Archival Test for Candidate Recurrence of the Wow! Signal Using Newly Available Parkes/Breakthrough Listen Data

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Manuscript Status

This is a hypothesis paper and targeted archival search proposal. It does not claim that a recurrence has been detected, that the original Wow! signal has been identified, or that an extraterrestrial or astrophysical source has been established.

The paper documents a specific, testable search hypothesis, identifies relevant public observational data, defines criteria for identifying a candidate, and records when and how the hypothesis was developed.

Abstract

The 1977 Wow! signal remains unresolved because it was strong, narrowband, short-lived, near the neutral hydrogen-line region, and has not been confirmed by recurrence. This paper proposes a targeted archival test using revised sky positions, a specific frequency range, and a date window documented before relevant Parkes coverage was confirmed.

The hypothesis does not claim a detection, source identification, or periodically recurring emitter. It defines a specific search plan: examine L-band data covering the revised Wow! localization fields during the interval from 2025 November 7 at 01:00 UTC through 2025 November 9 at 02:30 UTC, with highest-priority review of the 01:00–02:30 UTC subwindows on November 7, 8, and 9.

The proposed review prioritizes the revised frequency region near 1420.726 MHz and includes the possibility that a relevant narrowband candidate may be present in intermediate products or among signals that were downranked, flagged, or excluded as radio-frequency interference before final candidate publication.

The Australia Telescope National Facility has confirmed that Breakthrough Listen observed near one revised Wow! candidate field with the Parkes 64 m telescope on 2025 November 7, including the neutral hydrogen-line frequency region near 1420 MHz. Those observations are publicly available.

A null result in adequate data would weaken the recurrence-window hypothesis. A narrowband candidate with comparable observable characteristics would justify independent technical classification and targeted follow-up.

Original Contribution and Priority Record

The original contribution of this paper is the specific combination of three elements:

1. Prioritization of the revised Wow! localization fields during the fixed interval from 2025 November 7 at 01:00 UTC through 2025 November 9 at 02:30 UTC, including the predefined 01:00–02:30 UTC nightly subwindows.
2. Prioritization of the frequency region centered near 1420.726 MHz.
3. The proposal that archival review include intermediate candidate products and signals that may have been downranked, flagged, discarded, or classified as radio-frequency interference before final publication or public candidate release.

Kevin L. Brown formulated and documented this specific archival hypothesis and candidate-recovery proposal.

The revised sky localization and frequency constraints used in the paper are adopted from the cited prior literature. The Parkes observations and data products were generated by Breakthrough Listen. Confirmation of the relevant observational coverage was provided through correspondence with John Reynolds of the Australia Telescope National Facility.

No ownership of the Parkes observations, Breakthrough Listen data, prior localization research, or any subsequent independent data analysis is claimed. The contribution asserted here is the dated origin of the specific timing-window hypothesis, search priorities, and proposed review of downranked or RFI-classified candidate products.

1. Background

The Wow! signal was detected on 1977 August 15 by the Ohio State University Big Ear radio telescope during a search for narrowband radio signals. It remains notable because it was strong, narrowband, short-lived, and located near the neutral hydrogen-line region.

Its duration was consistent with passage through one Big Ear beam. However, it was not detected in the second feed horn, leaving two possible sky positions rather than one uniquely determined source location.

The central difficulty is recurrence. A useful recurrence hypothesis must be more specific than a general request to observe the Wow! field again. It must explain why a particular sky region, frequency band, and timing window should receive priority relative to the large search space already covered by SETI and radio-transient programs.

Recent work has narrowed the possible test space. Kipping and Gray showed that strict periodic recurrence is strongly constrained, while a stochastic repeater cannot be excluded without additional observing time. Méndez, Ortiz Ceballos, and Zuluaga proposed an astrophysical false-positive model in which cold neutral hydrogen clouds may brighten near the hydrogen line when stimulated by a transient radiation source.

Méndez et al. subsequently reported revised archival constraints from Ohio SETI data, including two adjacent candidate fields centered near:

Field A: RA 19h25m02s ± 3s, Dec −26°57′ ± 20′, J2000
Field B: RA 19h27m55s ± 3s, Dec −26°57′ ± 20′, J2000

They also reported a revised frequency estimate near 1420.726 MHz.

This paper uses those revised sky positions and frequency estimates as the basis for a targeted archival test.

2. Selection Rationale

2.1 Sky Region

The proposed region is not selected from an unrestricted all-sky search, star catalog, or unrelated source preference. It is selected from the two possible sky positions left by the original Big Ear observation. The original beam pattern and two-feed-horn ambiguity therefore provide the direct basis for the search area.

