Proposed USA-488 Award

Most Wanted Grid Survey

Final Report

October 31, 2007

The main text, exhibits, and section on statistical analysis were written by Kevin Kaufhold, W9GKA. The analysis on the Top 24 Grids, as well as the map and tables in that section, was developed and written by Bill VanAlstyne, W5WVO.

Executive Summary / Findings

The relevant population for this study is generally composed of amateurs seriously interested in working rare US grids. This is thought to number around 1,500, being primarily composed of VUCC holders and others that are located in the US and Canada. A sub-population composed of only those ops possessing the current station capability to contact all 488 US grids is also of great interest. This may number up to 500 people.

Standard statistical procedures have been employed, and one of the primary goals of the survey is to achieve statistically valid results. In conducting the survey, attempts were made to contact by e-mail all stations with 200 or more confirmed grids. Efforts were especially made to locate individuals with very high grid counts.

The response to the survey requests has been most gratifying. 88 people have supplied grid data, and 14 more have partially completed the survey with biographical and interest information. See Exhibit A for a list of those supplying information for the survey. The response percentage is far higher than with many professionally done surveys. If general VHF reflectors had been used for the survey requests, the response rate very likely would have been even higher. The sizable number of responses reflects a substantial level of interest in the topic at hand. Many 6-meter operators want to identify, and then work and confirm, the most wanted grids in the country.

Results of the survey are statistically significant at the 95% confidence level for the large bulk of grids, including all of the rarely activated grids. This enables the survey to identify with a large measure of credibility the “Most Wanted” grids in the US.

The FFMA User’s Group is also subjectively identifying the grids that they think may be rare. There is a close alignment between objective findings and subjective impressions as to most-wanted status.

The main text details 24 of the most needed grids in the US. The entire list of all 488 grids, ranked by most wanted to most confirmed, is included as Exhibit B. The Statistical Addendum extensively discusses statistical and mathematical concepts used in developing the Most Wanted List.

The Proposed FFMA / USA-488 Award

In July, 2007, Bill VanAlstyne, W5WVO, proposed an award to honor the memory of Fred Fish, W5FF. Initially referred to as the **Fred Fish Memorial Award** (FFMA), the award would be given to any amateur radio operator who confirms on 6 meters all 488 grids of the US contiguous states. See the FFMA FAQ for more details on the award and the discussion concerning various details, including the exact composition of grids. A Yahoo User's Group was initiated to explore the various issues in-depth. In August, 2007, the award was given the alternative name of **USA-488**, as some potential sponsors expressed a preference for having generalized titles used for awards. Even so, everyone in the User's Group has a definite preference for retaining the FFMA name, and strong efforts to make that happen will continue.

Development of the Most Wanted Grid Survey

In discussions on the FFMA Yahoo User's Group, it became quickly evident that a list of the rarely activated grids would be highly desirable. Kevin Kaufhold, W9GKA, began collecting information on grids confirmed by user group members. An Excel file containing all confirmed grids was developed, and statistical concepts were considered. The Most Wanted List resulted. Similar in general theme to the DXCC most wanted country list, the identification of specific "wanted" grids might hopefully lead to grid DXpeditions and forays to confirm rare grids.

The following collections efforts were used in the survey.

- The general goal was to produce a survey that identified the rare grids in the contiguous US. The more specific objective was to generate a "most wanted" grid list having statistically valid results at the 95th confidence level and containing appropriate demographic representation of the VUCC population. This resulted in a rather painstaking process, which is detailed below.

- The VE2PIJ VUCC list was used as the basic source of people who had confirmed grids on 6 meters. The VE2PIJ list is based on published information of VUCC holders, but also includes information directly received by VE2PIJ from any individuals supplying information on confirmed grids. W9GKA supplemented the list with other individuals also known to have confirmed grid totals.

    - The VE2PIJ list with supplemental information contained 1,585 stations having at least 100 confirmed grids. The list was then filtered out for known SK, known QRT, deleted VUCC numbers, and non-US/VE stations. This resulted in 1,459 individuals who were considered to be the target population of the survey. The list was then ranked from high to low confirmed grids.

- FFMA members provided grid information in late July, 2007. This resulted in 8 responses.

- FFMA members obtained 9 additional survey responses in August and September, 2007 from people they knew on the VUCC list. Most of the responses came from stations with higher grid counts. This method of survey collection was discontinued after a short time, as concerns were expressed that self-selection bias might creep into the survey results from sampling friends and acquaintances of FFMA members.

- A formal survey was developed in late August, 2007, through surveymonkey.com. The intention was to conduct a well-run survey over a limited time frame. The User's Group initially tested a draft survey, and then revised the survey into a final format.

- The decision was made to not use the VHF reflectors in the collection of survey information. It was felt that reflector traffic could open the FFMA User's Group to more activity than could be reasonably handled at the present time. It was also thought that reflector answers could degrade the quality of survey responses, as respondents would be able to provide incomplete or inaccurate data and information, and could do so under assumed call-signs. Collection efforts were instead concentrated on direct e-mails to call-signs with known confirmed grid counts. The survey computer program provided quality control of survey answers through the identification of specific call-signs keyed to e-mails sent out by the program. This was a much slower and more tedious process than using the reflectors, as it meant collecting e-mail addresses on as much of the targeted audience as possible. The quality of response would be higher with this route, however.

- The possibility of random sampling of the target population was discussed. After much thought, the decision was made to systematically survey all VUCC leaders above a designated cut-off. This was initially set at 300 total confirmed grids. 256 individuals are at or above this cut-off. This moved the survey away from a random sample and towards an attempted compilation of all members of a sub-population of VUCC holders. The 300 grid cut-off figure was established in the belief that all people having 300 grids confirmed would probably be very interested in pursuing and obtaining rare grids.

    - E-mail addresses were collected through QRZ. If no e-mail addresses were given or if the call-sign was not in the QRZ database, an e-mail was generated to <call> at arrl.net.

    - The 1st letter (see Exhibit C) was sent to 265 individuals in the 300 – 1200 range on 9-4-07. 90 e-mails bounced, many of these being the arrl.net address used as a default when no addresses were known. 2nd request letters were sent out on 9-10-07 (Exhibit G). Thank you letters were sent to survey respondents (Exhibit F). Requests for more information were sent to stations starting but not finishing the survey (Exhibit E). Regular mail letters were not sent out, due to the extensive time and monetary commitments necessary for such an effort.

- A general announcement letter (see Exhibit D) was sent out to individuals who had difficulty answering the survey and who requested assistance. This letter contained a general linkage that is not individually keyed to e-mail address, so it was offered only after there was specific knowledge of the individual. This provided another measure of quality control.

- The decision was then made to move down the VUCC list, again in a comprehensive fashion. The general belief was that individuals between 200–299 confirmed grids might still have the capability of contacting rare grids and ultimately working towards an all-US-grid award. This added 225 people to the sub-population, for a total count of around 500 individuals at or above the 200 grid cut-off figure.

    - E-mail addresses were collected on these individuals, in a similar fashion to the above effort. The 1st letter to this group was sent on 9-10-07. Over 90 e-mails bounced from this list, the vast bulk being <call> at arrl.net. Thank you letters, partial completion letters, and 2nd request letters were also generated for this group.

- Given the high bounce rate for both e-mailings, VE2PIJ supplied e-mail addresses collected from his VUCC list activities. Using these addresses, new 1st letter e-mails were sent out to people with high grid counts and who had different addresses from previous bounces.

- The decision was made to not survey the lower VUCC confirmed levels. The belief existed that operators with VUCC totals under 200 grids would not have the current capability to realistically contact very rare grid squares. There was also a feeling that the large bulk of the confirmed grids of this group would be commonly available anyway, and would not lead to further data on the rare grids. Many of these stations are possibly inactive on 6 meters, in any event.

- Between the various e-mail requests, 71 responses to the grid question were received through the survey, and another 14 provided biographical and interest information.

- Once information was collected, it was reviewed and edited into a standard format. This was necessary because the survey responses provided for four different options by which to answer the grid question. Individuals also sent grid data directly to FFMA members, instead of answering the survey directly. This data came in a variety of formats (MS Word, MS Excel, ASCII), and included DX grids. With multiple formats and data sets, editing was itself a time-consuming process.

- As final efforts toward quality control and verification of data, station grid responses were double-checked between the raw data and the edited information for accuracy of collection and editing. Data was also reviewed for possible confusion or inaccuracy by the respondent (see *Caution* in the section on the 24 Most Wanted Grids).

- Once the grid information was edited and verified, it was then sorted and statistically evaluated. The graphs, tables, Most Wanted List, and the other substantive information in this report were then generated.

- Drafts of this report were circulated for comments and revisions to the FFMA User's Group. The final version of this report was then circulated to survey participants and released to the general amateur population in November 2007.

A breakdown of survey statistics includes:

From FFMA members ------ 8
Contact from FFMA ------ 9
Grid answers to survey ----- 71
Total Grid answers ---------- 88

Interest info only in survey - 14
Looked at survey only ------ 2
Total activity ---------- 104
Survey Response Rate ----- 85%

Informal data collection - 1 month
Formal survey - 1 month
Data compilation, Report - 1 month
Start to Finish - 3 months

Interest and Comment Questions

Biographical Questions. The survey asked a few simple biographical questions before moving into the interest and grid questions. Information on survey participants is contained in Exhibit A.

What is your amateur radio call sign?

What is your grid square (four characters only)?

What is your State (USA) or Province (Canada)?

Interest Questions. The survey asked several questions relating to operating activities on 6 meters. Survey participants have been very active on 6 meters, spend a significant amount of their operating time on the band, and expressed interest in grid DXpeditions to rare grids.

Years Active on 6 meters -----

Less than 2 years	0.0%
2 to 5 years	5.9%
5 to 10 years	15.5%
10 to 20 years	19.1%
20 to 40 years	39.3%
More than 40 years	20.2%

Portion of operating time on 6 meters -----

Less than 10%	21.4%
10% to 30%	15.5%
30% to 50%	19.1%
50% to 70%	21.4%
70% to 90%	15.5%
More than 90%	7.1%

Interest in working and confirming all 488 contiguous United States grid squares on 6 meters if there were a high-visibility, high-prestige operating award -----

Not at all interested	2.4%
Somewhat interested	26.2%
Quite interested	48.8%
Extremely interested	22.6%

Interest in researching, organizing, supporting, or operating in a grid DXpedition in the contiguous 48 United States -----

Not at all interested	15.7%
Somewhat interested	56.6%
Quite interested	24.1%
Extremely interested	3.6%

Type of interest in USA-488 grid DXpeditions -----

Doing research on possible grid DXpedition locations	35.4%
Creating/organizing/managing a grid DXpedition project	13.9%
Providing financial support	29.2%
Providing equipment	20.0%
Direct participation	58.5%
Other	13.9%

Comment Questions. The survey asked several questions about interest in activating rare grids. A simple comment box always evokes interesting and thought-provoking responses. Several comments were of a positive nature.

- *Keep me updated as to results, Glad to see it done. 73's*

- *It's nice to see something like this coming together. 73*

- *Very nice undertaking. Thanks for making this one available.*

- *This is a good idea and was well executed. Nice work! I hope you get a good response, and I look forward to seeing the results.*

- *Thanks, glad to help. Hope to hear more from this survey.*

- *I'm sure you will tabulate results and send them back to the respondents. I appreciate your intent. As time goes by perhaps I can do more.*

- *Good idea ! I hope to receive further info and results.*

- *Hi, good luck on your project.*

On specific grids, we heard about two very tough ones, CM79 and EL58.

- *K6LMN has activated many of these 6M wanted grids but no takers at the time. Activated all grids in California except tough one - CM79*

- *I've driven as far south toward EL58 - to the beach and was still 6 miles from EL58. If any of the US is in this grid it must be an island.*

We also received many comments regarding many other grids.

- *I and several of my friends have taken much effort in activating rare grids here in Idaho during the ARRL June VHF contest.*

- *Both the wife and I are now retired... We have put on several grids and will continue to do so...*

- *I have 4-wheel drive and am set up for solar-powered remote operation at the 100-watt level on higher VHF bands for EmComm purposes. I could add some antennas and higher support structures for 6m with some advance notice.*

- *[We] talked about going up to DN75 in June in Montana but we have had too many conflicts.*

- *At age 78 still active, I have operated from rare grids around here before - EM16, EM47 - to name a few.*

- *Would help with near-by grids. Back in the early 80's finished a bunch of satellite WAS awards by spending 3 days in WVA!!!*

- *There are likely few really rare grids within a days drive of my QTH. Otherwise I might be interested in doing a grid expedition.*

- *Interesting gaps including a diagonal band from MO to ND.*

- *Have operated a couple of multi- operations including with W1XT from DN80 in 2000.*

There is also a clear concern regarding Hawaii and Alaska, as evidenced by the following:

- *What happened to Alaska & Hawaii? - they are part of the USA*

- *Also Hawaii BK19,28 AL91,92 Alaska grids.*

- *What is the difference between DM-02 and the Hawaiian Islands (BL & BK) ?*

- *I didn't see any Hawaiian or Alaska grids on your table, or maybe I just overlooked them.*

To explain ourselves on this item —

First and foremost, the survey focused only on the 488 grids in the contiguous US because that is the feat that Fred Fish, W5FF, accomplished. This award promotes the idea of duplicating his accomplishment, something no one else in the world has yet done.

