

CQP County Expeditions: What Makes the Best Ones Successful?

We received 44 expedition logs in CQP 2019. There were a few more expedition stations in addition to this who either participated and didn't submit a log, or who tried to participate and didn't make any QSOs. I examined each expedition and found five characteristics that made the best ones successful.

1. **TX Signal.** For all the 2019 expedition stations that operated CW and called CQ, I analyzed their received signal strength on the Reverse Beacon Network (<http://www.reversebeacon.net>) for CQP 2019. I reviewed SNR data from RBN stations in W0,W1,W2,W3,W4,W5,W8,W9 and VE2 call districts.

Three high power expedition stations were consistently louder than the rest:

- a) **K6T: W1SRD, W1RH, AA1ON, K0BEE in Tehama County**
- b) **KU6W: W6GJB, K9YC, K6SRZ in Merced County**
- c) **K6QK: N7CW, K6ZH, N6EEG, N6ERD in Imperial County**

Two low power expedition stations were consistently louder than the rest:

- **NS6T: NS6T, W6RGG in Tulare County**
- **K6MI: K6MI, NI6G, WB6HYD in Kings County**

All five of these stations shared two key factors regarding signal strength:

- a) **Low Angle Signal Enhancement**

At the bottom of the sunspot cycle, energy needed at low elevation angles for HF is more important than at the top of the sunspot cycle, even for stateside QSOs.