Because the historical data do not determine which feed horn received the signal, the appropriate primary search region is the pair of possible Wow! fields:

Field A: RA 19h25m02s ± 3s, Dec −26°57′ ± 20′, J2000
Field B: RA 19h27m55s ± 3s, Dec −26°57′ ± 20′, J2000

Candidate products from adjacent beam positions may also be relevant where telescope sensitivity provides meaningful coverage of either field.

2.2 Frequency Region

The primary frequency priority is:

1420.726 ± 0.005 MHz

Secondary review should cover approximately:

1420.70–1420.75 MHz

Broader comparison against nearby neutral hydrogen-line channels may be warranted when a candidate was flagged, downranked, discarded, or excluded by automated filtering.

The purpose of the broader comparison is not to classify every excess near 1420 MHz as relevant. It is to avoid eliminating a potentially useful candidate solely because its measured frequency, drift behavior, or initial classification differed slightly from the expected search parameters.

2.3 Timing Window

The timing window is selected by treating the 1977 detection as a fixed drift-scan event rather than as a simple calendar anniversary.

The recurrence search asks whether later data from the revised Wow! fields fall within the date-and-time conditions identified in the April 2026 AI-assisted analysis.

The resulting priority interval is:

2025 November 7 at 01:00 UTC through 2025 November 9 at 02:30 UTC

The highest-priority nightly subwindows are:

- 2025 November 7, 01:00–02:30 UTC
- 2025 November 8, 01:00–02:30 UTC
- 2025 November 9, 01:00–02:30 UTC

This is not proposed as evidence that an emitter repeats periodically. It is a predefined date-and-position test intended to focus archival review.

2.4 Timing-Window Development and Record

The priority window was first identified on April 20, 2026 through an AI-assisted review of the original Wow! observation, the revised candidate fields, and the conditions under which a similar signal might appear in modern data.

The analysis focused on three practical questions:

- **Where to look:** The revised Field A and Field B positions were used to focus the archival search.

- **When to look:** The analysis identified November 7-9, 2025, with 01:00-02:30 UTC on each date as the highest-priority subwindows.
- **Where a signal could be missed:** The review was extended beyond final candidate lists to include intermediate, downranked, and RFI-flagged products.

The surviving research record documents the following inputs and limitations:

- **Original observation used:** The 1977 event was treated as a fixed transit or drift-scan detection with a beam-shaped rise and fall, a duration consistent with passage through one Big Ear beam, and two possible sky positions because only one feed horn recorded the event.
- **Revised sky positions:** Field A: RA 19h25m02s +/- 3s, Dec -26°57' +/- 20', J2000; Field B: RA 19h27m55s +/- 3s, Dec -26°57' +/- 20', J2000.
- **Reference frame:** J2000.
- **Frequency:** 1420.726 +/- 0.005 MHz, with secondary review across approximately 1420.70-1420.75 MHz and nearby neutral hydrogen-line channels when candidate products were flagged or downranked.
- **Timing output:** November 7, 2025 at 01:00 UTC through November 9, 2025 at 02:30 UTC, with 01:00-02:30 UTC on each date given highest priority.
- **Comparison interval:** The complete range of dates considered during the AI-assisted review was not preserved in the available record.
- **Timing tolerance:** No separate numerical timing or ephemeris tolerance was preserved. The stated field, frequency, date, duration, and beam-coverage criteria define the practical acceptance range.
- **Computational method:** AI-assisted analysis. No standalone ephemeris program, executable astronomical model, or radio-astronomy pipeline was used to generate the timing window.
- **Date fixed:** April 20, 2026, before the June 18, 2026 confirmation of relevant Parkes observations.
- **Original record:** The April 2026 public research record is available at https://creationunified.com/identifying-the-return-of-the-wow-signal.

The timing window should therefore be treated as a predefined, testable search hypothesis, not as the output of a conventional astronomical calculation.

Because the full AI prompt and complete comparison interval are not reproduced here, another analyst may not be able to regenerate the same dates from first principles. The hypothesis remains testable, however, because the dates, sky positions, frequency range, candidate criteria, and conditions that would weaken or reject it were documented before the Parkes coverage was confirmed.

The window must be evaluated as originally stated and should not be adjusted after reviewing the available Parkes data.

3. Newly Available Parkes/Breakthrough Listen Data

Following an inquiry to the Australia Telescope National Facility, John Reynolds confirmed by correspondence that Breakthrough Listen observed near one Wow! candidate field using the Parkes 64 m telescope, Murriyang, on 2025 November 7.

The observed source was:

Source: XaP793-Wow
RA: 19:28:16.9999, J2000
Dec: −26:56:49.9992, J2000

This pointing is approximately 5 arcminutes from the second revised Wow! field and lies within the half-power beam of the Parkes 64 m telescope at 1420 MHz. The full width at half maximum at that frequency is approximately 15 arcminutes.

