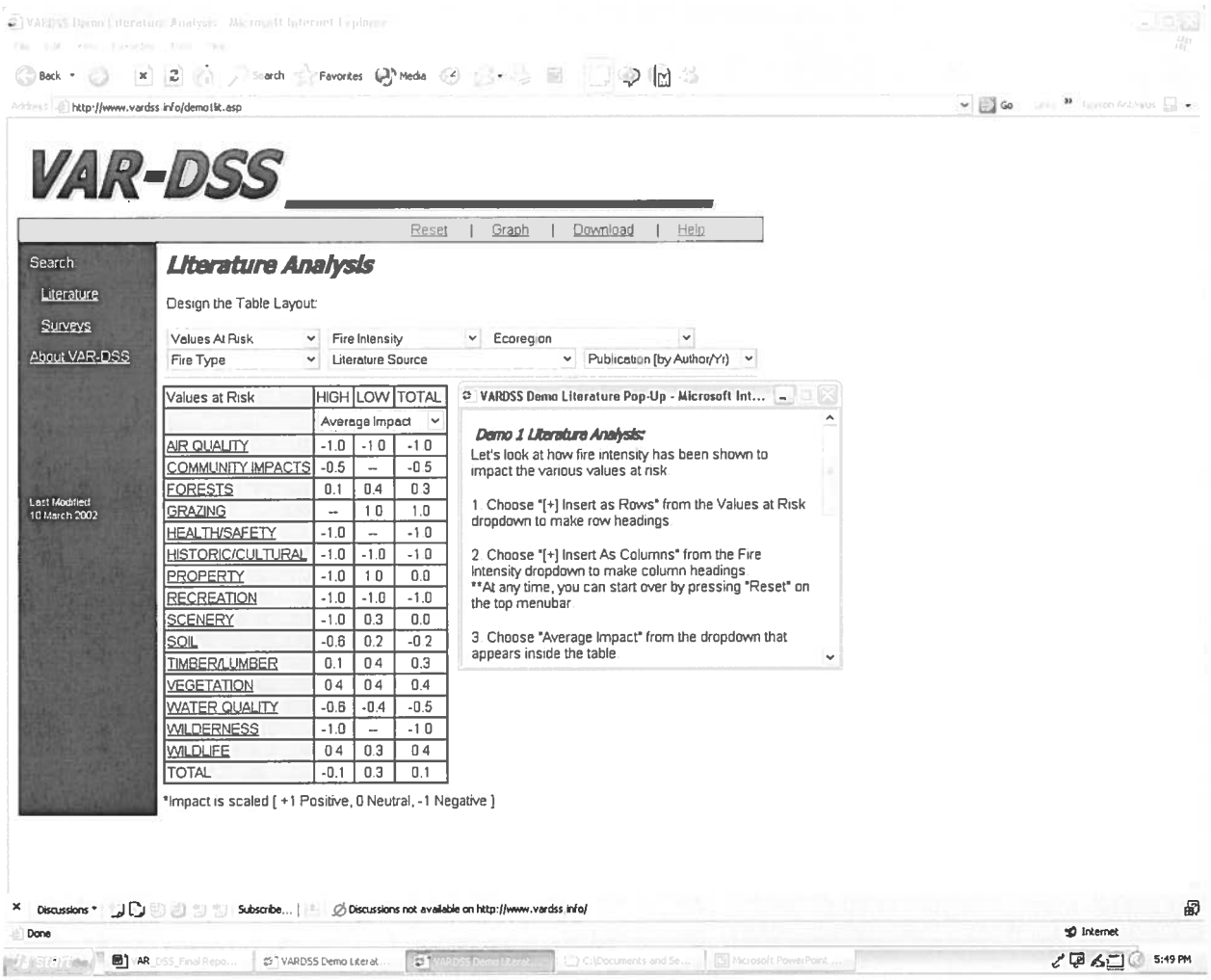
Let's look at how fire intensity has been shown to impact the various values at risk.

1. Choose "[+] Insert as Rows" from the Values at Risk dropdown to make row headings.

2. Choose "[+] Insert As Columns" from the Fire Intensity dropdown to make column headings.
**At any time, you can start over by pressing "Reset" on the top menu bar.