Second, confirming *all* grids in *all 50 states* is way beyond a difficult challenge; it is an unrealistic goal. There are over 100 grids in Alaska alone, many of them uninhabited and environmentally hostile. Hawaiian grids, while not inhospitable by any means, are generally beyond the reach of US stations in the eastern half of the country except during F2-layer band openings, which occur only during solar maxima every 11 years. The User Group felt the award should be attainable using sporadic-E and other regularly occurring terrestrial propagation modes that a fairly typical amateur could make use of.

In short, we wanted this to be an extremely difficult, challenging award to earn, but not an impossible one.

There were also a few questions dealing with requirements for an award:

- *Will existing grids count or do we have to start all over again?*

- *I moved, so my grids won't help you. Sorry.*

The proposed FFMA award is designed to mesh very smoothly with the existing VUCC program. All of the VUCC rules that are logically applicable to a single-band award are in effect for FFMA. For example, any grids confirmed since the start of the VUCC program can count towards the proposed FFMA award. And, as in VUCC, any confirmed contact with any part of a required grid counts, whether the station is located in the US, in Canada or Mexico, or in off-shore waters. VUCC Rule 6 on station locations also applies, so relocating may affect the confirmed grid count in some cases, just as in VUCC. The rule is exactly the same for either award.

On the technical aspects of the survey, we received the following:

- *A file upload where people can send you their whole log (and have the server compute the need/confirmed totals) would be popular and get you more responses.*

- *Survey seems to work with lower case letters and on to places for the state name. Good luck.*

- *I'm confused. The third to the last page said you could input grids worked or needed but the next question is only for those worked. My list is for grids needed.*

- *Sir, this survey was answered on my work computer over a two day time.*

All surveys go through a break-in period. During initial testing on this survey (we took the survey ourselves to work out the bugs), we became concerned that too many options on the grid question could create confusion in the responses. Once we read the above comments however, we came to believe that confusion was instead occurring because of providing too few options. By this time, we had also received several grid answers sent directly from people who grew frustrated with the length of the grid checklist. To remedy the situation, several more options were then added for grid data. This generated lots of data-editing on our part, but did seem to resolve the issues that some survey participants were having. At the same time, it seemed to create problems and resulting errors from other respondents. (See the Addendum on Future Surveys towards the end of this document for a more in-depth discussion of these issues.)

As suggested in one of the comments, automated processing of formatted file uploads would have been an ideal way to handle the volume of data, but this was beyond the scope of our resources. We truly appreciate the extra time that many survey participants took to complete this survey! The fact that we had so many complete responses in spite of

the long and involved grid question shows incredible interest and patience by the survey respondents. Thank you for all efforts expended in completing the survey.

The 24 Most Wanted Grids

The way in which a question is asked can affect the answers, so it is important to briefly discuss the exact verbiage of the grid questions. The following grid-related inquiries were contained in the survey. As noted above, the survey was ultimately expanded from two options for providing only confirmed grids to having all four of the following options.

Note that the following percentages only include survey on-line completions. The numbers do not include people who sent grid data directly to survey workers. The plain-text options would have much higher percentages, if direct responses would be included in the following calculations.

> In the next survey item, you will tell us which FFMA grids you have confirmed or still need on 6 meters. How would you like to tell us about that?

Check off the US grids I DO have confirmed.	61.8%
Check off the US grids I DO NOT have confirmed.	26.3%
Paste in a plain-text list of the US grids I DO have confirmed.	7.9%
Paste in plain-text list the US grids I DO NOT have confirmed	4.0%

This question then directed the survey participant to one of four of the following questions:

For Checklist of Grids CONFIRMED on 6 Meters ------

> Please mark each grid square that you have worked AND CONFIRMED from your current QTH, as defined in VUCC Rule #6: All contacts must be made from locations no more than 200 km apart.

For Checklist of Grids NOT CONFIRMED on 6 meters -----

> Please mark each grid square that you have NOT CONFIRMED (that is, that you still need) from your current QTH, as defined in VUCC Rule #6: All contacts must be made from locations no more than 200 km apart.

For Plain-text of CONFIRMED GRIDS -----

> Please paste in a plain-text list all grids you have CONFIRMED on 6 meters from your current QTH, as defined in VUCC Rule #6. Use a delimiter character between grid squares (tab, comma, space, etc).

> Optionally, you can enter ALL grids confirmed on 6 meters from your current QTH, if this is easier. We will remove those that aren't part of the 488 contiguous US grids.
>
> NOTE: Do NOT paste in full log data, only the 4-character grid squares confirmed, separated by a delimiter character.

For Plain-Text of Grids NOT CONFIRMED -----

> Please paste in a plain-text list of all the contiguous 488 US grids that you have NOT CONFIRMED (that is, that you still need) on 6 meters from your current QTH, as defined by ARRL VUCC Rule #6. Use a delimiter character between grid squares (tab, comma, space, etc).
>
> NOTE: Do NOT paste in full log data, only the 4-character grid squares confirmed, separated by a delimiter character.
>
> ALSO NOTE: the following island-only grids are considered to be part of the contiguous US: CM93, DM02, EL58, EL84; and that CM79 and DL88 are part of the US with very small pieces of US land in those grids. If you have NOT CONFIRMED these grids, please include them in your NOT CONFIRMED LIST.

Based upon responses to these questions in the survey, all 488 grids in the contiguous US were then ranked from least confirmed through most confirmed. See Exhibit B for the full list of all 488 US grids. Of great interest to the FFMA User's Group is the identification of the rarest of all US grids. Hopefully, widespread knowledge of the most wanted or needed of all US grids will generate home-based activity in or DXpeditions to these grids.

Please keep in mind that different surveys can and will generate different results, depending upon collection methods employed and parts of the population sampled. The following list should therefore be viewed as a representative sampling of the VUCC population. The emphasis (but not exclusive focus) is on stations with high-grid counts. No exact, 100% certainties exist in the world of statistics, only varying degrees of probabilities. Still, with so few survey respondents confirming the 24 grids on the top of the rankings, statistical levels of significance attach to the findings. See, the Statistical Addendum for specifics.

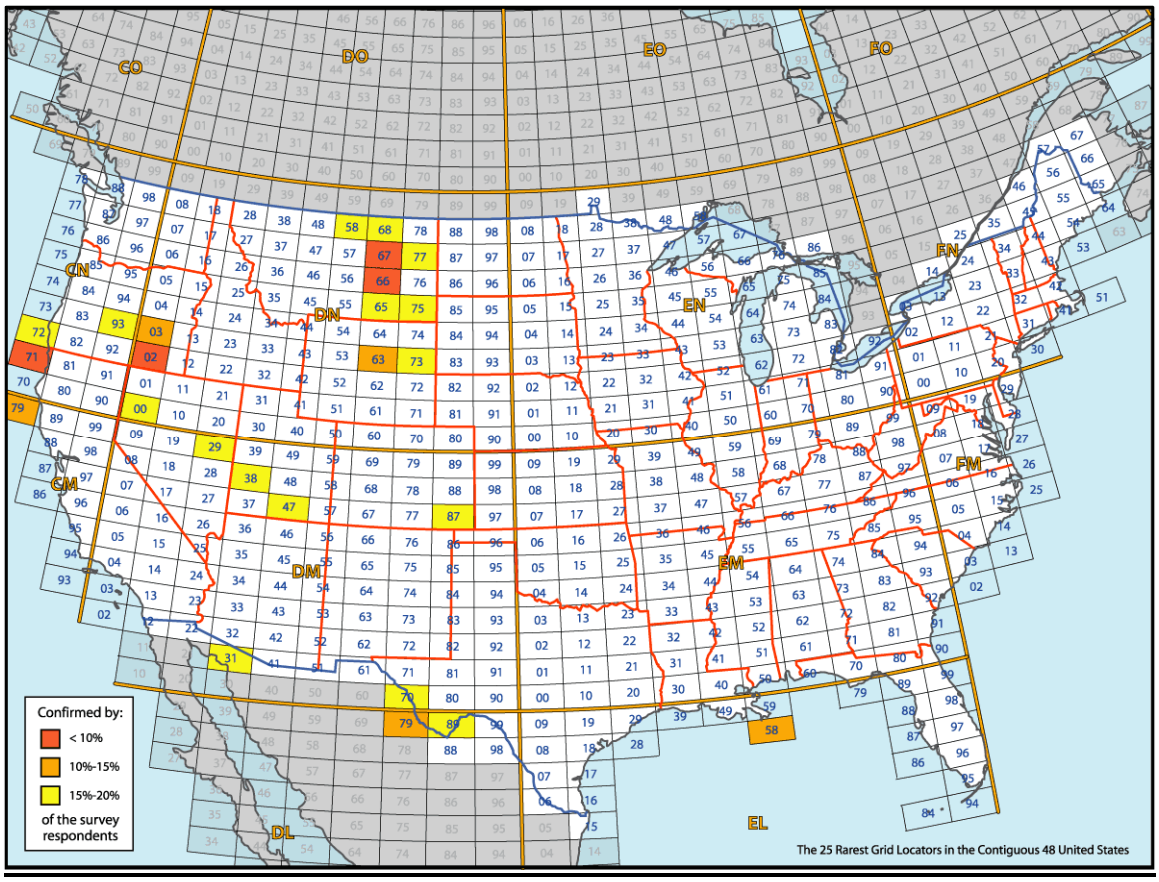
Please also note a general caution in the collection of data. Even though the FFMA User's Group attempted to be methodical and accurate in its collection efforts, the final survey results are also dependent upon the accuracy of the individuals supplying the data. This concern exists with any survey.

- For this specific survey, the concern was with individuals supplying needed grid data when they may not realize that some exotic grids squares were located in the US

(CM79, CM93, DN02, DL88, EL58, EL84, and others). In an effort to inform individuals, an explanation on this survey option noted that these grids were in the US (see the plain-text NOT CONFIMED option, above). In spite of this, some possibility remains that grids generally not known to be in the US may be rarer than they appear to be in the final survey results.

- There was also a concern expressed that some people might confuse the various options, such as supplying confirmed grids after indicating that they were supplying needed grids (or vice versa). There was also the possibility that some participants may have supplied incomplete grid information (such as not including any grids in the DL field). All answers were reviewed for these possibilities and were corrected when mistakes were confirmed by survey participants. In two cases of very obvious mistakes that could not be confirmed by the participants, the grid data was not included in the final results. The comment and interest questions from those respondents were still utilized, however.

Now that preliminary issues have been discussed, we can move onto the results of the survey. The following list itemizes the rarest 24 grids in the nation. Note how almost all of the grids are either interior western US locations having little population (Eastern Oregon; Wyoming; Montana; Nevada; Utah; Colorado), or grids that border the US in someway (along the Pacific Ocean; near Canada; in and around Mexico; in the Gulf of Mexico). Details on the 24 least confirmed grids in the survey are contained below. The following map, all of the accompanying tables, and much of the commentary concerning the Top 24 rare grids have been supplied by Bill, W5WVO.



DN67 – confirmed only 5 times, 5.7% of the survey. This is in Montana. There are few amateurs living in this grid, and no large population centers.

Licensed amateurs:	5
Demographics:	A few small towns. Sparsely populated.
Geography:	High plains / rolling hills, 2200-2800 ft; Ft Peck Lake. Higher elevations in the south.
RF takeoff angle issues:	No significant takeoff angle problems.
Accessible mountaintops in grid:	Yes, but probably not necessary.
Boundaries/corners with other Top 24 grids:	Southeast corner with DN66/77 (http://www.confluence.org/confluence.php?id=480). Northeast corner with DN68/77 (http://www.confluence.org/confluence.php?id=491). Northwest corner with DN58/68 (http://www.confluence.org/confluence.php?id=493). These are prime activation spots if operating permission can be negotiated with property owners.

CN71 – confirmed only 6 times by 6.8% of the survey responses. This grid is mostly in the Pacific Ocean, and lies along coastal northern California. However, Crescent City, California is in the grid, with 135 resident amateurs, so it is perplexing that so few survey respondents have confirmed it. This grid is consistently needed, however, among all the top grid hunters. Communication with several resident amateurs indicates that there is simply no one there who operates 6 meters. This grid is a prime candidate for *permanent activation* by helping get local hams active on the band.

Licensed amateurs:	135
Demographics:	Crescent City (112)
Geography:	Coastal plain, low mountains to the east.
RF takeoff angle issues:	Less than 2° any direction from Crescent City area
Accessible mountaintops in grid:	Yes, overlooking the city.
Boundaries/corners with other Top 24 grids:	Boundary with CN72 (southwest OR) to the north.

DN02 – confirmed 6 times by 6.8% of the survey. This grid is in the interior of Oregon. The area is described by locals as "the big empty". Steen Mountain is in the grid, at 9,300 feet and a road to the top. A gate on the road is locked until the snow thaws out, however, typically by early July. Juniper Mountain is also 4 miles into the grid from the northwest. KB7ME may be planning a grid DXpedition to somewhere in DN02 for the 2008 June VHF QSO Party.

Licensed amateurs:	0
Demographics:	Very sparsely populated. A very few small towns.
Geography:	Northern edge of Great Basin Desert. Mountain wilderness and desert valleys
RF takeoff angle issues:	Activation from most valley locations would be problematical. Mountaintop DXpedition.
Accessible mountaintops in grid:	Yes, many
Boundaries/corners with other Top 24 grids:	Northwest corner with CN93/DN03 (http://www.confluence.org/confluence.php?id=592).

DN66 - confirmed 7 times, 8.0% of the survey. This grid is in Montana and has 23 amateurs living in it.