The target was observed three times for five minutes each, producing 15 minutes of total target coverage between 08:17 and 08:46 UTC. These observations were interleaved with observations of a reference field located 0.5 degrees north.

The receiver coverage included the neutral hydrogen-line frequency region near 1420 MHz.

Breakthrough Listen has made the observations publicly available at:

https://bldata.berkeley.edu/PKS/PKS_1054_2025-11-07T07:30/

The blc* directories each contain a fraction of the Parkes Ultra Wideband receiver range, which spans approximately 700–4000 MHz. The general organization of Breakthrough Listen data products is described by Lebofsky et al. (2019).

These observations do not constitute a detection claim. Their significance is that relevant public data now exist near one of the candidate Wow! fields and include the frequency region required for the targeted archival review.

The Parkes observation time is later than the highest-priority 01:00–02:30 UTC subwindow. It nevertheless falls on the principal date, covers a nearby field within the Parkes beam, and includes the neutral hydrogen-line frequency region.

The difference between the predefined highest-priority time and the actual Parkes observation time must remain explicit. A candidate found at 08:17–08:46 UTC would represent a result on the principal date and within relevant field and frequency coverage, but it should not be reported as occurring inside the narrower 01:00–02:30 UTC subwindow.

4. Proposed Archival Review

The primary objective is not merely to search final published candidate lists. The review should examine the processing chain at a sufficiently early stage to determine whether a relevant signal could have been removed or downranked before reaching final candidate products.

Where access permits, the review should include:

- raw or minimally processed voltage or filterbank products;
- intermediate narrowband hit tables;
- candidate lists generated before final RFI rejection;
- signals classified as local or nonpersistent interference;
- candidates excluded because they appeared in an off-source or reference observation;
- candidates removed because their Doppler drift did not satisfy a predefined first-pass threshold;
- frequency channels masked because of known or suspected RFI;
- products downgraded because of low persistence, an unusual signal shape, or incomplete multi-beam confirmation;
- logs documenting automated and analyst-applied exclusion decisions.

The hypothesis allows for the possibility that a candidate meeting the stated criteria may have been present in intermediate products without surviving the final Breakthrough Listen candidate-selection process.

This does not imply that the original classification was incorrect. Automated and manual RFI rejection are necessary components of large-scale technosignature searches. The purpose of the proposed review is to test whether a narrowly specified external hypothesis changes the evidentiary value of a previously rejected or downranked event.

5. Candidate Criteria and Falsification

A candidate recurrence should not be defined as any excess near 1420 MHz.

A useful event should display several of the following properties:

- narrowband structure, preferably approximately 10 kHz or less where comparable resolution is available;
- occurrence within or near the November 7–9, 2025 UTC interval;
- location within Field A, Field B, or a beam position providing meaningful sensitivity to one of those fields;
- frequency near 1420.726 MHz or within the defined hydrogen-line review band;
- duration on the order of tens of seconds to a few minutes;
- a time profile consistent with passage through the telescope beam;
- absence from the reference field if the event is genuinely sky-localized;
- no immediate ordinary terrestrial, satellite, instrumental, or processing explanation.

Doppler drift should be treated as a classification feature after candidate retrieval rather than as an absolute first-pass exclusion rule. An unusual or low measured drift rate should not by itself prevent a candidate from being inspected when the field, date, duration, frequency, and signal shape otherwise justify review.

5.1 Conditions That Weaken or Falsify the Hypothesis

The hypothesis would be weakened if adequate Parkes/Breakthrough Listen coverage near the relevant field and frequency contained no narrowband candidate with comparable observable characteristics.

It would also be weakened or falsified if:

- a recovered candidate is clearly explained as ordinary radio-frequency interference;
- the event is attributable to a known satellite, aircraft, terrestrial transmitter, instrumental effect, or processing artifact;
- the signal appears equivalently in the reference field in a manner inconsistent with sky localization;
- the candidate time profile is inconsistent with the telescope beam and pointing conditions;
- the signal frequency or duration is materially inconsistent with the stated criteria;
- the timing window cannot be traced to its declared fixed inputs;
- the timing window was materially adjusted after the Parkes coverage became known;
- independent analysts applying the same retrieval criteria cannot recover the event.

A documented null result is a scientifically useful outcome. It would reduce support for the proposed recurrence window and help define the limits of the timing-window hypothesis.

5.2 Meaning of a Positive Result

A positive result would not mean that the Wow! signal has been solved.

It would mean that a narrowband candidate with comparable observable characteristics exists in relevant November 2025 data within or near the refined Wow! fields and neutral hydrogen-line region and is sufficiently unusual to justify independent classification.