3. Choose "Average Impact" from the dropdown that appears inside the table.

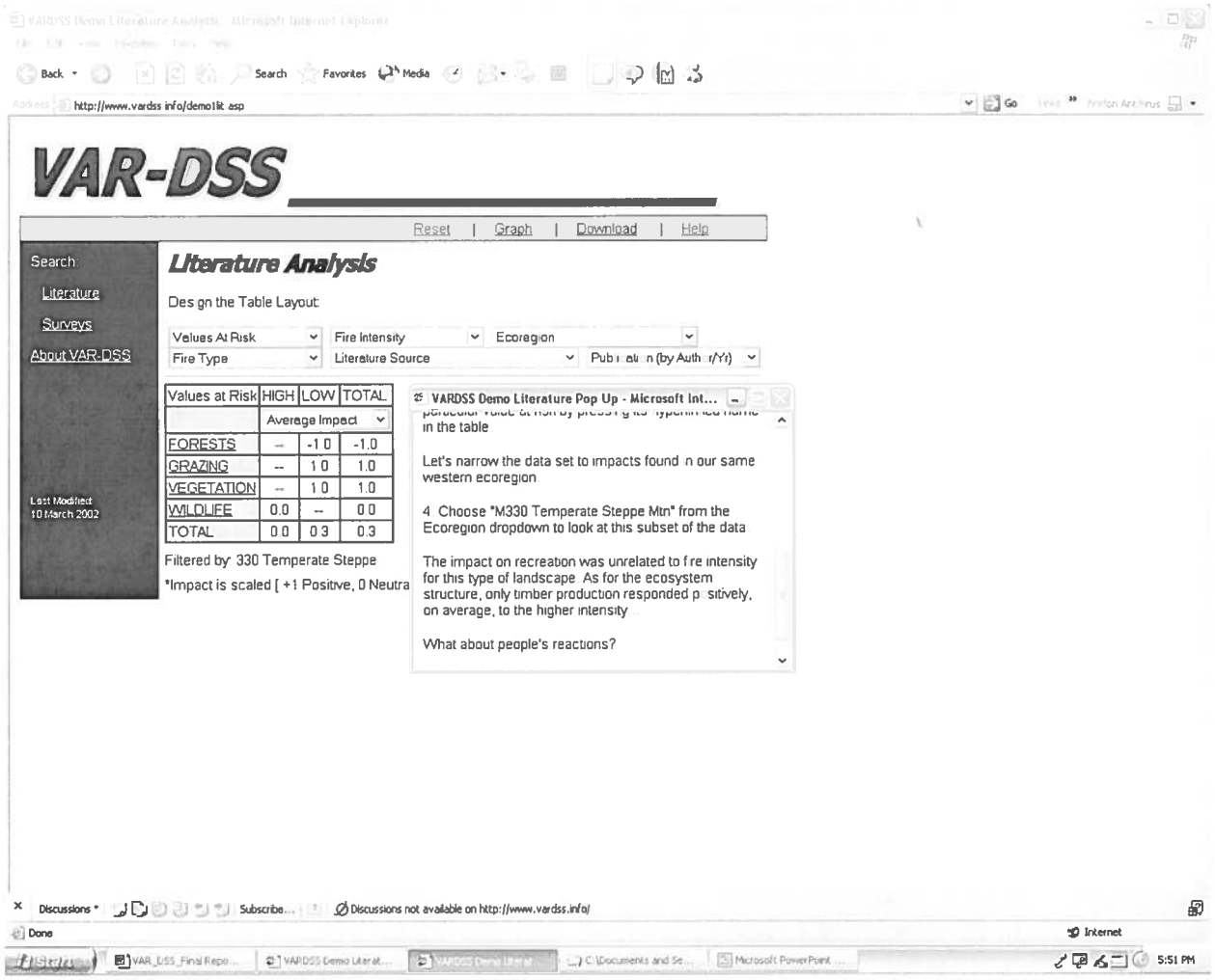
The results of these three steps are shown in the following screen:



We can see that only wildlife had a positive response, on average, to a high intensity fire, while recreation-related values responded more positively to fires of lower intensity. Note that you can get a description of a particular value at risk by pressing its hyperlinked name in the table.

Let's narrow the data set to impacts found in our same western ecoregion.

4. Choose "M330 Temperate Steppe Mt." from the Ecoregion dropdown to look at this subset of the data. The result is shown in the following screen:



The impact on recreation was unrelated to fire intensity for this type of landscape. As for the ecosystem structure, only timber production responded positively, on average, to the higher intensity...