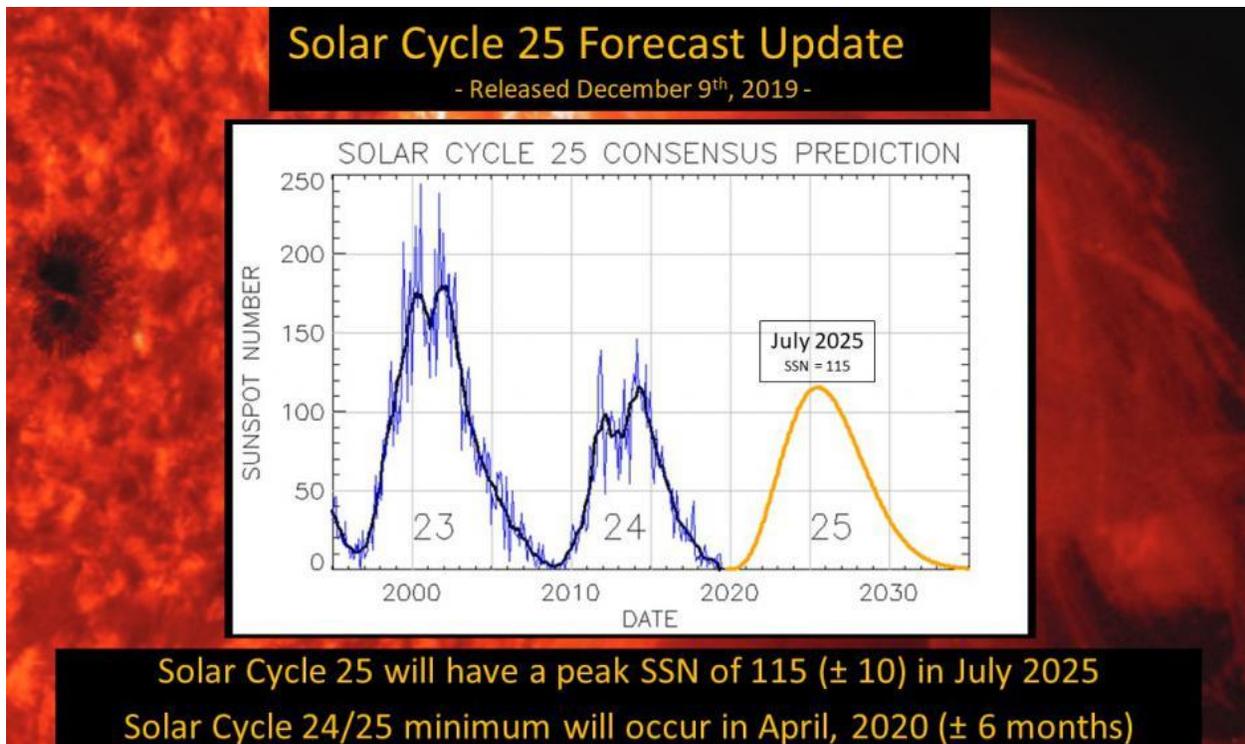


Figure 1. NOAA Solar Cycle Prediction, December 2019

K6T, K6QK and KU6W were all located at sites with downsloping terrain toward the east. NS6T and K6MI were both located on flat terrain, but had their antennas on tall tower trailers. For example, NS6T and W6RGG operated from US Tower in Tulare County, and used a 100ft. tower trailer.

I ran an HFTA simulation of the K6T, KU6W and NS6T setups at 14.0MHz. Figure 2 shows the result toward 80°.

Blue: KU6W in Merced County, 2-el Yagi at 40ft.

Red: K6T in Tehama County, 2-el Yagi at 40ft.