Licensed amateurs:	23
Demographics:	Forsyth (17)
Geography:	High plains, Yellowstone River
RF takeoff angle issues:	Essentially flat in all directions
Accessible mountaintops in grid:	High spots, no real mountains
Boundaries/corners with other Top 24 grids:	Boundary with DN65 to the south. Northeast corner with DN67/77 (http://www.confluence.org/confluence.php?id=480).

DL79 – confirmed 10 times, 11.4% of the responses. This grid is in the Chihuahuan Desert, with the towns of Presido, TX and Ojinaga, Mexico located in the grid. There has been no recent activity. N6CL may have operated from Ojinaga in the past.

Licensed amateurs:	0
Demographics:	Presidio is largest town.
Geography:	Rio Grande plains; volcanic mountains and mesas away from the Rio Grande
RF takeoff angle issues:	From Presidio, essentially flat in all directions.
Accessible mountaintops in grid:	Yes.
Boundaries/corners with other Top 24 grids:	Northeast corner with DM70/DL89 (http://www.confluence.org/confluence.php?id=307). Was activated by some hams previously.

DN63 - confirmed 10 times, 11.4% of the survey. Wyoming.

Licensed amateurs:	13
Demographics:	Small towns mostly in east and southwest of grid
Geography:	High plains east and southwest, mountainous in the central and northern parts of grid
RF takeoff angle issues:	
Accessible mountaintops in grid:	High spots in plain areas. Mountains in north, some accessible, but area is extremely remote.
Boundaries/corners with other Top 24 grids:	DN73 on eastern boundary.

CM79 – confirmed 11 times, 12.5% of the respondents. The grid contains only a square mile of land, and people must back-pack into this small sliver, which is primitive and uninhabited. Last known activity was a grid DXpedition in 1995 that made 60+ contacts.

Licensed amateurs:	0
Demographics:	Uninhabited.
Geography:	Coastal range rises sharply from the Pacific. Rugged and primitive.
RF takeoff angle issues:	Getting out is a difficult proposition from anywhere in this grid square. Useable takeoff angles to the east may be possible from some specific locations. The northeast corner of the grid square is only slightly below the northwest-southeast ridgeline.
Accessible mountaintops in grid:	No mountaintops (though the Chemise Mountain ridgeline is close). Nothing is easily accessible.

DN03 - confirmed 11 times, 12.5% of the survey. This Oregon grid borders DN02, and is also considered rare, although not as much as DN02. KI7JA activates this grid sometimes.

Licensed amateurs:	27
Demographics:	Burns/Hines (24)
Geography:	High desert basin, mountains to the north
RF takeoff angle issues:	From Burns/Hines, 3.5° to the west, but clear in all other directions.
Accessible mountaintops in grid:	Some forestry lookouts
Boundaries/corners with other Top 24 grids:	Southwest corner with CN93/DN02 (http://www.confluence.org/confluence.php?id=592).

EL58 – confirmed 11 times, 12.5% of the survey. This grid is in the Mississippi Delta south of New Orleans. There is no connection to the mainland, and the nearest road on the mainland ends five miles north of EL58, according to one report supplied in survey responses. There may be refinery activity around the mouth of the Mississippi River, although Hurricane Katrina may have reduced commercial activity in the region. There are no amateurs living in the grid.

Licensed amateurs:	0
Demographics:	Oil/gas industry depots; no residential population
Geography:	Mississippi River delta; island sand bars no more than 5 to 7 feet above mean high tide. Accessible only by helicopter or boat.
RF takeoff angle issues:	No. Flat.
Accessible mountaintops in grid:	No

DN58 - confirmed 13 times, 14.8% of the survey. This is in upper Montana, bordering Canada.

Licensed amateurs:	59
Demographics:	Havre (53) in western part of grid; other small towns along US 2.
Geography:	Milk River valley tracks with US 2 through central part of grid. Hills and buttes in southwest.
RF takeoff angle issues:	From Havre, worst-case 2° (southeast). Typical along river looking to the south / southeast.
Accessible mountaintops in grid:	Few mountaintops with roads. Bowery Peak (6150 ft) and Centennial Mountain (5806 ft) are exceptions.
Boundaries/corners with other Top 24 grids:	Southeast corner with DN67/68 (http://www.confluence.org/confluence.php?id=493).

CN72 - confirmed 14 times, 15.9% of the responses. Pacific Ocean / Oregon grid. With 200 licensees, why is this grid even in the Top 24? Must generate local 6-meter activity!

Licensed amateurs:	200
Demographics:	Brookings (97); Gold Beach (49); numerous other small coastal towns.
Geography:	Coast range
RF takeoff angle issues:	Yes. From the coast, takeoff angle is significantly impaired except up and down the coast. Need to get on top of a hill or mountain.
Accessible mountaintops in grid:	Many, some close to coast/towns, e.g., Grizzly Mountain near Gold Beach
Boundaries/corners with other Top 24 grids:	Boundary with CN71 (northwest CA) to the south.

DM38 - confirmed 14 times, 15.9% of the responses. Utah, bordering with Nevada.

Licensed amateurs:	95
Demographics:	Scattered towns
Geography:	High desert basin, mountain ridges
RF takeoff angle issues:	Mostly no problems unless you get close to the mountains
Accessible mountaintops in grid:	Yes, but road access is minimal
Boundaries/corners with other Top 24 grids:	Southeast corner with DM47 (http://www.confluence.org/confluence.php?id=662). Northwest corner with DM29 (http://www.confluence.org/confluence.php?id=669).

DN47 - confirmed 14 times, 15.9% of the survey. Southern Utah along Arizona border.

Licensed amateurs:	14
Demographics:	East of Kanab (6), Escalante (3); sparsely populated.
Geography:	Glen Canyon / Colorado River – mesas, canyons
RF takeoff angle issues:	A mixed bag. Depends on where you are. Lots of relatively flat areas in the central part of the grid.
Accessible mountaintops in grid:	No actual mountains. Accessible mesa tops with good takeoff.
Boundaries/corners with other Top 24 grids:	Northwest corner with DM38 (http://www.confluence.org/confluence.php?id=662).

DN65 - confirmed 14 times, 15.9% of the responses. Another Montana grid.

Licensed amateurs:	21
Demographics:	Colstrip (11); Hardin (6); sparsely populated.
Geography:	Mostly high plains. Mountains in southwest corner.
RF takeoff angle issues:	Mostly flat except in southwest corner.
Accessible mountaintops in grid:	Accessible hilltops throughout, and mountaintops in the southwest, e.g., Point Lookout (7245 ft), Windy Point (9186 ft, highest peak in the area).
Boundaries/corners with other Top 24 grids:	Boundary with DN66 to the north.

DN68 - confirmed 14 times, 15.9% of the responses. Yet another Montana grid, bordering Canada.

Licensed amateurs:	36
Demographics:	Glasgow (20), other small towns along US 2.
Geography:	Milk River valley through central part of state. Otherwise mostly flat with low buttes and rolling terrain in east.
RF takeoff angle issues:	Mostly flat
Accessible mountaintops in grid:	High spots in the east, but few real hills
Boundaries/corners with other Top 24 grids:	Southwest corner with DN58/67 (http://www.confluence.org/confluence.php?id=493).

DM29 - confirmed 15 times, 17.0% of the responses. Nevada, bordering with Utah.

Licensed amateurs:	28
Demographics:	Ely/Ruth/McGill area (24); otherwise sparse.
Geography:	High desert basin, isolated high mountain ridges running north-south
RF takeoff angle issues:	Mostly no problems unless you get close to the mountains
Accessible mountaintops in grid:	Yes, but road access is minimal
Boundaries/corners with other Top 24 grids:	Southeast corner with DM38 (http://www.confluence.org/confluence.php?id=669).

DM31 - confirmed 16 times, 18.2% of the survey responses. This is border grid between Arizona and Mexico, with not much land actually being in the US.

Licensed amateurs:	1 (US), 3 (Mexico)
Demographics:	Mostly uninhabited. US land area divided between Barry Goldwater Air Force Range (west), Organ Pipe Cactus National Monument (central), and Tohono O'Odham Indian Reservation (east).
Geography:	Sonoran Desert; one of the hottest regions in the US. Mostly flat with occasional low mesas.
RF takeoff angle issues:	None.
Accessible mountaintops in grid:	None.

DM70 - confirmed 16 times, 18.2% of survey. This is in the Chihuahuan Desert between Texas and Mexico.

Licensed amateurs:	9
Demographics:	Few small towns – Fort Davis (5), Marfa (4).
Geography:	Chihuahuan desert – high plains, with low hills and mesas in the northeast
RF takeoff angle issues:	Essentially flat.
Accessible mountaintops in grid:	High spots/mesas, no real mountains.
Boundaries/corners with other Top 24 grids:	Southeast corner with DL79/DL89 (http://www.confluence.org/confluence.php?id=307). Was activated by some hams previously.

DN00 - confirmed 16 times, 18.2% of the survey. Nevada, bordering northern California.

Licensed amateurs:	22
Demographics:	Small towns – Lovelock (9)
Geography:	Desert basin, Humboldt River in the east, Humboldt Range east of the river (to 9800 ft)
RF takeoff angle issues:	From Lovelock, 3° to the east – not ideal. Too close to mesas south of the Humboldt Range.
Accessible mountaintops in grid:	Mining country — many accessible peaks in the Humboldts and elsewhere. Black Rock Desert in the north.

DN77 - confirmed 16 times, 18.2% of the survey. This grid is in Montana, and the eastern edge adjoins North Dakota.

Licensed amateurs:	83
Demographics:	Glendive (38); Sidney (22); other small towns.
Geography:	Great Plains. Yellowstone River valley in east.
RF takeoff angle issues:	None. Essentially flat.
Accessible mountaintops in grid:	No mountains. Bluffs and buttes.
Boundaries/corners with other Top 24 grids:	Southwest corner with DN66/67 (http://www.confluence.org/confluence.php?id=480). Northwest corner with DN67/68 (http://www.confluence.org/confluence.php?id=491).

CN93 - confirmed 17 times, 19.3% of the survey responses. Interior Oregon. With 191 licensees and two major population centers, why is this grid even in the Top 24? Similar to CN71 in this regard. Need to generate local 6-meter activity here.

Licensed amateurs:	191
Demographics:	La Pine (77); Bend (56).
Geography:	Mountains in west, desert plain in east.
RF takeoff angle issues:	Not in the east; in the west, mountaintop locations
Accessible mountaintops in grid:	Paulina Peak (7984 ft) is high and auto-accessible
Boundaries/corners with other Top 24 grids:	Southeast corner with DN02/DN03 (http://www.confluence.org/confluence.php?id=592).

DL89 - confirmed 17 times, 19.3% of the responses. Another Texas / Mexico grid.

Licensed amateurs:	9
Demographics:	Terlingua (5); Alpine (4); sparsely populated.
Geography:	Chihuahuan Desert; Rio Grande valley. Mountains in the south (Big Bend National Park).
RF takeoff angle issues:	Generally no.
Accessible mountaintops in grid:	Mountains in BBNP are accessible only by trails.
Boundaries/corners with other Top 24 grids:	Northwest corner with DM70/DL79 (http://www.confluence.org/confluence.php?id=307).

DM87 - confirmed 17 times, 19.3% of the responses. Colorado grid, bordering Kansas and Oklahoma.

Licensed amateurs:	41
Demographics:	Springfield (26); other small towns
Geography:	High plains. Higher hills in west.
RF takeoff angle issues:	No
Accessible mountaintops in grid:	No mountains; many accessible hills.

DN73 – confirmed 17 times, 19.3% of the responses.

Licensed amateurs:	18
Demographics:	Newcastle (9); other small towns.
Geography:	High plains with low buttes and mesas.
RF takeoff angle issues:	Newcastle is somewhat compromised to the northeast; otherwise pretty much flat.
Accessible mountaintops in grid:	No mountains; hills and buttes, many accessible.
Boundaries/corners with other Top 24 grids:	Boundary with DN63 to the west.

Not in the top 24 "Most Wanted" grids but still believed to be much needed are four very remote grids on the edge of the US. These grids may be rarer than they appear in this report, due to a lack of awareness that they are part of the 488 contiguous US grids. This could have resulted in their under-reporting as "needed grids" by those who chose to report that way.

CM93 - confirmed 19 times, 21.6% of the responses. This is a difficult grid to access, as it is an island-only location with no connection to the southern California mainland. It comprises Santa Rosa Island off the coast of southern California. The island is part of Channel Islands National Park and is owned by the National Park Service. Permission would be needed from the NPS to operate from the island.

Licensed amateurs:	0
Demographics:	Channel Islands National Park. No resident population except park rangers
Geography:	Mountainous island; operable beach areas on the east side.
RF takeoff angle issues:	Operation either from the eastern shore area or from a remote inland mountaintop are possible.
Accessible mountaintops in grid:	Yes, but backpack only. No vehicular access.

DL88 – confirmed 20 times, 22.7% of the responses. This grid is in Big Bend National Park, west Texas along the Rio Grande. Extremely difficult and hostile physical conditions exist there. W5OZI led a grid DXpedition to DL88 in 1991. There may have been some other attempted activity since then, but nothing in several years. Visitors to this area of the country have declared a "never again" stance on return trips.