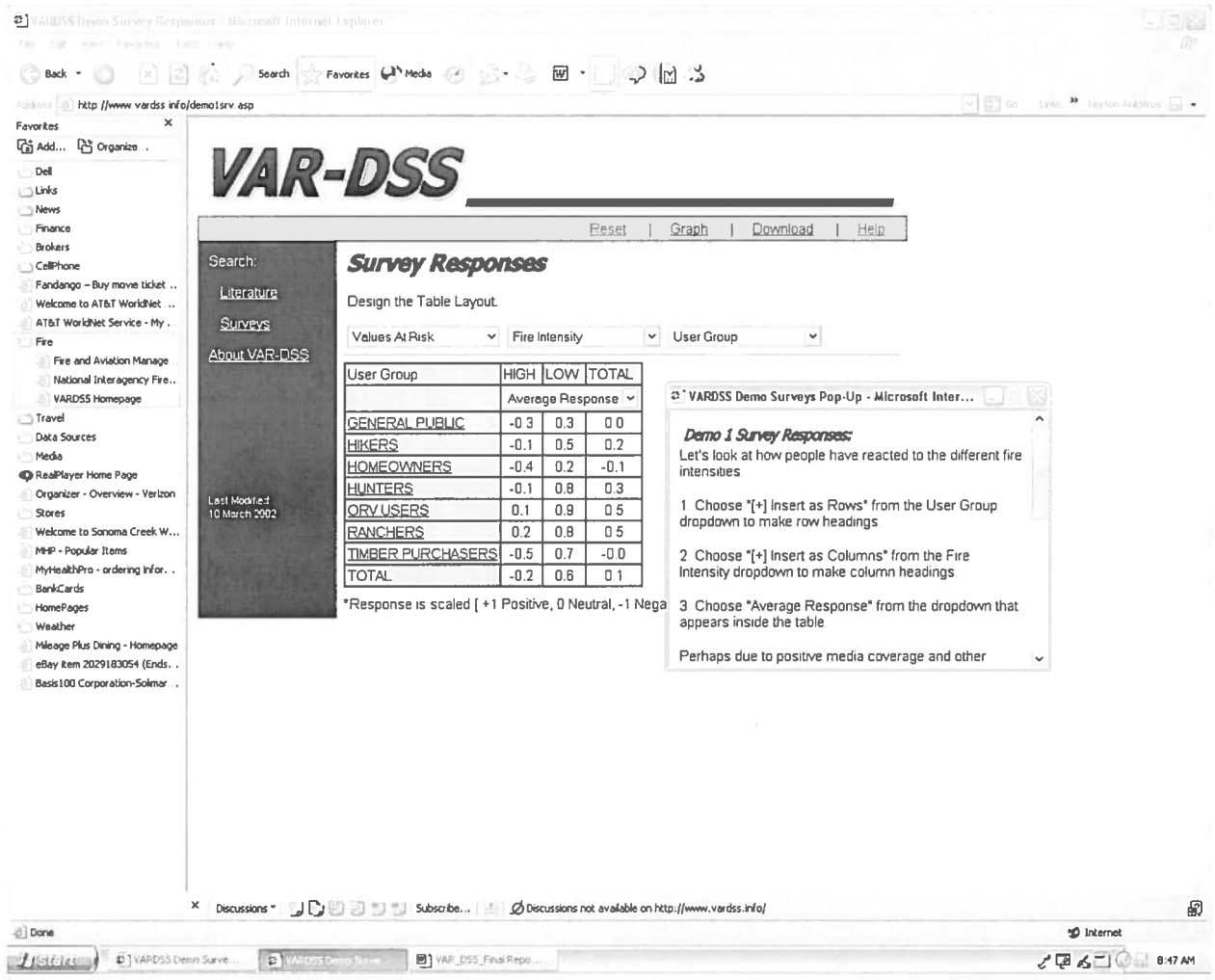
Note that many of the results in this demonstration summarized data on how the literature was evaluated for its effect on value. In the table above negative, neutral and positive impacts have been averaged. This is one characteristic that distinguishes VAR-DSS from a catalogue.