Green: NS6T in Tulare County, 2-el Yagi at 100ft. over flat terrain

Teal: Reference 2-el Yagi at 40ft. over flat terrain

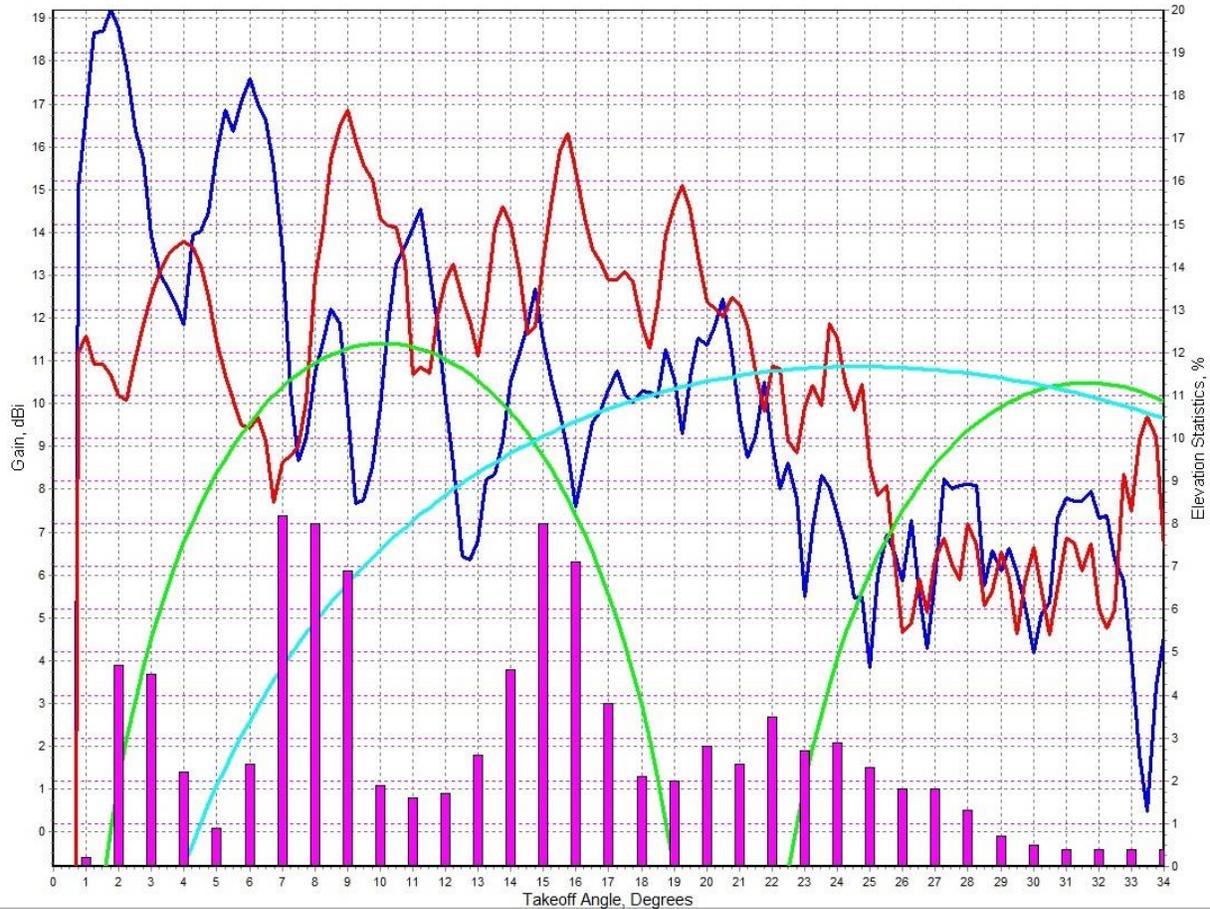


Figure 2. CQP 2019: 20m Elevation Angle Analysis of Loud Expedition Stations

HFTA v1.03 by N6BV, Copyright 2003-2004 ARRL. Elevation data set from ALOS World 3D 30m, Copyright JAXA, <https://www.eorc.jaxa.jp/ALOS/en/aw3d30/data/index.htm>

Low angle enhancement from downsloping terrain was impressive at the K6T and KU6W locations. One might conclude that these must have been stunning locations with thousands of feet of downsloping terrain. In actuality, low angle enhancement is more reachable than one might think it is. See Figure 3.

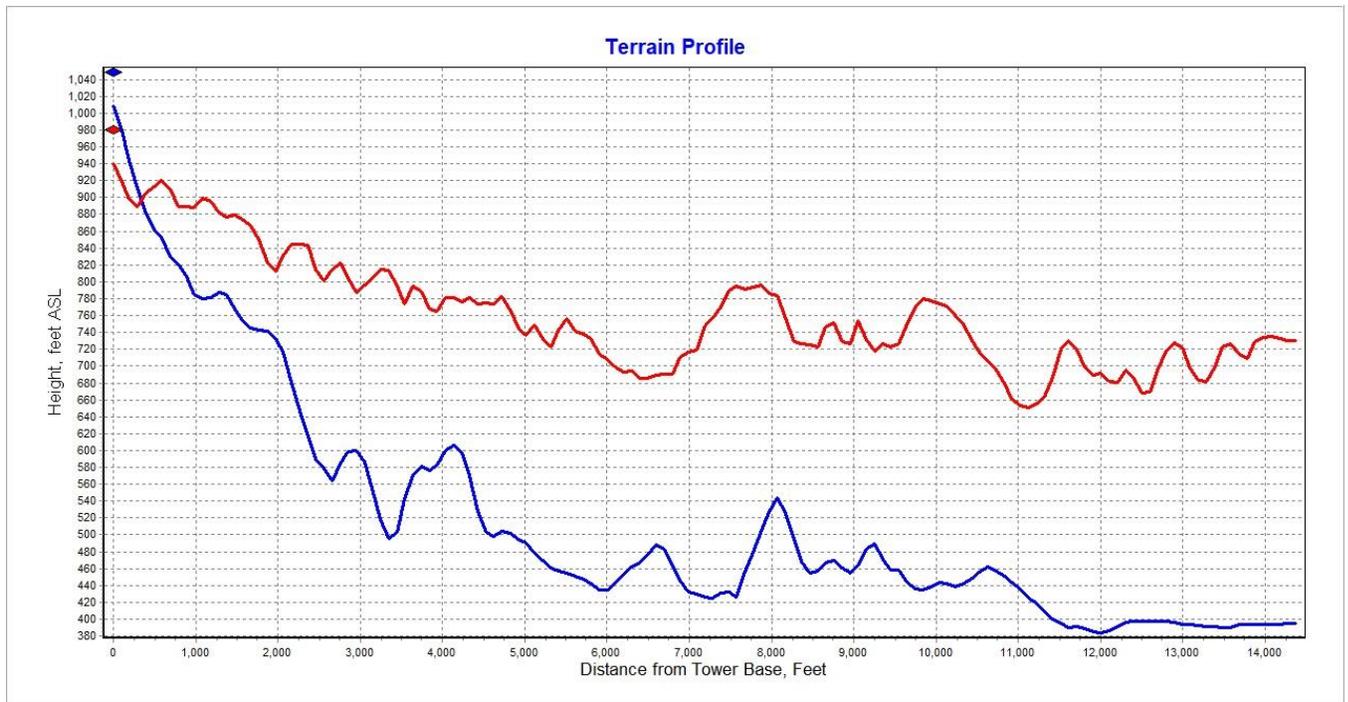


Figure 3. CQP 2019: **KU6W (Merced)** and **K6T (Tehama)** Terrain Toward 80°

Both of these locations were at about 1000ft. elevation. The key similarities were immediate downsloping terrain from the antenna, no taller obstacles within about 20 tower heights outward from the antenna (W6NL rule of thumb), and continued gentle downslope for thousands of feet.