Such a candidate would require standard technical review, including:

- independent RFI rejection;
- comparison with the reference field;
- telescope pointing and beam-response analysis;
- telescope and receiver logs;
- calibration review;
- frequency-resolution and time-resolution verification;
- Doppler-drift analysis;
- polarization analysis, if available;

- satellite, aircraft, and terrestrial transmitter checks;
- repeat searches of the same sky region;
- comparison with natural neutral hydrogen-line phenomena;
- examination by analysts independent of the original hypothesis.

Only after those steps could the candidate's scientific significance be responsibly assessed.

6. Data and Analysis Status

The observational data referenced in this paper were produced and publicly released by Breakthrough Listen.

At the time of this revision, the author had not independently completed a full technical analysis of the raw or intermediate Parkes products. No candidate finding, negative result, or completed technical review from Breakthrough Listen had been communicated to the author as of July 28, 2026.

The presence of public data near the relevant field and frequency therefore establishes testability, not confirmation.

Any candidate identification would require independent review by qualified radio-astronomy and signal-analysis specialists. Any resulting publication should distinguish clearly among:

1. the dated origin of the specific hypothesis and search plan;
2. the acquisition and ownership of the observational data;
3. the work required to retrieve and identify a candidate;
4. the technical work required to validate or reject that candidate.

7. Research Chronology and Priority Record

The following chronology records the development and transmission of the hypothesis:

- **April 20, 2026** Recurrence hypothesis and search window first formulated.
- **April 20, 2026** Hypothesis first documented publicly in a timestamped video: https://www.youtube.com/watch?v=JvjUHcrUDTI
- **June 18, 2026:** John Reynolds of ATNF confirmed that Breakthrough Listen observed XaP793-Wow with the Parkes 64 m telescope on 2025 November 7 and provided the pointing, beam, duration, frequency-coverage, and public-data information.
- **April 20, 2026:** Original dated version of this archival-test paper.
- **June 22, 2026:** John Reynolds's referral and the manuscript were sent to Joe Bright at Oxford/Breakthrough Listen.
- **6/22/26, 7/19/26:** Follow-up messages sent requesting acknowledgment and technical review.
- **July 28, 2026:** Version 2.2 prepared to simplify technical language, clarify the AI-assisted timing-window record, and strengthen the contribution and attribution record.

At the time the hypothesis was formulated and initially documented, no candidate analysis or finding from Breakthrough Listen had been communicated to the author.

The supporting evidence for this chronology consists of the original manuscript files, submission records, timestamped public video, email threads, and the June 18, 2026 ATNF correspondence.

8. Conclusion

This paper proposes a targeted archival test of a possible Wow! recurrence window.

The search region is justified by revised archival localization of the original Wow! fields. The frequency priority is based on the revised estimate near 1420.726 MHz. The timing interval was identified through an April 2026 AI-assisted review of the original observation, the revised field positions, and the conditions chosen for priority archival searching. It is not presented as a conventional astronomical ephemeris calculation.

Newly available Parkes/Breakthrough Listen data provide a concrete archival dataset for review. Those data do not establish recurrence, but they move the hypothesis from an abstract request for future coverage toward a specific and falsifiable data-analysis task.

The proposed review is specifically designed to examine whether a relevant narrowband event may exist in intermediate, downranked, RFI-flagged, or otherwise excluded products rather than only in final published candidate lists.

A documented null result would constrain the recurrence-window hypothesis. A technically credible candidate would justify independent validation and targeted follow-up.

The contribution of this paper is not a claimed detection. It is the dated formulation of a specific archival hypothesis identifying where, when, at what frequency, and at what point in the processing chain a candidate should be sought. Any later publication based materially on these priorities should cite this paper while separately crediting the teams responsible for the observations, candidate retrieval, and technical validation.

Author Contributions

Kevin L. Brown: Conceptualization; recurrence-window hypothesis; date-and-position search rationale; targeted search plan; candidate-recovery criteria; falsification framework; research chronology; manuscript preparation.

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The author thanks John Reynolds of the Australia Telescope National Facility for confirming the 2025 November 7 Parkes observational coverage and for providing technical information concerning the source pointing, beam coverage, observing duration, frequency range, reference-field observations, and public-data location.

The author acknowledges Breakthrough Listen and the Parkes/Murriyang observing team for acquiring, processing, preserving, and publicly releasing the underlying observational data.

The author also acknowledges the prior researchers whose revised localization, frequency analysis, recurrence constraints, and alternative astrophysical models helped define the targeted search area evaluated in this paper.

Conflict of Interest Statement

The author declares no financial conflict of interest related to the Parkes/Breakthrough Listen observations or data products.

Data Availability

The Breakthrough Listen Parkes observations discussed in this paper are publicly available at:

https://bldata.berkeley.edu/PKS/PKS_1054_2025-11-07T07:30/

The author's supporting chronology, timestamped public presentation, correspondence record, and timing-window development record are available at:

https://creationunified.com/identifying-the-return-of-the-wow-signal

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