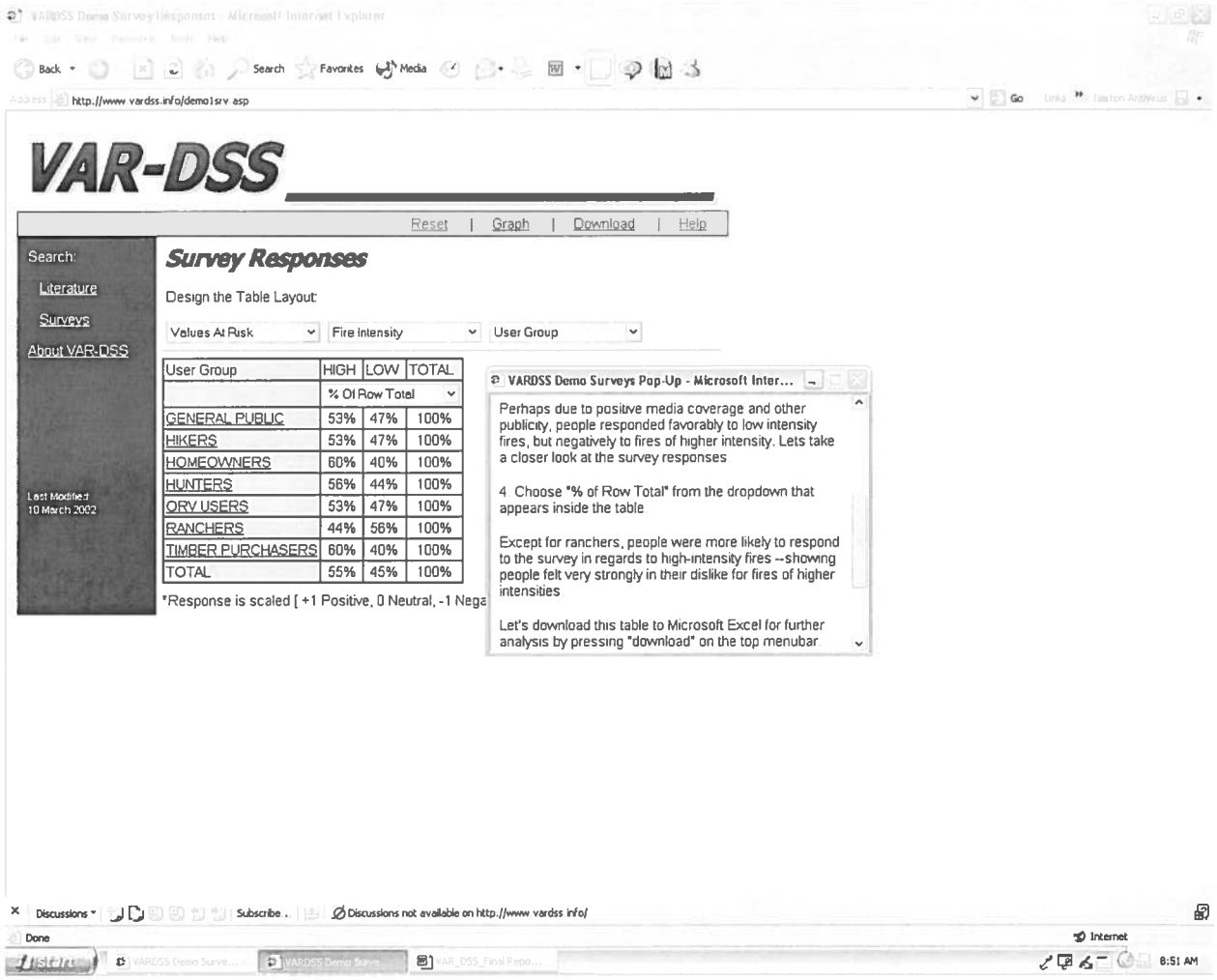
What about people's reactions?