Licensed amateurs:	0
Demographics:	In US, unpopulated. In Mexico, nearly unpopulated. No towns.
Geography:	Chihuahuan Desert. US territory is southernmost tip of Big Bend National Park. Grid is almost entirely in Mexico.
RF takeoff angle issues:	In US, mountains are to the east, so need to be as far to the west as possible.
Accessible mountaintops in grid:	Undeveloped. Mountaintops to the east are accessible only by back-country hiking. No trails.
Boundaries/corners with other Top 24 grids:	Boundary with DL89 to the north. Best boundary site may be near the Pettits ruins (4WD accessible)

DM02 - confirmed 26 times, 29.5% of the responses. This is another island-only grid off the coast of southern California. San Clemente Island is owned by the US Navy. Military restrictions on radio operation exist on this island. KB5MY has worked June VHF contests from DM02 in the past. W6FQ was on 2-meter meteor scatter from the grid in August, 2007.

Licensed amateurs:	Typically 0. Can vary with USN/contract personnel on the island at any given time.
Demographics:	Owned and occupied by US Navy. Civilian access restricted to contractors.
Geography:	Island
RF takeoff angle issues:	No
Accessible mountaintops in grid:	No

EL84 – confirmed 27 times, 30.7% of the responses. The islands in this grid comprise the Dry Tortugas and the Marquesas Keys. The National Parks Service owns the Tortugas and maintains limited boat access from Key West for park visitors. The Marquesas are part of the Key West National Wildlife Refuge and consist of protected wetlands.

Licensed amateurs:	0
Demographics:	National Park / National Wildlife Refuge
Geography:	Island keys.
RF takeoff angle issues:	No.
Accessible mountaintops in grid:	No.

On to the Grid DXpeditions !!!

Now that we have some reasonable idea of the most wanted grids in the US, the FFMA User's Group requests assistance in mounting grid DXpeditions to these rare grids, as well as help in activating permanent 6-meter activity. The survey questionnaires have been most helpful in this regard.

As a general note on potential sites in remote coastal regions, the VUCC rules do not prohibit contacts with stations at sea; only contacts with aircraft in flight are prohibited. Conceivably, one could boat into the mostly-water grids along the Pacific Ocean and the Gulf of Mexico to generate contacts. Seaplanes would also work, so long as the contacts occur while the plane is sitting on the water. In past years, there has been notable 6-meter activity stemming from commercial freight and tanker ships plying international waterways. For example, W1LP/mm gave out numerous water-only contacts as a radio operator aboard a tanker. The general idea of using open waterways for activity in coastal grids is certainly feasible. This would avoid access problems in very tough terrain (CM79, CM93, EL58) or in restricted areas (DM02, EL84). Food for thought in activating some of these rare grids.

Flying into remote interior locations (Nevada, Montana, Wyoming, etc) and then setting up radio operations after landing is also possible. This type of grid DXpedition would be dependent upon available runway or landing spaces, however, as well as favorable weather conditions.

Some of the rarest grids touch each other! VUCC rules (though not ARRL VHF contest rules) allow for QSOs from two (border) or four (corner) adjoining grid squares to count for all the grids occupied by the DXpedition station, which must be physically within all activated grids simultaneously. This requires accurate GPS placement and layout of the station facilities. A wonderful online resource for information about grid square corners is the Degree Confluence Project (http://www.confluence.org). Check it out!

Additionally, it is hoped that permanent 6-meter activity can be cultivated in some rare grids having an amateur population. A grid DXpedition could be mounted near or at the QTH of an amateur living in the grid, with the thought that the amateur could become a permanent addition to the 6-meter community thereafter. A grid DXpedition of this type could have a lasting impact on VHF activity in that grid.

All of these creative possibilities would take tremendous advance planning, involving more sophisticated activities than the typical drive-through "contest rover" DXpedition. Although rovers and mobiles with 6 meters capability might constitute a large proportion of rare grid activation efforts initially, it is possible that future grid DXpeditions could take on more of the trappings of traditional HF DXpeditions to rare locations around the world.

The FFMA User's Group is thinking through several options. The preference is for one or more DXpeditions in the summer of 2008 and beyond. A true DXpedition is envisioned,

rather than a stopover lasting only a few hours (though this is without doubt better than no activation at all). Hopefully, this will be a well-organized and announced effort or efforts, complete with living facilities (food, water, shelter) as well as being well-equipped as to radios, amplifiers, antennas, etc. Also under consideration is the development of an informal grouping of operators with mobile abilities who could quickly move into rare grids close to their home locations. This would take advantage of fleeting and shifting band openings that occur during the summer months.

We need assistance on almost all aspects of possible grid DXpeditions, contest rover or non-contest mobile grid activations, and creating regular ongoing 6-meter activity by resident amateurs in rare grids. If you are capable of leading such an effort, being an operator, lending equipment, helping with logistics, etc., then please contact Bill, W5WVO.

Exhibit A – Survey Respondents

Great thanks go to the following participants who supplied information used in this survey. This survey would not have been possible without this information. Several respondents wrote individualized e-mails to survey workers, taking the time to explain details and nuances of their grid information. Thank you so much for the tremendous effort and care taken to accurately convey confirmed grids. Amateurs who provided biographical, interest, and grid data are noted by "Complete" in the Response column. All statistical information in this paper relating to grids is based on these responses. Biographical and interest answers noted in the main text are based on all survey participants.

Call	Grid	State	Response
AA0ZP	EN21	NE	Complete
AA5AM	EM13	TX	Complete
AA5C	EM13	TX	Complete
AA5JG	EM04	OK	Complete
AA5XE	EM00	TX	Complete
AA7A	DM43	AZ	Complete
AF2K	FN13	NY	Complete
AK3E	FM19	MD	Complete
K0IP	DN312	ID	Complete
K0TLM	EM29	MO	Interest
K1TEO	FN31	CT	Complete
K1TOL	FN44	ME	Complete
K2OVS	FN30	NY	Complete
K3ZO	FM18	MD	Complete
K4JAF	EM70	FL	Complete
K4MIJ	EM86	TN	Complete
K4RWP	EM86	TN	Complete
K5GJR	EL17	TX	Complete
K5TN	EM15	OK	Complete
K6EID	EM73	GA	Complete
K6GXO	DM04	Ca	Complete
K6IPF	CN80	CA	Complete
K6LMN	DM04	CA	Complete
K6QG	CM98	CA	Complete
K7CW	CN87	WA	Complete
K7NN	DM42	AZ	Complete
K8EB	EN73	MI	Complete
K8PT	EN66	MI	Interest
K8ROX	EN80	OH	Complete

K8TL	EM89	OH	Complete
K8ZES	FN02	NY	Complete
K9CS	EN60	IL	Complete
KB4OLM	FM08	VA	Complete
KB6NAN	CM87	CA	Complete
KB8U	EN71	MI	Complete
KB8UUZ	EN91	OH	Complete
KD4MYE	FM05	NC	Complete
KG4NZR	EL98	FL	Complete
KL7NO	BP54	AK	Complete
KR7O	DM07	CA	Complete
KT1J	FN34	VT	Complete
KU7Z	DN41	UT	Complete
KX9X	EM59	IL	Complete
N0LL	EM09	KS	Complete
N1GC	EM95	NC	Complete
N2CG	FN20	NJ	Complete
N2WK	FN03	NY	Complete
N3JPU	FM19	MD	Complete
N4FEG	FM06	VA	Complete
N4HN	EM95	NC	Complete
N4UFP	EM94	SC	Complete
N5XYO	DM90	TX	Interest
N6CW	DM12	CA	Complete
N6VI	DM04	CA	Complete
N7CFO	CN87	WA	Complete
N8II	FM19	WV	Interest
N8KOL	EN80	OH	Interest
N9JF	EM49	IL	Complete
NG4C	FM16	NC	Complete
NR5O	DM33	AZ	Complete
NW5E	EL98	FL	Interest
VE1YX	FN74	NS	Complete
VE2PIJ	FN35	QC	Complete
W0DFK	EM47	MO	Complete
W0FY	EM48	MO	Complete
W0JRP	EM27	MO	Complete
W1AIM	FN34	VT	Complete
W1JR	FN42	NH	Complete
W1LE	FN41	MA	Complete
W1XZ	FN32	MA	Interest
W2BZY	EL98	FL	Complete
W2YE	FM19	VA	Complete
W3DHJ	DM78	CO	Interest
W3EP	FN31	CT	Complete
W3VZ	FM19	MD	Complete
W3ZZ	FM19	MD	Complete

W4DR	FM17	VA	Complete
W4FRA	FM15	NC	Interest
W4HY	EL88	FL	Complete
W4UDH	EM52	MS	Complete
W4WTA	EM83	GA	Interest
W5OZI	EM00	TX	Complete
W5TFW	EM40	LA	Complete
W5WP	EM20	TX	Complete
W5WVO	DM65	NM	Complete
W6BYA	CM87	CA	Complete
W6GMT	EN37	MN	Complete
W6OMF	CM98	CA	Interest
W9GKA	EM58	IL	Complete
W9JN	EN54	WI	Complete
W9RPM	EN43	WI	Complete
W9RVG	EM57	IL	Complete
W9VA	EN62	IL	Complete
WA5LFD	EM12	TX	Complete
WA5OLT	EM12	TX	Complete
WA8RJF	EN91	OH	Partial Grid Info
WB0ULX	EN04	SD	Interest
WB4KTF	EL29	TX	Complete
WB5AFY	EM04	TX	Complete
WD8USA	EN73	US	Interest
WK6I	DM13	CA	Complete
WO9S	EN61	IL	Complete

Exhibit B – Most Wanted List

The following is the full Most Wanted List developed from the survey, ranked from most wanted to most common. Note that the list is broken out into three equal-sized columns — Most Wanted, Middle Grids, and Most Common. These columns each flow *down* over multiple pages. For example, when the end of the first column on this page is reached, its continuation would start in the first column of the next page, *not* the middle column of *this* page.

Most Wanted			Middle Grids			Most Common		
Grid	**# Cnfrmd**	**% of ops**	**Grid**	**# Cnfrmd**	**% of ops**	**Grid**	**# Cnfrmd**	**% of ops**
DN67	5	5.7	DN96	51	58.0	EM88	73	83.0
CN71	6	6.8	EL06	51	58.0	EM92	73	83.0
DN02	6	6.8	EN46	51	58.0	EN33	73	83.0
DN66	7	8.0	EN65	51	58.0	EN43	73	83.0
DL79	10	11.4	FM25	51	58.0	EN74	73	83.0
DN63	10	11.4	CN92	52	59.1	FN23	73	83.0
CM79	11	12.5	CN97	52	59.1	EL59	74	84.1
DN03	11	12.5	DM58	52	59.1	EM04	74	84.1
EL58	11	12.5	DM75	52	59.1	EM29	74	84.1
DN58	13	14.8	EL19	52	59.1	EN12	74	84.1
CN72	14	15.9	EM43	52	59.1	FM09	74	84.1
DM38	14	15.9	EM87	52	59.1	FM15	74	84.1
DM47	14	15.9	DM72	53	60.2	FN25	74	84.1
DN65	14	15.9	DN91	53	60.2	DM67	75	85.2
DN68	14	15.9	EN04	53	60.2	EM30	75	85.2
DM29	15	17.0	EN22	53	60.2	EM98	75	85.2
DM31	16	18.2	EN57	53	60.2	EN62	75	85.2
DM70	16	18.2	FN64	53	60.2	EN70	75	85.2
DN00	16	18.2	FN66	53	60.2	FM14	75	85.2
DN77	16	18.2	CM89	54	61.4	FN11	75	85.2
CN93	17	19.3	CN86	54	61.4	DM68	76	86.4
DL89	17	19.3	CN94	54	61.4	DM78	76	86.4
DM87	17	19.3	DM52	54	61.4	EM42	76	86.4
DN73	17	19.3	DM61	54	61.4	EM57	76	86.4
CN78	18	20.5	DN36	54	61.4	EM70	76	86.4
DN04	18	20.5	DN94	54	61.4	EM78	76	86.4
DN35	18	20.5	EL18	54	61.4	EN37	76	86.4
DN75	18	20.5	EL79	54	61.4	EN40	76	86.4
CM93	19	21.6	EM07	54	61.4	EN60	76	86.4
DM19	19	21.6	EN30	54	61.4	FN35	76	86.4
DM39	19	21.6	EN55	54	61.4	EM09	77	87.5
DN12	19	21.6	FM27	54	61.4	EM21	77	87.5
DL88	20	22.7	CM94	55	62.5	EM49	77	87.5