Figure 4. CQP 2019: KU6W antennas: 2-el 20m Yagi, 40m Dipole used on 15m&40m. Antennas at about 40-45ft.

The NS6T operation at US Tower was on flat ground, so their low angle enhancement was achieved with a tall tower. Note the difference in Figure 2 between the NS6T antenna at 100ft. and the same reference antenna at 40ft., both over flat terrain.

Thank you to US Tower for their generosity in hosting Tom NS6T and Bob W6RGG for CQP 2019, and for the use of their portable trailer which supported a 100ft. tower! <https://www.ustower.com>



Figure 5. CQP 2019: NS6T antennas: 2-el Force12 C3S Yagi at 100ft., 40m Inv-Vee at 85ft., 80m Inv-Vee at 70ft. All supported by a US Tower portable tower trailer.

b) Antennas

The K6T, KU6W and NS6T expeditions all used a Yagi with 2 elements on 20m. The enhancement of a 2-element Yagi compared with a dipole at the same height on 10m-20m is approximately 4dB in the primary lobe direction. Since an S-unit on our radios is about 5dB, it's clear that using a 2-el Yagi provides a huge improvement toward the east, where a huge majority of our CQP QSOs are made. Having a portable mast or tower onto which the antenna could be safely installed and erected to an effective height for the site terrain, makes an ideal combination. If you are on flat terrain and faced with the choice of putting up a 20m dipole at 60ft. in tall trees, or putting up a 2-el Yagi at 20ft on a push-up mast, you should choose the high dipole in the trees without hesitation. On 20m, the 60ft. high dipole will provide a 4-6dB improvement on flat terrain over the 2-el Yagi at 20ft. for takeoff angles at 15° and below. However, if you are

on the edge of impressively downsloping terrain, the 2-el Yagi at 20ft. will probably perform better than a 60ft. high dipole on 20m, worthy of an HFTA analysis to confirm for your site. Alan AD6E went on CQP county expeditions successfully for many years using an A3S Yagi and a push-up mast as high as he could safely muscle it up on his own, usually about 20ft. He always selected locations with great downsloping terrain. His results and county records speak for themselves.

On 40m, the K6QK Imperial County expedition uses a 2-el 40m Yagi. The effect showed on RBN, where on 40m they generally were the strongest expedition station of them all. Stations that installed a 40m dipole at a decent height saw the next level of performance.

Several expeditions used other antennas, such as ground mounted verticals or low Inv-Vees. The RBN signal strength readings for these stations were usually well down the list. Comparing an Inv-Vee with a dipole where the apex is at the same height, the Inv-Vee will usually be down 1-2dB, depending on the angle that the antenna legs are extended out from the center apex. A ground mounted vertical on flat terrain with poor soil conductivity will struggle to keep up with Yagis and dipoles, however there are exceptions. One is when the vertical is mounted very close to salt water. The other exception is that a vertical dipole can be within about 1-2dB of a horizontal dipole installed a half-wavelength above ground when the vertical dipole is located at the edge of steep downsloping terrain. See the article by Tom N6BT regarding vertical dipole characteristics over sloping terrain in the May/June 2019 issue of NCJ. <https://ncjweb.com/features/mayjun19feat.pdf>

- c) High Power.** Most stations we are contacting in CQP are likely battling some level of RFI from themselves or their neighbors. As more noise sources continue to emerge from electrical power lines, wall wart power supplies, LED lighting and dimmer switches, and other consumer electronics, the ability for our signal to rise above this noise level is crucial.