Next Page

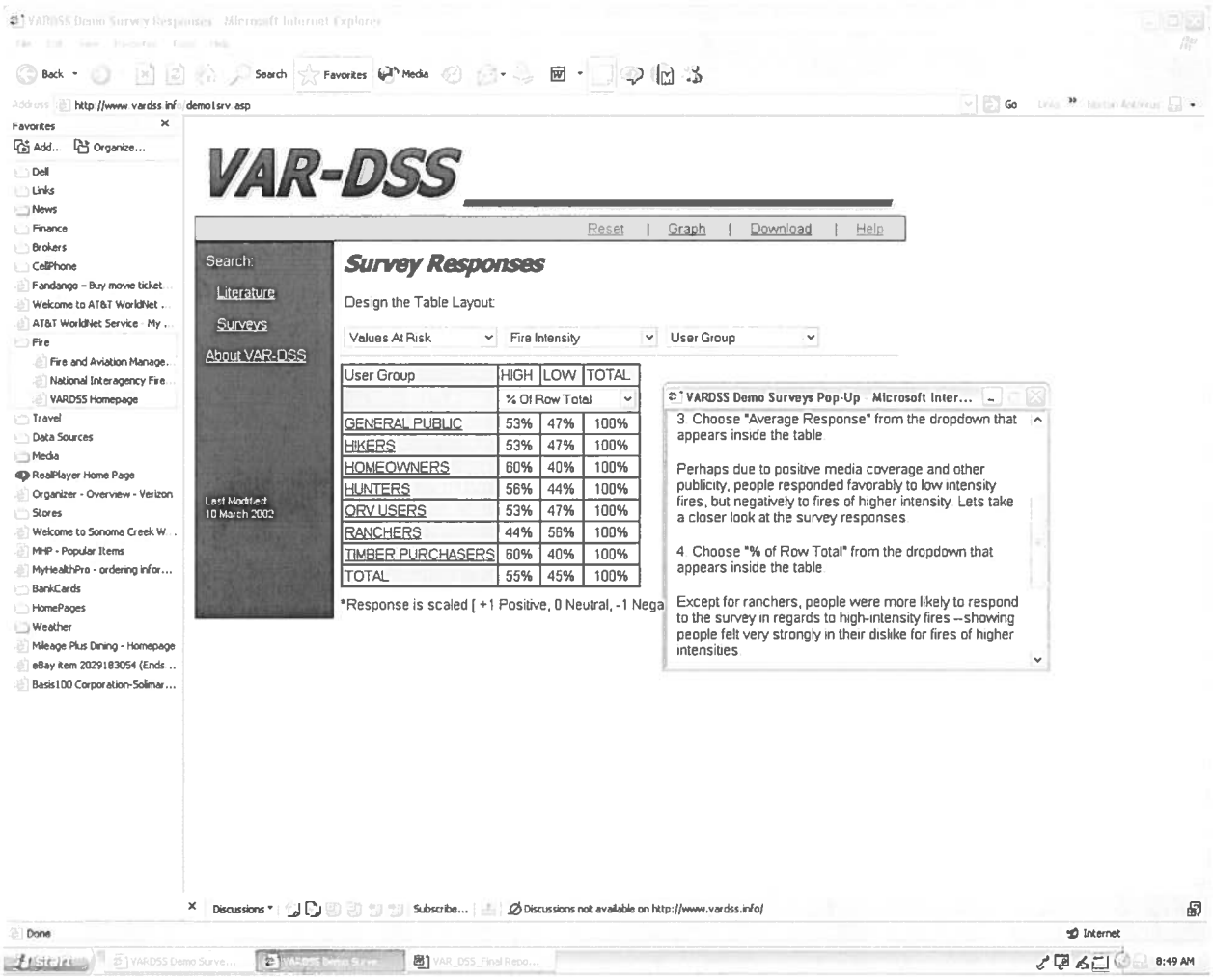
Following the demo's directions, we produced the following screen on public responses:

VAR-DSS


VAR-DSS
Reset | Graph | Download | Help
Search:
Literature
Surveys
About VAR-DSS
Survey Responses
Design the Table Layout
Values At Risk
Fire Intensity
User Group
User Group | HIGH | LOW | TOTAL
Average Response
GENERAL PUBLIC | -0 3 | 0.3 | 0 0
HIKERS | -0.1 | 0.5 | 0.2
HOMEOWNERS | -0.4 | 0.2 | -0.1
HUNTERS | -0.1 | 0.8 | 0.3
ORV USERS | 0.1 | 0.9 | 0 5
RANCHERS | 0.2 | 0.8 | 0 5
TIMBER PURCHASERS | -0.5 | 0.7 | -0.0
TOTAL | -0.2 | 0.6 | 0 1
*Response is scaled [+1 Positive, 0 Neutral, -1 Nega
Last Modified: 10 March 2002
VARDSS Demo Surveys Pop-Up - Microsoft Inter...
Demo 1 Survey Responses:
Let's look at how people have reacted to the different fire intensities
1 Choose "[+] Insert as Rows" from the User Group dropdown to make row headings
2 Choose "[+] Insert as Columns" from the Fire Intensity dropdown to make column headings
3 Choose "Average Response" from the dropdown that appears inside the table
Perhaps due to positive media coverage and other



Screen continued on next page:



The demo then shows that the data from the created table can be downloaded into MS Excel for further analysis by the user. By combining literature results with survey results, the user has an opportunity to broaden their view and expand their understanding of how values at risk might be related to their project or effort.

The measure of impact under **"count"** is a count of the number of articles/responses that were positive, negative or neutral with respect to fire effect. For example, a positive impact would be an indication of positive or beneficial fire effects. Some articles might have made both positive and negative impacts. In this case we would have listed a count for both the positive and negative.