DM17	20	22.7	CM96	55	62.5	EM66	77	87.5
DN54	20	22.7	DM16	55	62.5	EM72	77	87.5
DN93	20	22.7	DN07	55	62.5	EM81	77	87.5
DM83	21	23.9	DN81	55	62.5	EN11	77	87.5
DN56	21	23.9	EM33	55	62.5	EN31	77	87.5
CN77	22	25.0	EN29	55	62.5	EN42	77	87.5
DM27	22	25.0	CN80	56	63.6	EN63	77	87.5
DM74	22	25.0	DM57	56	63.6	EN83	77	87.5
DN10	22	25.0	DN62	56	63.6	CM97	78	88.6
DN21	22	25.0	EM01	56	63.6	CN88	78	88.6
DN25	22	25.0	EM61	56	63.6	DM65	78	88.6
DN37	22	25.0	EN58	56	63.6	DM95	78	88.6
EN07	22	25.0	DM59	57	64.8	DN26	78	88.6
DN46	23	26.1	EL39	57	64.8	EM26	78	88.6
DN64	23	26.1	EM03	57	64.8	EM55	78	88.6
DM66	24	27.3	FM26	57	64.8	EM58	78	88.6
DN50	24	27.3	DN76	58	65.9	EM86	78	88.6
DN85	24	27.3	DN86	58	65.9	FN33	78	88.6
DN95	24	27.3	EM05	58	65.9	DM09	79	89.8
DN18	25	28.4	EM47	58	65.9	DM12	79	89.8
DN20	25	28.4	EN16	58	65.9	DN70	79	89.8
DN92	25	28.4	EN24	58	65.9	EL99	79	89.8
EL15	25	28.4	DM35	59	67.0	EM17	79	89.8
DL99	26	29.5	DM81	59	67.0	EM20	79	89.8
DM02	26	29.5	DM82	59	67.0	EM22	79	89.8
DM23	26	29.5	DN60	59	67.0	EM27	79	89.8
DM46	26	29.5	EM16	59	67.0	EM35	79	89.8
DM48	26	29.5	EM24	59	67.0	EM83	79	89.8
DM71	26	29.5	EN23	59	67.0	EM85	79	89.8
DM85	26	29.5	DM76	60	68.2	EM90	79	89.8
DM94	26	29.5	EL16	60	68.2	EM96	79	89.8
DM36	27	30.7	EN08	60	68.2	EN35	79	89.8
DN34	27	30.7	EN18	60	68.2	EN54	79	89.8
DN88	27	30.7	EN27	60	68.2	EN71	79	89.8
DN97	27	30.7	FN55	60	68.2	EN80	79	89.8
EL84	27	30.7	DM99	61	69.3	FN03	79	89.8
EN86	27	30.7	EN76	61	69.3	FN54	79	89.8
CN70	28	31.8	EN92	61	69.3	DM33	80	90.9
DM86	28	31.8	FN14	61	69.3	DM62	80	90.9
DN87	28	31.8	FN65	61	69.3	EL88	80	90.9
DM32	29	33.0	DM44	62	70.5	EM32	80	90.9
DN38	29	33.0	DN32	62	70.5	EM40	80	90.9
DM28	30	34.1	EM41	62	70.5	EM75	80	90.9
DM63	30	34.1	EN00	62	70.5	EM95	80	90.9
DN01	30	34.1	DM73	63	71.6	EN10	80	90.9
EL28	30	34.1	EN03	63	71.6	FN02	80	90.9
DM88	31	35.2	DN47	64	72.7	FN13	80	90.9

DN43	31	35.2	EM23	64	72.7	FN24	80	90.9
CN95	32	36.4	EM62	64	72.7	FN30	80	90.9
DM96	32	36.4	EM91	64	72.7	CM87	81	92.0
DN42	32	36.4	EN32	64	72.7	CM98	81	92.0
EN05	32	36.4	DM05	65	73.9	CN84	81	92.0
EN15	32	36.4	DM37	65	73.9	DM03	81	92.0
CM86	33	37.5	DN31	65	73.9	EL09	81	92.0
DM18	33	37.5	DN41	65	73.9	EL89	81	92.0
DN48	33	37.5	EN56	65	73.9	EL95	81	92.0
FN56	33	37.5	EN64	65	73.9	EM13	81	92.0
CN81	34	38.6	CM99	66	75.0	EM25	81	92.0
EN02	34	38.6	DM45	66	75.0	EM48	81	92.0
FN67	34	38.6	DM93	66	75.0	EM73	81	92.0
CN83	35	39.8	DN45	66	75.0	EM94	81	92.0
CN98	35	39.8	EM34	66	75.0	EN13	81	92.0
DN15	35	39.8	EM65	66	75.0	EN34	81	92.0
DN82	35	39.8	EN25	66	75.0	EN51	81	92.0
DM92	36	40.9	EN66	66	75.0	EN53	81	92.0
FN45	36	40.9	EN84	66	75.0	EN73	81	92.0
DM51	37	42.0	DM08	67	76.1	FM05	81	92.0
EN06	37	42.0	DM15	67	76.1	FM07	81	92.0
EN38	37	42.0	DM54	67	76.1	FM17	81	92.0
EN67	37	42.0	DM69	67	76.1	FM28	81	92.0
EN85	37	42.0	DN06	67	76.1	FN21	81	92.0
CN75	38	43.2	EM06	67	76.1	FN22	81	92.0
DN08	38	43.2	EM19	67	76.1	FN53	81	92.0
DN11	38	43.2	EM52	67	76.1	DM13	82	93.2
DN14	38	43.2	EM99	67	76.1	EL17	82	93.2
DN24	38	43.2	EN17	67	76.1	EL49	82	93.2
DN53	38	43.2	DM91	68	77.3	EL86	82	93.2
DM55	39	44.3	EM53	68	77.3	EM15	82	93.2
DM80	39	44.3	EM71	68	77.3	EM77	82	93.2
DN72	39	44.3	EM82	68	77.3	EM84	82	93.2
DN23	40	45.5	EM97	68	77.3	EN44	82	93.2
DN28	40	45.5	CM95	69	78.4	EN50	82	93.2
DN78	40	45.5	DN13	69	78.4	FN34	82	93.2
CN74	41	46.6	DN27	69	78.4	DM79	83	94.3
CN76	41	46.6	DN44	69	78.4	EM50	83	94.3
DM77	41	46.6	DN84	69	78.4	EM60	83	94.3
DM89	42	47.7	EM28	69	78.4	EM89	83	94.3
EN01	42	47.7	EM44	69	78.4	EN41	83	94.3
DN51	43	48.9	EM67	69	78.4	EN52	83	94.3
DN52	43	48.9	EN26	69	78.4	EN72	83	94.3
DN98	43	48.9	FN01	69	78.4	EN90	83	94.3
EN47	43	48.9	FN46	69	78.4	EN91	83	94.3
FM13	44	50.0	CN96	70	79.5	FM04	83	94.3
DM49	45	51.1	DM07	70	79.5	FN00	83	94.3

DN33	45	51.1	DM64	70	79.5	CN85	84	95.5
DN57	45	51.1	EM02	70	79.5	DM04	84	95.5
DN74	45	51.1	EM14	70	79.5	DM43	84	95.5
DN90	45	51.1	EM36	70	79.5	EL29	84	95.5
DM53	46	52.3	EM37	70	79.5	EL96	84	95.5
DM84	46	52.3	EM38	70	79.5	EM00	84	95.5
DN16	46	52.3	EM59	70	79.5	EM10	84	95.5
EL08	46	52.3	EM68	70	79.5	EM12	84	95.5
EN48	46	52.3	EM31	71	80.7	EM63	84	95.5
EN75	46	52.3	EM45	71	80.7	EM64	84	95.5
CN90	47	53.4	EM46	71	80.7	EM69	84	95.5
DN61	47	53.4	EM51	71	80.7	EM74	84	95.5
DN83	47	53.4	EM76	71	80.7	FM08	84	95.5
EL07	47	53.4	EM80	71	80.7	FM16	84	95.5
CN73	48	54.5	EN21	71	80.7	FN43	84	95.5
DL98	48	54.5	EN36	71	80.7	CN87	85	96.6
DM24	48	54.5	EN45	71	80.7	DM14	85	96.6
DN05	48	54.5	FM02	71	80.7	EM79	85	96.6
EN28	48	54.5	FM03	71	80.7	EN61	85	96.6
FN57	48	54.5	CM88	72	81.8	FM06	85	96.6
DM56	49	55.7	DM06	72	81.8	FN10	85	96.6
DM97	49	55.7	DM26	72	81.8	FN41	85	96.6
DN55	49	55.7	DM34	72	81.8	EL97	86	97.7
EM08	49	55.7	DM41	72	81.8	EL98	86	97.7
EN14	49	55.7	DN17	72	81.8	FM18	86	97.7
CN82	50	56.8	DN30	72	81.8	FM29	86	97.7
CN91	50	56.8	DN71	72	81.8	FN20	86	97.7
DM22	50	56.8	EL94	72	81.8	FN31	86	97.7
DN22	50	56.8	EM11	72	81.8	FN42	86	97.7
DN80	50	56.8	EM18	72	81.8	FN44	86	97.7
EN20	50	56.8	EM54	72	81.8	EL87	87	98.9
FN51	50	56.8	EM56	72	81.8	EN82	87	98.9
DM25	51	58.0	EM93	72	81.8	FN12	87	98.9
DM90	51	58.0	EN81	72	81.8	FN32	87	98.9
DM98	51	58.0	DM42	73	83.0	FM19	88	100.0
DN40	51	58.0	EM39	73	83.0			

Exhibit C - 1st Survey Letter

Subject: 6 Meter Most Wanted Grid Survey

We're a group of dedicated 6-meter amateurs working toward increasing grid-chasing interest and grid DXpedition activity on the Magic Band. To this end, we've developed a short survey to identify the rarest of the 488 grid squares in the contiguous 48 United States. As far as we know, no one but the late Fred Fish, W5FF, has worked and confirmed all of them, but some of you are reportedly very close!

As one of the top grid-chasers in North America, your statistical contribution to this effort is very important. Please take a few minutes to respond to this survey, tell us a little about your 6-meter interests, and submit your current 6-meter US grids-confirmed totals. As described in the survey, you can do this in one of two ways:

A list of the 488 contiguous US grid squares is given, and you can mark the check-boxes for those US grid squares you have confirmed.

Or, if you have computerized log records, you can generate a plain-text list of your US grid squares confirmed and just paste it in.

Either way, it will help us to isolate the truly rare grid squares and give us an idea of where future grid DXpedition efforts are most needed. (Your information will not be used for commercial purposes.)

Here is a link to the survey:
http://www.surveymonkey.com/s.aspx?sm=vVAayHDokbz7vp9wuG4qZg_3d_3d

This link is uniquely tied to this survey and your e-mail address, please do not forward this message.

Should you need help or have any questions on the survey, you may contact me at: w5wvo@cybermesa.net; or our survey worker at: w9gka@arrl.net.

Thanks in advance for your participation!

Bill VanAlstyne
W5WVO
USA-488 Award Yahoo Users Group

PS: If you wish to opt-out from receiving further messages regarding this survey, please use this link:
http://www.surveymonkey.com/optout.aspx?sm=vVAayHDokbz7vp9wuG4qZg_3d_3d

Exhibit D - General Announcement letter

Re: 6 Meter Most Wanted Grid Survey

We're a group of dedicated 6-meter amateurs working toward increasing grid-chasing interest and grid DXpedition activity on the Magic Band. To this end, we've developed a short survey to identify the rarest of the 488 grid squares in the contiguous 48 United States. As far as we know, no one but the late Fred Fish, W5FF, has worked and confirmed all of them, but some of you are reportedly very close!

As one of the top grid-chasers in North America, your statistical contribution to this effort is very important. Please take a few minutes to respond to this survey, tell us a little about your 6-meter interests, and submit your current 6-meter US grids-confirmed totals. As described in the survey, you can do this in one of two ways:

A list of the 488 contiguous US grid squares is given, and you can mark the check-boxes for those US grid squares you have confirmed.

Or, if you have computerized log records, you can generate a plain-text list of your US grid squares confirmed and just paste it in.

Either way, it will help us to isolate the truly rare grid squares and give us an idea of where future grid DXpedition efforts are most needed. (Your information will not be used for commercial purposes.)

Here is a link to the survey:

http://www.surveymonkey.com/s.aspx?sm=_2fLPw_2b7lqrqzV1k7LLQLhbQ_3d_3d

Should you need help or have any questions on the survey, you may contact me at: w5wvo@cybermesa.net; or our survey worker at: w9gka@arrl.net.

Thanks in advance for your participation!

Bill VanAlstyne
W5WVO
USA-488 Award Yahoo User's Group

Exhibit E - Letter to Partial Answers

6 Meter Most Wanted Survey

Thanks for answering the survey. I noticed that you did not answer the confirmed grid checklist question.

With this being the most important question in the survey, I am wondering if there is something we can do to help you in answering.

If you have a word doc, excel file, or other data format of your confirmed or needed grids, please just send me the file directly to my e-mail address. Or, if you prefer, you can copy and paste the grids into the survey. I can sort through US grids vs. total grids.

If you want to work through the checklist again, please go ahead for another try. Here is a link to the survey:

http://www.surveymonkey.com/s.aspx?sm=_2fLPw_2b7lqrqzV1k7LLQLhbQ_3d_3d

Whatever way is easiest for you, we will be glad to accept it.

Should you need help or have any questions on the survey, you may contact Bill at: w5wvo@cybermesa.net; or myself at: w9gka@arrl.net.

Kevin Kaufhold
W9GKA
USA-488 Yahoo User's Group

Exhibit F - Thank you letter

6 Meter Most Wanted List Survey

Thank you so much for taking the Most Wanted Grid Survey. Your responses will assist us greatly in developing a list of the rarest grids in the US. Ultimately, we hope to develop grid DXpeditions to these rare spots. We also are proposing an award for confirming all 488 US grids on 6 meters, and are working with potential sponsors.

We will send you a copy of the final survey results. If you have any suggestions on activating rare grids, please e-mail to: w5wvo@cybermesa.net. If you have comments or suggestions on the survey, please e-mail to: w9gka@arrl.net.

Thanks for you participation in the survey.

Bill VanAlstyne, W5WVO
Kevin Kaufhold, W9GKA
USA-488 Award Yahoo User's Group

Exhibit G - 2nd Request Letter

6 Meter Grid Survey - 2nd Request

Recently, we sent you a request to take a survey on the most wanted grids in the US.

Since you have confirmed a large number of grids on 6 meters, your response is very important in identifying the rarest of the 488 grid squares in the contiguous 48 United States. The survey will give us an idea of where future grid DXpedition efforts are most needed. (Your information will not be used for commercial purposes.)

Please take a few minutes to complete this survey. Here is a link to the survey: http://www.surveymonkey.com/s.aspx

This link is uniquely tied to this survey and your e-mail address. Please do not forward this message.