On SSB, success in CQP 2019 highly depended on whether the expedition station was operating high power or low power. The difference between running 100W and 500W output is 7dB. There are several robust amplifiers that run off of a generator's 120V which have been used successfully in CQP: Elecraft KPA500, Acom 1010 or the Ameritron AL-811. If your Airbnb expedition site has a 240V dryer outlet, or if you have

a generator that puts out 240V, you can use your full legal limit amplifier and lift your signal nearly 5dB more versus using a 500W 120V amp.

- 2. RX Noise Level.** Operating from a location with a low receive noise level is more important than ever. Due to station downsizing as we all age, antenna restrictions where we live, and the increasing inability to use an amplifier without causing RFI to one's neighbor, most of the stations calling us in CQP throughout the U.S. are not going to be particularly strong during the sunspot minimum. The ability to lower your receive noise floor is key to accessing new layers of stations calling you.

The K6T group operates from an Airbnb location in Tehama County which is off the electrical grid and has no power lines for miles. The property is on 40 acres and the nearest neighbor is two miles away. There are RF quiet generators that are used to power the house and the ham setup. The location is incredibly quiet.

Jim K9YC, Glen W6GJB and the W6BX team have placed a great deal of importance over the years on operating from a quiet expedition location in CQP. They have taken many scouting trips to evaluate the noise on the HF bands from prospective CQP locations.



Figure 6. CQP 2019: K6T antennas: 2-el SteppIR at 40ft, 40m Dipole at 50ft, 80m CW Inv-Vee at 37ft.

- 3. Operating Skill.** It's a fallacy that operating a state QSO party requires less skill than other big contests of the year.
 - a)** From CA, CQP requires proficiency in calling CQ and running stations on both CW and SSB. This is a big one that we often take for granted as NCCC members. Many CQP expedition participants are not seasoned contesters who have a lot of practice running stations at 100 Qs/hr on CW or SSB. For some, FT8 may be their primary mode, and this is their one CW or SSB contest per year. For others who participate in other contests, it might mostly be search & pounce.
 - b)** CQP requires the ability to copy a serial number and QTH, which could be a state, province or CA county, and to enter it all into a contest logger that expedition operators may be unfamiliar with.
 - c)** CQP requires operating strategy, knowing when to switch modes and bands, when to take off-time, and where to be to catch the best propagation to rare mults. This is not obvious to those who aren't on HF all year.

One example of great operating skill overcoming points #1 and #2 above is the K6MM expedition to San Francisco County in CQP 2019. The team of K6MM, ND2T, K6TD, AD6TF, AF6RT and N0NKJ combined for over 850 QSOs. They experienced severe RX noise levels from their location. They had respectable SNR readings on RBN but were not at the top. I am convinced it was their operating skill, undoubtedly led by successful world DXpeditioners and contesters K6MM, ND2T and K6TD, that propelled them to keep making QSOs through the noise to an excellent QSO total from San Francisco County and a huge improvement of getting SFRA into more logs in CQP 2019 compared with CQP 2018.



Figure 7. CQP 2019: K6MM SFRA team: (L-R) AF6RT, K6MM, N0NKJ, ND2T, K6TD, AD6TF

- 4. Presence on CW.** The ratio of the total number of CW contacts to Phone contacts made in CQP 2019 was the highest in CQP history. I believe this is due to five factors:
- a) At the bottom of the sunspot cycle, QSOs naturally gravitate toward CW over SSB, as it is easier to make CW QSOs with weaker signals.
 - b) CW QSOs count for 3 points in CQP, while SSB QSOs count for 2 points. SSB QSO rate had to be 50% higher than the CW QSO rate in order to even keep up with CW. At the bottom of the sunspot cycle for CQP 2019, many stations rightly determined that spending more time on CW would give them a higher score.
 - c) Several stations that ordinarily would have been on SSB during better conditions were most likely on FT8, or went QRT, during CQP 2019. I know of a few stations that started CQP 2019 on SSB, gave up because it was too hard, and made a few QSOs on FT8 instead.
 - d) Some stations capable of making hundreds of Phone QSOs on 20m opted not to, considering 20m Phone too much work. 15m and 10m Phone would be considered by these stations as a lot more fun than 20m, but 15PH was anemic during CQP 2019, while 10m was non-existent.
 - e) As we age, some have less tolerance for Phone contesting, and elect to just stay on CW.