DEMO #2

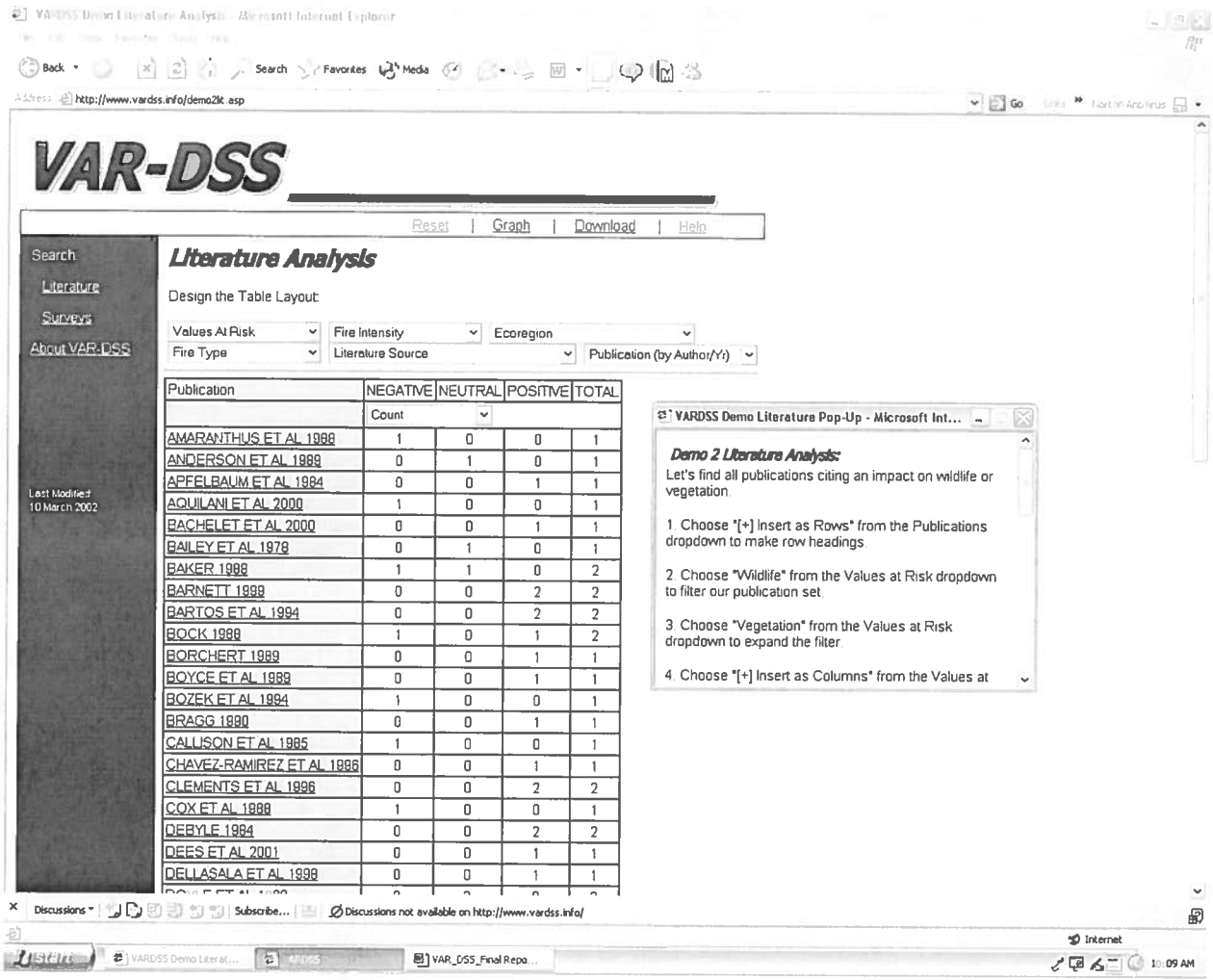
Demo two illustrates additional features of the VAR-DSS. Here we will build a list of literature and then expand it to include vegetation and wildlife impacts. We will also show how a particular literature citation can be obtained.