Should you need help or have any questions on the survey, you may contact me at: w5wvo@cybermesa.net; or our survey worker at: w9gka@arrl.net.

Thanks in advance for your participation!

Bill VanAlstyne
W5WVO
USA-488 Award Yahoo User's Group

PS: If you wish to opt-out from receiving further messages regarding this survey, please use this link: http://www.surveymonkey.com/optout.aspx

Statistical Addendum

This addendum details statistical issues in the development of a Most Wanted List. The chief reference book for this task is *Statistics for Management and Economics*, 6th ed., Keller and Warrack, 2003. Many books on statistical analysis will suffice. Sampling entails a significant amount of statistics. It is a necessary part of developing a valid "Most Wanted List". For those only marginally interested in the statistics behind the creation of the List, things will be stated in very simplistic terms.

The term "population" is considered to be the universe of all possible people or things being studied. The population must be defined before a sample can be seriously considered. Criteria thought to be important in identifying a population in this case:

1) The population should be composed of amateurs in search of the most-wanted grids in the contiguous US.

2) The population should be composed of relevant demographic patterns of amateurs desiring to work the most-wanted grids.

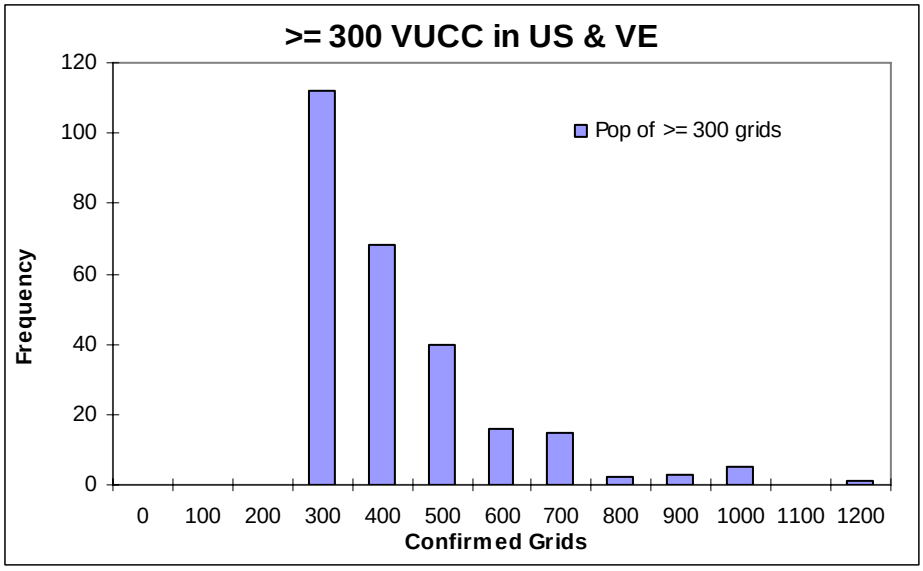
Our task at identifying the population is made much easier than the typical situation, since population data is available through an extensive 6-meter VUCC list maintained by VE2PIJ. This VUCC list canvasses VUCC holders for worked and confirmed grid totals, and also includes stations that have never applied for VUCC but who have nevertheless confirmed 100 or more grids. Thus, the VE2PIJ list might be a more complete indication of confirmed grids than what is available through ARRL. The list only generates information on number of grids confirmed by stations, and does not detail the exact grids that have been confirmed. Still, it is an invaluable reference, as the list provides knowledge of the general shape of the population distribution of confirmed grids.

The above criteria produce at least three ways of thinking of the population. Each definition of the term *population* effectively includes different parts of the distribution of amateur radio stations that use 6 meters.

A. First, only those stations that are in constant search for the rarest grids would be included in the population. This would limit the target group to VUCC holders who are leading in grid counts with the current station capabilities to contact all 488 US grids, if they were on the air. A cut-off figure of 200 to 300 confirmed grids might be appropriate with this definition. The following is a descriptive output for the population of amateurs with 300+ grids confirmed on 6 meters.

=> 300 Grids	
Mean	450.687
Standard E	10.2699
Median	400
Mode	300
Standard D	166.2328
Sample Va	27633.36
Kurtosis	3.624812
Skewness	1.781453
Range	900
Minimum	300
Maximum	1200
Sum	118080
Count	262

Of particular note is the high mean average of confirmed grids. The probability distribution is visually portrayed in the following graph.

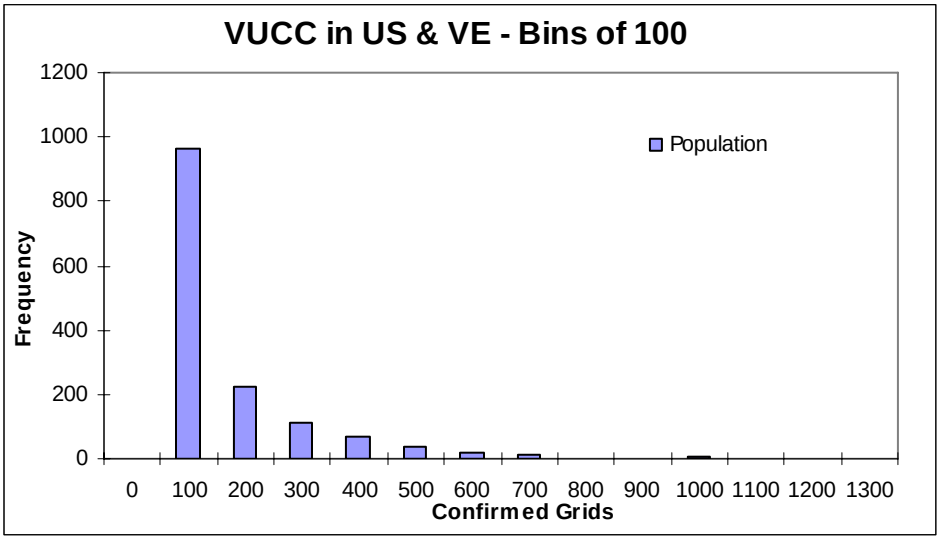


B. The second view of the relevant population is broader, and includes all VUCC holders possessing certain demographic qualities. The justification for this expanded view is that any stations with VUCC would probably be interested in the "wanted grids". Sampling would likely be the only way to accurately gauge interest in this group, since the population size would approach the number of VUCC holders on 6 meters (1,571 as of August, 2007; source: *QST*, 8-2007, page 98). The actual number might be lower, possibly as low as 1,000, due to deaths, relocations, and demographic factors. It could also be somewhat higher, due to regular expansion of the VUCC list. The VE2PIJ 6-meter list (see VE2PIJ website) has around 1,450 VUCC holders that are in the US and Canada and who are not deceased or off the air. To round things

off, 1,500 is considered to be the target population under this perspective. The statistics on this version of the population are:

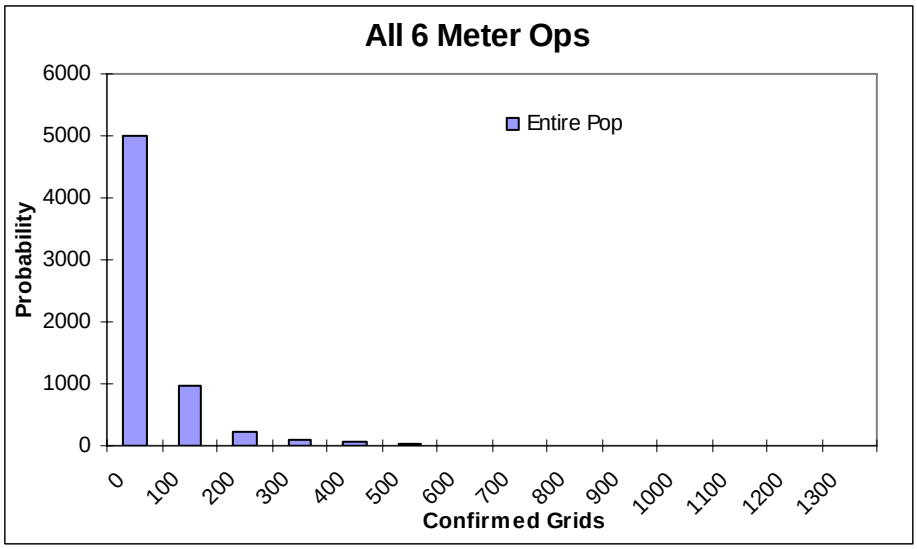
100 + grids - Pop	
Mean	189.0234
Standard E	3.91053
Median	100
Mode	100
Standard D	148.9085
Sample Va	22173.75
Kurtosis	7.929082
Skewness	2.499533
Range	1100
Minimum	100
Maximum	1200
Sum	274084
Count	1450

The mean average of confirmed grids is now substantially lower, at 189 grids. In the following graph, notice how the addition of the large number of stations with 100 – 200 confirmed grids dwarfs the totals included in the more restrictive definition of the population, that of ≥ 300 grids.



C. The third view is the most expansive of the possible definitions of the population. Certainly many operators are actively seeking VUCC at any one time, and many stations will be interested in working rare grid DXpeditions. This expansion of VHF activity to include casual interest is well known among contest administrators. There will routinely be many times more amateurs *working* a contest than actually

submitting entries to the sponsor. In the CQ VHF, the calls/logs ratio can be as high as 20:1, while the ARRL VHF contests will commonly have 5:1 or higher calls/logs ratios. If the 5:1 ratio (or higher) of VHF contests is used, a population of 5,000 to 10,000 or more amateurs is possible. This is also the same general range of numbers as what some observers believe may be on the 6-meter band in the US on a regular basis. The entire distribution of amateurs on 6 meters would effectively be included with this definition, as shown in the following graph with an assumed 5,000 stations at under 100 confirmed grids. Again, notice how the addition to the population swamps out all other totals in the remaining parts of the graph.



All things considered, the general working thesis of this paper is that the second view is appropriate as a definition of the population. There may be around 1,500 people within this definition, primarily being composed of VUCC recipients (and others) in selected geographic locations who are seriously interested in collecting grids. A more restrictive view of the population (e.g., ≥ 200 grids, or ≥ 300 grids) is considered a sub-population, and is the portion of the population of greatest interest to this survey. Somewhat more than 250 people may be at or above 300 confirmed grids, and a total of 600 people may be at or above 200 confirmed grids. The largest definition of the population would include 6-meter amateurs who are *not* looking for grids — 5,000 to 10,000 or more stations — and would be too broad for our purposes.

The term *sample* refers to a select group of the relevant population that is surveyed in some fashion. Samples are often necessary for any of several reasons:

- The population is unknowable and thus impossible to survey completely.
- The population is defined with certainty, but it is too big to survey completely, making a sample necessary for practical purposes.
- The population is defined with certainty, but it is not economically feasible to survey everyone in a population.

In our case, the survey attempts to ascertain what US grid squares have not yet been confirmed by the population. Sampling is likely the only way to accurately evaluate the number of confirmed and missing grids among the population of VUCC recipients.

All surveys should be valid, from a statistical point of view. If the results are indistinguishable from a zero grid count, for instance, nothing of any great value has been demonstrated. This involves the question of "statistical significance", whereby the sample is tested in various mathematical ways to determine whether the results legitimately convey useful information about the population. The sample should take great efforts to accurately portray the target population.

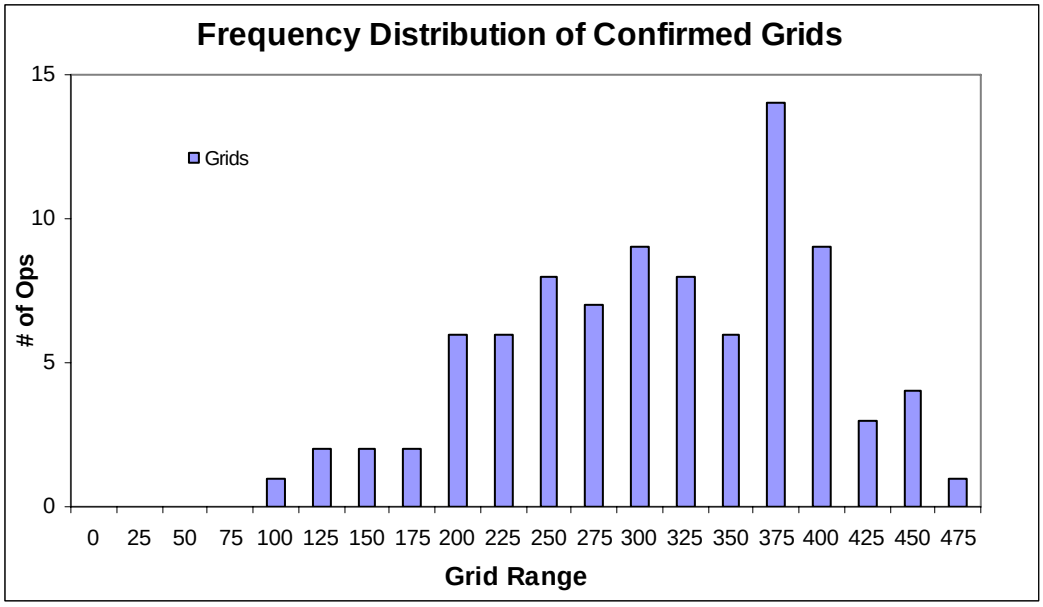
Developing knowledge of confirmed grid squares of the target or "true" population, is most important. This first inquiry is actually composed of two types of statistical analysis: 1) evaluating the number of confirmed grids of the sample to determine accuracy to the target population; and 2) evaluating each specific grid in the sample to determine accuracy of "most wanted" status. These two items will be discussed sequentially.