A great example of a successful CQP 2019 expedition on CW is the N6ESL team of K6EI and W6ESL in San Joaquin County. This group operated dipoles, running low power M/M with one station dedicated to CW and another station on Phone. Combined, they made 607 QSOs. 534 of them were made on CW by Jim K6EI in less than 15 hours of operating time. Jim called CQ the entire time, and was able to establish impressive runs on CW. The Phone station understandably could not achieve the same results as CW, making 73 hard-earned QSOs. Having very little time to plan for the expedition, they made smart decisions with the antennas they used, and how they made the most of their antennas during CQP. Their expedition with mostly CW QSOs helped propel San Joaquin County to the largest gain of any CA county logged by stations outside of CA compared with 2018 (see my March 2020 JUG article). It also got them a new San Joaquin County M/M LP record, and the Top M/M LP Expedition plaque for CQP 2019. You can read all about their story in the November 2019 WVARA newsletter, starting on page 4, at:

<https://archive.wvara.org/het%2F2019%2Fheterodyne-11-2019.pdf>



Figure 8. CQP 2019: Jim K6EI running CW from N6ESL M/M LP expedition to SJOA

- 5. Preparation and Persistence.** These may seem obvious, but often times CQP expeditions could have been more successful if these points were practiced.

Preparation involves many facets of an expedition: site selection and reconnoiter of the site, obtaining and testing all gear beforehand no matter how trivial it seems, planning to have more time available for setup when everything takes longer in the field, practicing logger and CW skills well in advance, developing an operating schedule and strategy, and planning for backups when problems arise.

The ability to persist through adversity is sometimes considered a personal trait where you either have it or you don't. However, I don't think that's entirely true. Depending on the situation, I think we usually choose whether we have the willingness to persist past that adversity, or whether we choose to quit. It's the people who choose to push forward through adversity who tend to be the most successful CQP expeditioners and who attain the most respect from the rest of us.

A great example of both qualities in CQP 2019 was Kent N6WT and his expedition to Mendocino County. Kent tested his primary expedition antenna at home, but prepared for any problems by bringing his SOTA antenna as a backup. It turned out that his primary antenna developed a problem in the field in Mendocino County. Having his SOTA antenna and short mast available allowed him to be on the air. His SNR readings on RBN showed he was far from being loud, but he adjusted by operating more CW.

Kent faced adversity during the contest when his Flex 6500 radio failed with a CPU fan error. Some would have stopped there and quit. Kent did not. He diagnosed the failure to a fan bearing issue in the Flex. He came up with an ingenious plan: take the weight off the fan bearing by turning the radio upside down. Sure enough, this solved the problem, and Kent was able to continue making contacts in CQP with his Flex radio belly-up!

Kent ended up with over 200 QSOs in CQP 2019: 154 on CW and 48 on PH. Kent was the only station on CW from MEND in CQP 2019. Without these contacts, Mendocino County would have been a lot rarer. This is the kind of expedition spirit I love to see.



Figure 9. CQP 2019: N6WT's Flex 6500 radio upside down, still making QSOs

Recommendations

I hope this article provides insight into what makes CQP expeditions successful, and inspires more CQP participants to go on CA county expeditions in the future. Even if you do not organize your own expedition, you can still play an important role for other expeditions:

- Consider providing spare equipment to expeditions. Many of us have spare antennas, radios, amplifiers, masts, AB577 portable towers, and even tower trailers that would make a huge difference to several expeditions this year.
- Be a CW operator for a day at an expedition. Some folks on expeditions enjoy the outdoor experience and the setup more than they do the operating aspect. Being the experienced CW operator can make an enormous impact to expeditions during the sunspot minimum, instead of several expeditions going through all the trouble and then struggling as Phone-only.

- Be a technical advisor or a contesting mentor to expedition groups leading up to CQP. Whether it is site selection advice, HFTA support, N1MM+ training, or antenna guidance, many of us can provide valuable help to expedition groups who are not experts in these areas.

Good luck in CQP!

Dean Wood, N6DE

CQP Chairman