The demo begins…

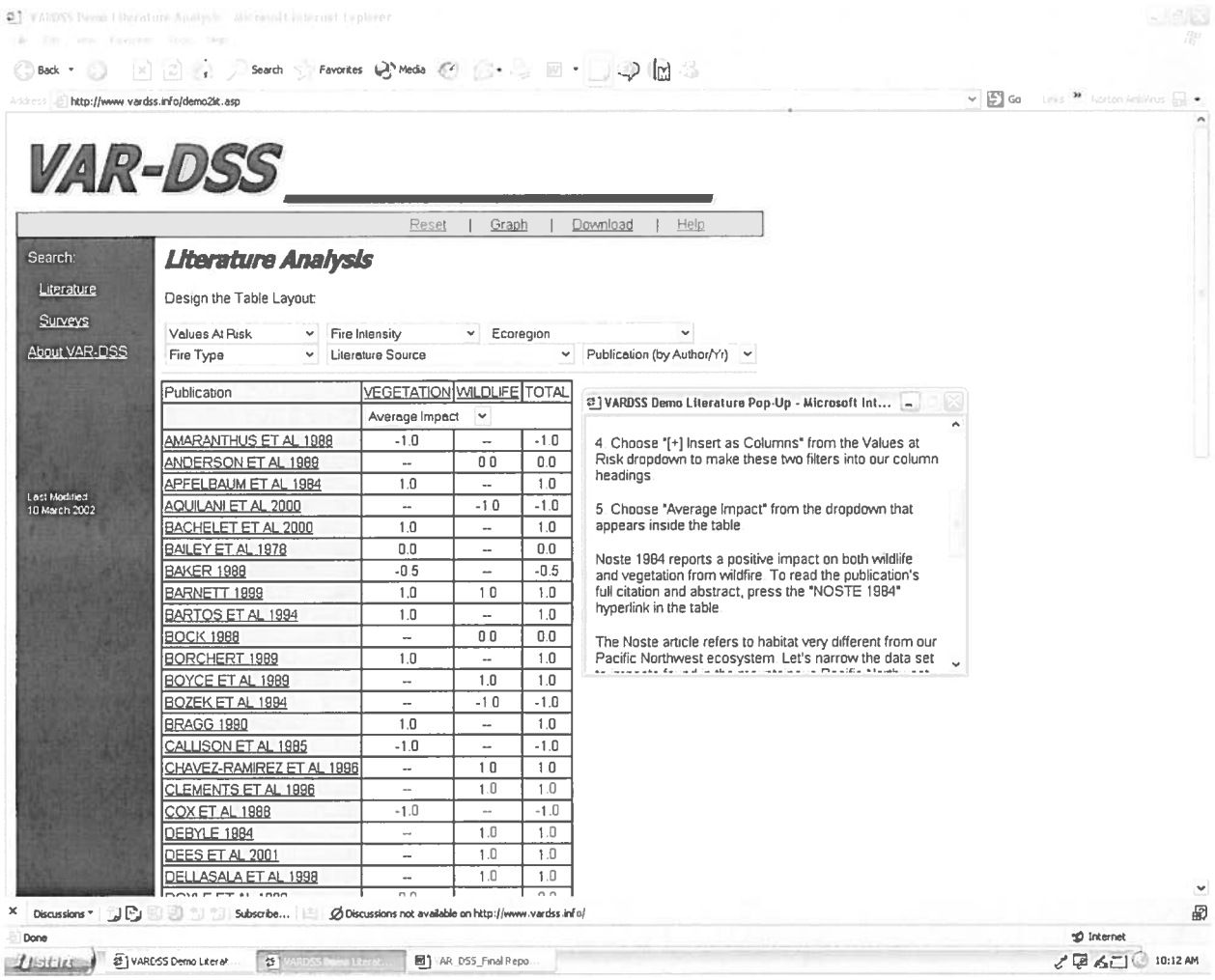
"You are part of an Interagency Fuels Management Team considering the reintroduction of fire to restore a large meadowland area in the Pacific Northwest. The meadow provides critical habitat to several species of local wildlife."

"You need to compile a list of literature regarding the reintroduction of fire to the area --specifically, the effective simulation of natural wildfire conditions and the resultant impact on wildlife and vegetation. You also want to be aware of public perception and attitudes in your consideration of the benefits of treatment versus the potential for negative public reaction."