The Number of Confirmed Grids. The sample participants check off the US grids that they have confirmed over the years. In so doing, the aggregate of all sample responses will generate a frequency and probability distribution of the total number of grids confirmed for each station. This is very valuable information, as it establishes the range of grids that have been confirmed. This type of statistic is referred to as interval data, since an interval of confirmed grids is established through the sample responses. The full set of descriptive and inferential statistical tools are available to analyze interval data. Descriptive Statistics can be summarized as:

..... Sample	
Mean	322
Standard E	9.079871
Median	326.5
Mode	384
Standard D	85.17674
Sample Va	7255.078
Kurtosis	-0.452343
Skewness	-0.383956
Range	372
Minimum	105
Maximum	477
Sum	28350
Count	88
CI + -	17.79619

In the above sample, the mean average of survey responses has 322 confirmed grids, having a dispersion, or sample standard deviation, of 85. The confidence interval of this sample is ± 17, meaning that to 95% certainty, the average number of grids confirmed through sampling is 322, plus or minus 17. This is a small range, representing ± 5.5% of the sample mean. This is approaching the range of political polling, where it is common to have a margin of error (which is the confidence interval) of ± 3%, to within 95% certainty. The chief way to reduce the confidence interval is by increasing the sample size.

The frequency distribution of survey responses on the number of grids confirmed by each station is graphed below as the light blue columns.



If normally distributed, the sample distribution should develop into something of a mound shape or bell curve. Notice how the distribution of the sample has produced a negative skew, however, with a larger mass on the right and the tail to the left. This is most likely due to an emphasis in the survey on stations with high grid totals.

Analysis of Specific Grids. So far, the discussions have been limited to the sample mean of confirmed grids. Now, we move to the most important item — an evaluation of the responses of the grid squares themselves.

The survey was designed with simplicity in mind. We only wanted to know whether the survey participant had confirmed a US contiguous grid. This is a very basic yes or no type of answer. Such answers are considered to be “nominal” in nature. The only calculations that are valid with nominal data are those that are based on the frequency of occurrence. An example of this would be the percentage of times the grid has been confirmed. The frequencies or percentages of all of the grids can then be calculated and compared with each other. This derived output is “ordinal” in that it can be ranked. This

results in a determination of which grids are the least confirmed among all 488 US contiguous grids. Presto, the Most Wanted List appears.

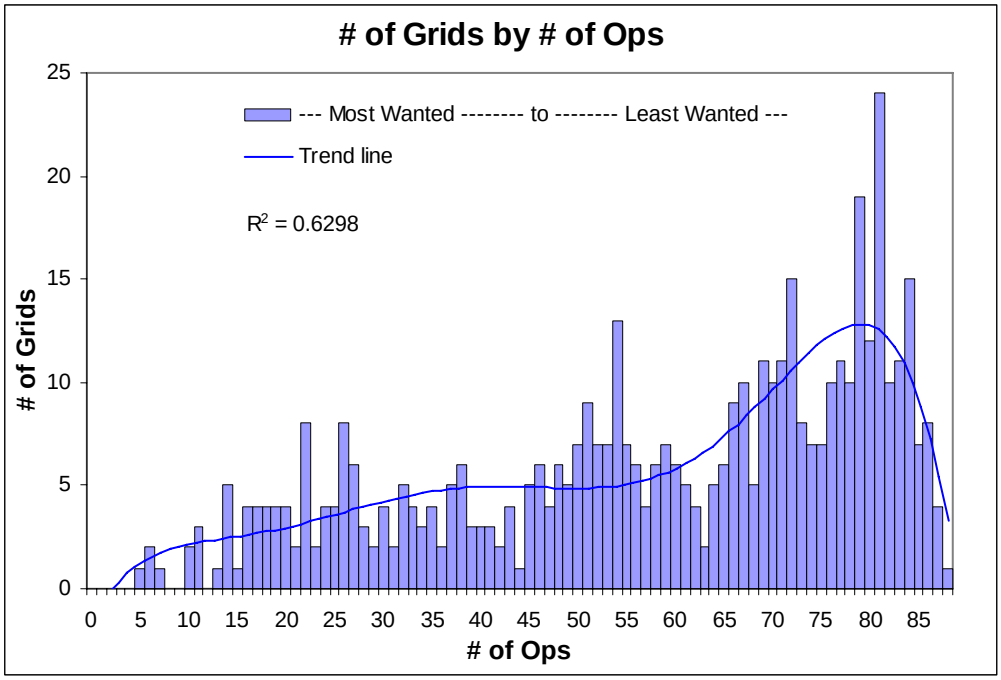
Even with the limitations involving nominal data, some statistical tests are still possible. A proportion is the percentage of successful trials in a sample. It can be evaluated for statistical significance.

Even though we have knowledge of the population mean and variance of the number of confirmed grids, we do not know the percentage of successful trials in any particular grid of the population. Often, the percentage of successful trials will be set at 0.50, on the general belief that there is a 50-50 chance of a yes or no answer in any population. This is a common-sense and conservative belief, as it will take stronger evidence from the sample responses to overcome. If there is some advance knowledge of the "rareness" of the grids, then the assumed percentage of successful trials can be adjusted accordingly. This will make it easier to show that the sample is significant. But just because we think a grid may be rare or common, does not mean that it really is — and vice versa. Grid DXpeditions and contest rovers might activate an otherwise rare grid regularly, while certain well-populated grids with no resident 6-meter stations might be activated by outsiders only occasionally or not at all. The grids CN71 and CN72 are examples of this phenomenon.

With our survey, equations generate a significant answer for all grids between 0 and 36 times confirmed, as well as between 52 to 88 times confirmed. The intervening grids confirmed 37 to 51 times are indistinguishable from a random chance of 50-50. It is not so critical that the more commonly available grids, hovering at 50% of the responses, be statistically valid since there are generally not considered rare. It is more important that the large bulk of confirmed grids, and especially those with low confirmed counts, are statistically distinguishable from a random 50-50 chance.

The confidence intervals of the grid responses can also be evaluated. The survey generates a confidence interval of between 2% and 3%, depending on the number of times a grid has been confirmed. This is within the range of political polling confidence intervals.

The fruits of our labors to this point in the discussion can be seen in the following graph, depicting the number of confirmed grids among all survey responses.



This graph shows the number of confirmed grids among the stations that have participated in the survey. Notice the probability distribution that developed from the survey answers. A few grids are rarely confirmed, many grids are commonly confirmed, and some grids have even been confirmed by almost the entire survey. Also notice that the distribution is shifted towards the right. This is due to the common availability of many grids, with most stations working the vast bulk of US grids.

The Excel data sort as to what is "rare" is considered an objective finding, but its usefulness can be limited by the various statistical tests, as described above. Subjective findings are commonly used to either corroborate or cast suspicion on the objective findings. If both the subjective findings and objective findings are in accord with each other, that tends to support the statistical process. Subjective indications carry their own set of limitations and problems, however. Some concerns include advance knowledge of the objective findings when developing subjective opinions, the lack of a reasonable basis for the subjective belief, etc. If used with caution, the use of subjective findings at least develops another set of facts to consider in the overall conclusion of "most wanted" status.

The FFMA User's Group is currently developing a set of grids that are known to be rarely activated or difficult to access. So far, many of the grids that are subjectively felt to be rare are also on the top 24 grids of the Most Wanted list.

Demographic Considerations. A sample should be composed of the relevant demographic factors that make up the target population. Otherwise, the sample does not accurately reflect the population, and could very well end up distorting results in favor of certain demographic items that have been unwittingly over-sampled. It is common among

statisticians to classify or sort samples into sub-groupings to better reflect the underlying population. This is called *stratified random sampling*, where the population is separated into mutually exclusive sets, and then simple random samples are drawn from each stratum.

A possible downside in developing sub-groupings lies in the sample size of the stratum. If the sample of strata is small but otherwise reflects the overall composition of the target population, the entire sample may be statistically significant, but no statistically valid conclusions can be reached for each strata. The only way to solve this problem is to increase the size of the sample to the point where each strata becomes statistically valid by itself. This creates its own problem where the sample size becomes so large as to be cost-ineffective to produce or is otherwise not practical to develop. In our case, the priority was on maintaining an appropriate demographic profile of the entire sample, with the statistically relevancy of each separate strata being less important.

The sample can be segmented into many different demographic factors. In the sample at issue, the survey respondent's residence is an obvious factor. Segmentation of the sample by number of grids confirmed by the respondent is more subtle, but is still a potentially important distinction to consider.

Geographical Factors. The sample should look at the residence of the survey responses. An east coast station, for example, could have a different grouping of needed grids than will a west coast station. There are many possibilities in developing appropriate weighting of the survey for the QTH of the station completing the survey.

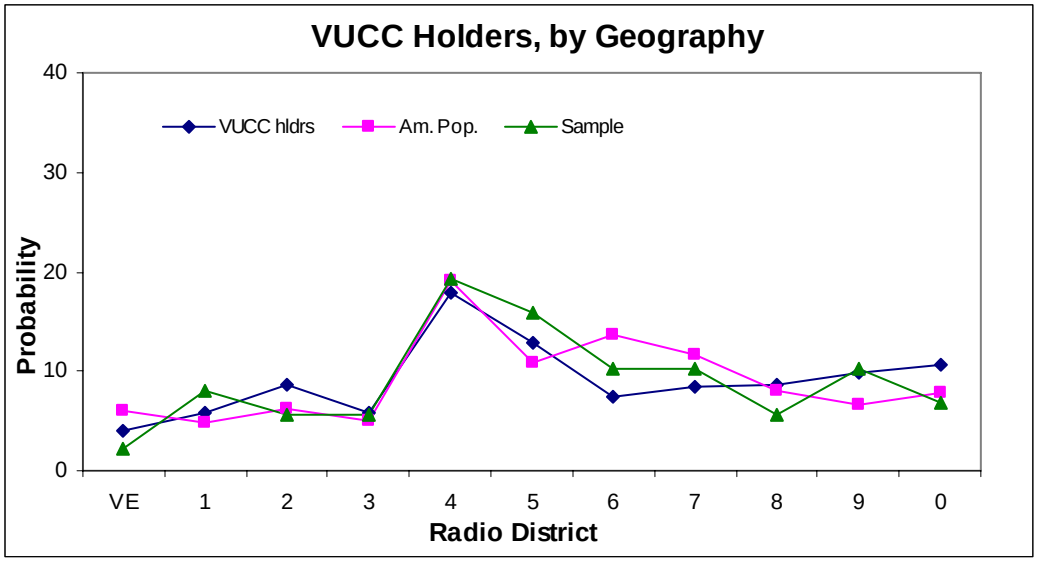
With the use of the general amateur population, we are implicitly assuming that VUCC holders live in the same areas and in the same proportion as the general population. Demographic-related statistics of the entire US amateur population are available through Joe Speroni, AHØA. FCC radio district statistics can be added from state or zip-code totals. The large size of radio districts requires the fewest number of responses to reflect the same weighting as that of the general amateur radio population.

In developing US radio districts for the geographic areas of the survey, a problem exists with overweighting US VUCC holders. Canadians might be interested in the FFMA, along with XEs and some other DX stations. In fact, VEs have submitted data for the sample. This problem is somewhat alleviated by estimating that Canadians comprise roughly 6% of all US-plus-VE amateurs. Each US district in the sample can then be reduced by 6% to fit in the Canadian population. No effort is made at segmenting Canadians into their own districts, as that would generate less than 1% of the sample being allocated to almost all VE districts, which is too small to sample for the number of our survey responses.

Due to the inherent propagation characteristics of the 6-meter band, it is likely that only amateurs on the North American continent would be able to make a serious effort at collecting all 488 grids. XE, Central America, and Caribbean demographic data have not

yet been considered for the sample. If these areas are thought to be important in the target population, they can be added to the survey in the same way as the Canadians have been.

We can go beyond general amateur radio population statistics by developing derived output from the VE2PIJ VUCC 6-meter list. By sorting through this list, we can determine the percentage of VUCC holders in any US radio district and Canada. The following graph shows the information visually.



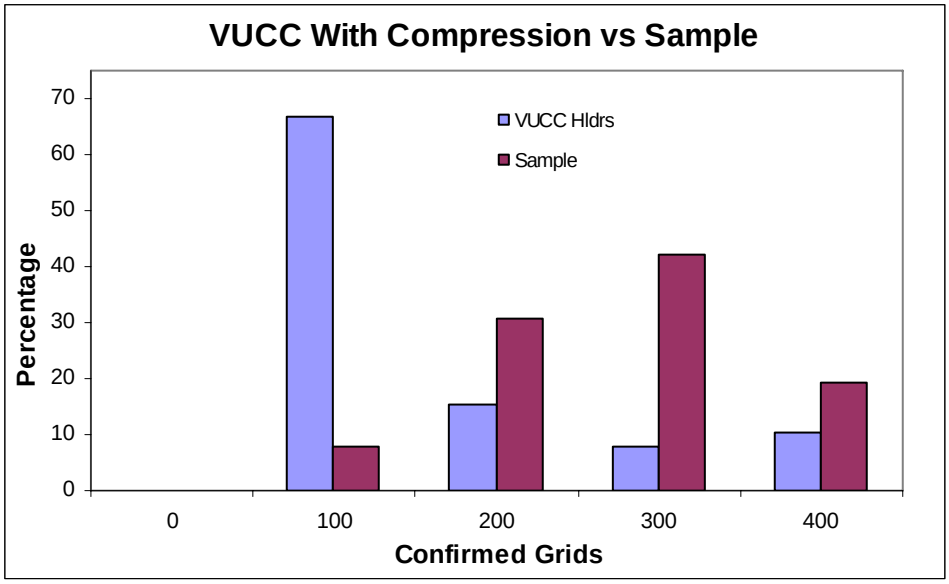
Notice the close symmetry between the percentage of the general amateur radio population by district and the percentage of VUCC holders by district. Statistically, there is a 76% correlation between the two calculations. This brings great credibility to using either or both types of geographic data in the statistical analysis of the survey data. Also notice the very close alignment of the survey sample with both geographical estimations. There is an 82% correlation between the geographic location of the general US population and the location of the survey respondents, and an 87% correlation between the VUCC population location and that of the survey responses.