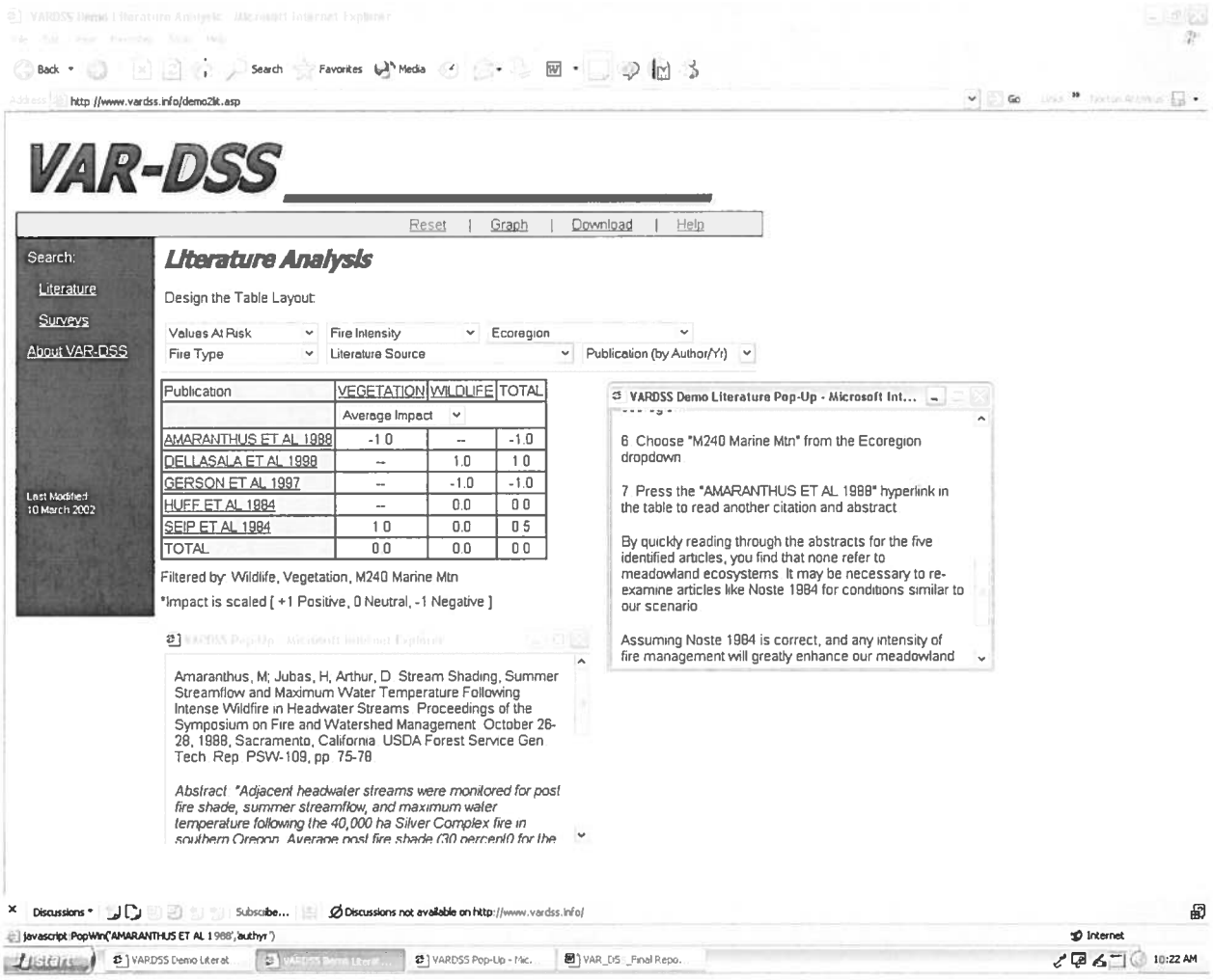
Executing the first three steps result in the following intermediate table:



Executing steps four and five produce the screen below:



The final screen will produce the following citation showing that the user can sort on analysis from broad summaries to specific citations.



The logic used in this second demonstration is more advanced than for demo #1 and illustrates more features of the VAR-DSS.

CONCLUSONS AND OUTLOOK

Phases I and II of the VAR-DSS project were highly successful. The prototype VAR-DSS fully operates beyond original specification and is significant in that it applies two software innovations: 1. it is a web-enables computer program and 2. it uses dynamic table design. Web enabled programs are becoming more common as software developers increasing place programs on the web for users to operate. This allows full distribution of the software at minimal cost and enables wide-spread access and distribution. The dynamic table design is used by major corporations for managing large amounts of data in a relatively simple ways. It is, as far as we know, new to fire and perhaps to public forestry.

The implications of this second innovation are potentially significant. While this design was used here to manage VAR, it could be vastly expanded to other fire management topics and problems. The dynamic table design would enable expansion of the system to incorporate VAR

into a broader fire management framework that would include other data sets of interest to managers as well as software that would aid in planning and budgeting fire management projects. Software such as Rx Cost used to estimate the cost of fuels treatments, cold be linked into a web enabled and integrated suite of fire management programs. In addition the dynamic table design also would enable cross agency sharing of fire data and of integrated management programs.

It is crucial to understand the VAR-DSS and similar systems are not similar to providing a library card catalogue. The data in the system have been processed and analyzed to provide summary information that is more analytic in nature. Further, because the VAR-DSS system is analytic, as opposed to just descriptive, it requires a modest investment of time by the user to gain even basic proficiency. Recognizing this, we developed the two demonstration programs included in the prototype.

In short, the project is completed and we think it was an outstanding success. It provides important insights into how a much broader and integrated interagency data system could be designed. Also recognize that this report does not do justice to the program.

Phases I and II have been complete since April 1, 2002, and because we have received no feedback from the JFS program, we can no longer promise to support the program as it has resided on the WEB.

We encourage the JFS leadership to consider the future of such a potentially powerful data analysis system including the implications that it might have for fire managers involved in VAR. Also, consider the implications for the design and operation of an integrated data analysis system that could facilitate interagency cooperation and common fire management efforts beyond analysis of values at risk.