Segmentation by Number of Grids. With the decision being made within the User's Group to focus on the operators with higher grid totals, but still maintain some sampling of the lower grid counts, it was generally hoped that the survey would include grid totals of the entire VUCC population while paying close attention to stations with higher accumulated totals.

With any definition of the VUCC population, a distinctly skewed distribution is generated. The intuitive sense behind the skew in the descriptive statistics is that it grows more and more difficult to work and confirm new grids as a station's grid total increases. With whatever cut-off figure is used (or even if there is no cut-off at all, as is the case with including casual operators), the probability mass will be shifted to the left and the tail to the right.

A caveat implicit in using the entire VUCC list is that it counts total confirmed grids from throughout the world, and not just grids in the contiguous US. This is the reason why the grid totals of a few stations are dramatically higher than 488 grids. This problem can be somewhat corrected by compressing the very high grid totals into the 400-488 grid range, and then more directly comparing the VUCC population against the sample. This is done on the common-sense belief that ops with very high grid counts will have most of the US grids anyway, and are left with confirming DX grids to increase their counts. The stations with low grids counts will mostly have grids from the US and Canada, and therefore there will not be much of a difference between total confirmed grids and US confirmed grids.

A comparison of the distribution of the estimated VUCC population and the sample survey done to date is made in the following graph.



Notice that the vast amount of the VUCC population is weighted towards the 100 confirmed grid level, while the survey emphasizes the higher grid counts. 93% of the survey responses come from individuals with 200 or more confirmed grids. The 7% of the survey under 200 confirmed grids comes from the initial collection of responses among the FFMA User's Group as well as from VUCC holders having more than 200 total worldwide, confirmed grids but then somewhat less than 200 US confirmed grids.

Conclusions. The survey generates statistically significant results for most of the grid confirmations. Only around the mid-point of the number of times that a grid has been confirmed will the survey results be indistinguishable from zero. This range is not critical to the determination of "Most Wanted" status. The confidence intervals on the number of grid confirmations is within tolerable ranges, between 2% and 3%, depending on the number of times that a grid has been confirmed. We therefore have a very good idea of what may be rare or common (through the number of times a grid has been confirmed),

as well as “how rare is rare” (through the confidence interval on each grid confirmation). The survey closely matches, as well, the geographical dispersion of the VUCC population. Results of the survey are negatively skewed, however, while that of the entire VUCC population is positively skewed. This finding is to be expected, since the survey was primarily limited to a sub-population all VUCC holders at or above 200 grids. The survey’s Most Wanted List should therefore be considered most relevant and suited for use among stations within the sub-population having 200 or more confirmed grids.

Addendum on Future Surveys

It is recommended that rare grid surveys be conducted on a periodic basis. Given the good response from this first survey, it is suggested that:

- An annual survey would involve too short of a time-span, as totals at the upper grid levels are often slow to change. A biennial survey might be more appropriate.

- Using a survey computer program was a great success.

- Sampling a significant percentage of the VUCC population was very informative, as we have now a very good idea of the most wanted grids among a broad section of the population. The survey therefore acts as a "baseline" of what grids are rare to VUCC holders.

- Results of this survey were consistent with the more limited W3EP survey (see following addendum). Thus, surveys of the future could possibly be limited to high grid totals without sacrificing quality or depth of responses. Future surveys could also draw upon the baseline of results developed in this survey.

- An initial request for update form prior survey respondents would be useful. This would allow comparisons to be drawn on the same sample between two points in time, gauging the impact of DXpeditions to rare grids.

- Designers of future surveys should give serious consideration to limiting the amount of grid options to choose from. Having four different options may have been convenient for participants in this survey, but it proved to be a challenge on the collection end. Data editing became a time consuming chore with the various options. It also allowed for errors to potentially creep into the results in two ways:

  - First, data editing mistakes could occur in the collection of a variety of formats and styles of grid presentation. Efforts were undertaken to guard against that scenario, but that resulted in even more time being taken to ensure the reliability of the data.
  - Second, the survey respondent could confuse the various options, supplying the right data for the wrong option. Such mistakes did occur in this survey, which were discovered and corrected through data verification with the participants in question. Having only one option would have avoided many of these problems.

  It is therefore suggested that checklists of *needed grids* be primarily used in the next survey. Having copy and paste options provides too much variety for collection purposes, and having two different checklists of confirmed vs. unconfirmed grids was a large headache for verification purposes. A checklist can be computer automated in collection, at least if done consistently. Having a checklist of needed grids for the data

question avoids another problem: Many stations simply do not know that some grids on the edge of the US are included in the count. Compounding this problem is the fact that some grids maps supplied by commercial radio manufacturers incorrectly overlay VUCC grids on top of maps of the US. Having only one checklist of grids needed would at least generate all 488 US grids for the survey participant to choose from.

- Including a map of the 488 US grids in the next survey would also be of great benefit.

- A continuous time approach in future endeavors also has merit. This would move data collection on grids towards more of an interactive endeavor, with statistical sampling techniques playing less of a role. VUCC leaders could check into a web-site and submit their needed grids on a periodic basis, in preparation for the scheduling of future grid DXpeditions. Leader grid totals could also be announced and regularly updated through such a web service. VUCC leaders would be encouraged to use this web-service, as grid DXpeditions would be mounted based on information received to the web-site.

- This last thought may perhaps the best idea to come out of this recap. Using an interactive approach instead of running a formal survey has great appeal and much to offer. During the winter of each year, the user group could request information from the VHF reflectors, directing people to a website where they would identify the grids they would like to see grid DXpedition activity from. The results of the 2007 baseline survey could be used as a guide of what grids might be rare, with website users then identifying with more particularity the grids that they would need in 2008 and following. Stations would be encouraged to become a member of the website in order to direct future DXpeditions to rare grids. A simple membership form to the website would reduce many of the problems associated with open-source sites. E-mail newsletters and other interactive options of a continuing nature could also be developed through such a website.

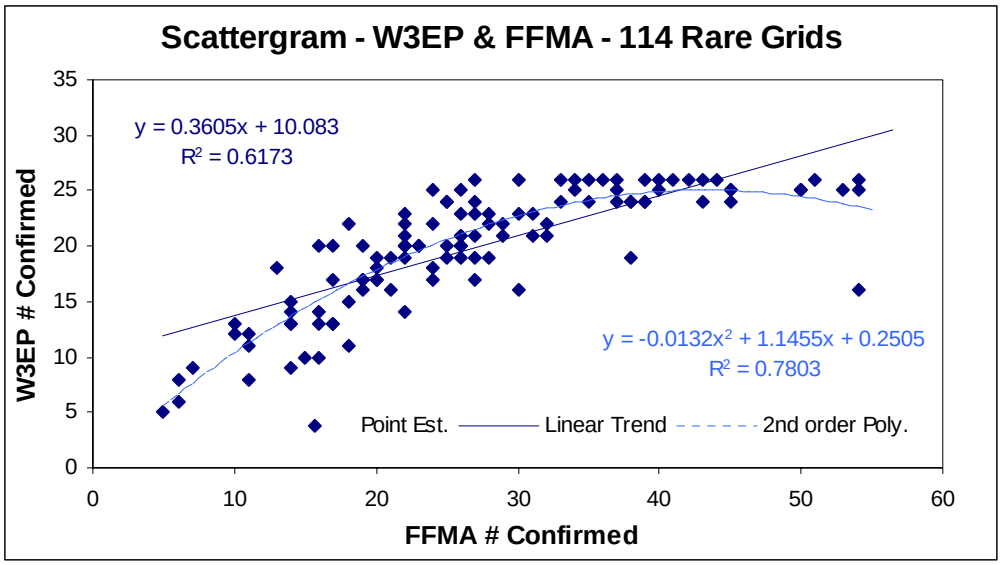
Addendum on W3EP Survey

After the FFMA User's group began its survey in July, 2007, the group became aware of another survey being simultaneously conducted on virtually the same topic. Done by Emil Pocock, W3EP, this other survey was gathering information on the confirmed grids of the highest VUCC leaders. E-mail pleasantries were exchanged between the designers of the two surveys.

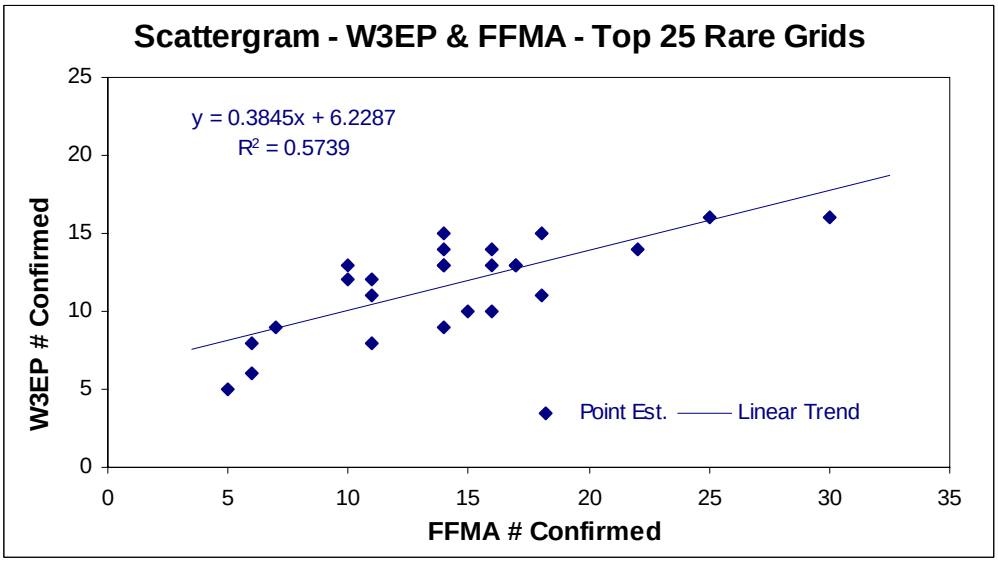
While the topic of both surveys was the same, large differences existed in survey focus and in the VUCC population sampling techniques used in each survey. W3EP exclusively concentrated on VUCC leaders who had confirmed at least 366 US grids. The analysis was also limited to 114 grids that were not confirmed by two or more of the survey respondents. The FFMA survey was broader in scope, surveying all VUCC holders down to the 200 grid level. All 488 US grids were tracked and ranked for the number and percentage of confirmations by the survey respondents. Both surveys used the same 488 grids in the determination of the contiguous US.

Due to the differences in survey methodologies, it was mutually decided to maintain separate survey collection efforts, with the final results then being compared. W3EP even joined the FFMA User's Group, and ultimately supplied his own confirmed grids for the FFMA survey. At least one member of the FFMA User's Group supplied grid data for W3EP's survey.

Given the differences in sampling procedures and sections of the overall VUCC population surveyed, it was initially unclear whether results from the two surveys would be close to each other. The two surveys proved to be remarkably consistent in results. The most wanted or needed status of the 114 grids tracked by W3EP had a correlation of 79% with the number and percentage of confirmations of the same grids of the FFMA survey. A Scattergram of the two surveys is illustrative. Notice the close grouping of results of the two surveys.



When the top 25 rare grids of the two surveys were compared, there was found to be 74% correlation between survey results. The following Scattergram again shows the closeness of results in the two surveys.



The similarity of findings between surveys lends credibility to the final results of both surveys. A comparison of the top 25 rarely confirmed grids of the W3EP survey follows.

W3EP			FFMA		
Grid	Confirmed	% Confirmed	Grid	Confirmed	% Confirmed
DN67	5	15.2	DN67	5	5.7
CN71	6	18.2	CN71	6	6.8
CM79	8	24.2	CM79	11	12.5
DN02	8	24.2	DN02	6	6.8
DM38	9	27.3	DM38	14	15.9
DN66	9	27.3	DN66	7	8.0
DM29	10	30.3	DM29	15	17.0
DN77	10	30.3	DN77	16	18.2
DN03	11	33.3	DN03	11	12.5
DN75	11	33.3	DN75	18	20.5
DL79	12	36.4	DL79	10	11.4
EL58	12	36.4	EL58	11	12.5
CN72	13	39.4	CN72	14	15.9
DM70	13	39.4	DM70	16	18.2
DM87	13	39.4	DM87	17	19.3
DN63	13	39.4	DN63	10	11.4
DN65	13	39.4	DN65	14	15.9
DN73	13	39.4	DN73	17	19.3
DM31	14	42.4	DM31	16	18.2
DN21	14	42.4	DN21	22	25.0
DN68	14	42.4	DN68	14	15.9
CN78	15	45.5	CN78	18	20.5
DM47	15	45.5	DM47	14	15.9
DM28	16	48.5	DM28	30	34.1
DM39	16	48.5	DM39	19	21.6