WALLABY Pilot Survey Data Release 1:
Description of Source Parameters and Data Products

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1 Overview

This document accompanies the first public data release of phase 1 pilot survey data from the WALLABY H I survey[1] on ASKAP. The document describes in more detail the individual source parameters and data products from the SoFiA 2 source finding pipeline.[2] Please see the official data release paper[3] for more general information about the release.

2 Source parameters

Here we provide a more detailed description of the catalogued source parameters derived by SoFiA. All parameters were calculated under the following assumptions:

- The spatial pixel size is $\Delta x = 6''$, and spatial pixels are correlated by a Gaussian restoring beam of FWHM $\theta = 5\ \Delta x = 30''$. This implies a beam solid angle in units of pixels of $\Omega = \pi(\theta/\Delta x)^2/[4\ln(2)] \approx 28.3$.
- The spectral channel width is $\Delta\nu = 1/54$ MHz $\approx$ 18.5 kHz, and the signal in adjacent spectral channels is uncorrelated.
- Sky positions are specified in J2000 equatorial coordinates, while frequencies are specified in the Solar System barycentric rest frame.
- Pixel coordinates are zero-based and entirely arbitrary, as they are defined relative to the actual region of the full data cube that was processed by each instance of SoFiA.
- Most parameters specified in the catalogue are observables, and users are responsible for converting those into accurate physical parameters such as velocity width (see Section 3).

Note that some of these assumptions may not be strictly correct in all cases. Faint sources may have been only partially deconvolved, and their PSF could therefore be a combination of the dirty and clean beams.

2.1 List of source parameters

`name` – **source name**
: Official WALLABY source name of the form "WALLABY Jhhmmss±ddmmss" in accordance with the official IAU naming scheme (see `https://cds.unistra.fr/cgi-bin/Dic-Simbad?WALLABY`).

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[1]Koribalski et al., 2020, Ap&SS, 365, 118; `https://ui.adsabs.harvard.edu/abs/2020Ap&SS.365..118K`
[2]Westmeier et al., 2021, MNRAS, 506, 3962; `https://ui.adsabs.harvard.edu/abs/2021MNRAS.506.3962W`
[3]Westmeier at al., 2022, PASA, 39, E058; `https://doi.org/10.1017/pasa.2022.50`

`ra`, `dec` – **right ascension and declination (deg)**
Right ascension and declination of the flux-weighted centroid of the source in J2000 equatorial coordinates in degrees (see parameters `x` and `y` for details).

`freq` – **frequency (Hz)**
Flux-weighted barycentric frequency centroid of the source in Hertz (see parameter `z` for details).

`f_sum` – **flux** (Jy Hz)
Integrated H I flux in units of Jy Hz, calculated as

$$\texttt{f\_sum} = \frac{\Delta\nu}{\Omega} \sum_i S_i \tag{1}$$

where the summation is over all spatial and spectral pixels, i, of the SoFiA source mask, $\Delta\nu = 1/54$ MHz ≈ 18.5 kHz is the spectral channel width of ASKAP and $\Omega = \pi\theta^2/[4\ln(2)]$ is the solid angle of a Gaussian beam of FWHM θ (in units of pixels). We here assume a $30''$ restoring beam and $6''$ spatial pixel size, which implies $\theta = 30''/6'' = 5$ and hence $\Omega \approx 28.3$. The flux measurement will be inaccurate for any emission that has not been deconvolved and is dominated by the dirty beam instead of the $30''$ Gaussian restoring beam. This could result in flux errors for faint sources that are buried in the noise.

`err_f_sum` – **statistical uncertainty of flux** (Jy Hz)
Statistical uncertainty of the integrated flux measurement, `f_sum`, calculated using a modified version of the standard error propagation law,

$$\texttt{err\_f\_sum} = \sqrt{\frac{N}{\Omega}}\Delta\nu\sigma, \tag{2}$$

where N is the total number of spatial and spectral pixels in the SoFiA source mask, Ω is the solid angle of the synthesised beam, $\Delta\nu = 1/54$ MHz ≈ 18.5 kHz is the spectral channel width of ASKAP and σ is the local RMS noise level at the location of the source. The modification to the error propagation law takes into account the fact that the signal is spatially correlated as a result of the finite beam size, but assumed uncorrelated spectral channels.

`rms` – **local RMS noise (Jy)**
Robust estimate of the local RMS noise level in Jy per spectral channel and beam at the location of the source. The estimate is derived from the median absolute deviation about zero via

$$\texttt{rms} = C \times \mathrm{median}(|S_i|) \tag{3}$$

where the median is over all spatial and spectral pixels, i, within the cubelet of each source that are not part of any source mask. $C = 1/\Phi^{-1}(3/4) \approx 1.4826$ is a conversion factor between median absolute deviation and standard deviation under the assumption of a normal distribution of all flux density values.

`w20` – **line width at 20% of the peak (Hz)**
The w_{20} line width of the integrated H I spectral profile across the source mask is measured at a level of 20% of the peak flux density in the spectrum. The measurement is carried out by moving inwards from both ends of the spectrum until 20% of the peak is exceeded for the first time. Linear interpolation across the bracketing channels in between which the signal crosses the threshold is used for improved accuracy.

`w50` – **line width at 50% of the peak (Hz)**
Same as `w_20`, but at 50% of the peak flux density of the integrated spectrum.

`wm50` – **line width at 50% of the mean (Hz)**
Width of the integrated H I spectral profile at 50% of the mean flux density as defined in section 4 of Courtois et al. (2009).[4]

[4]Courtois, H. M. et al., 2009, AJ, 138, 1938

`kin_pa` – **position angle of the kinematic major axis (deg)**

Estimate of the position angle of the kinematic major axis of the source in degrees, measured counter-clockwise, with 0° pointing up (towards increasing y). The position angle is measured by determining the flux-weighted centroid position of the source in each spectral channel separately and then fitting a straight line to the set of centroid positions using orthogonal regression (also known as *Deming regression*). The resulting position angle points towards the **approaching side** of the object, i.e. the side covering the upper end of the frequency range occupied by the source. Note that the position angle is specified relative to the pixel grid of the data cube, not the sky coordinate system, and is likely to differ slightly from the kinematic position angle derived by the WALLABY kinematics pipeline. A value of −1 indicates that a kinematic position angle could not be established. Please also note that for very faint or non-rotating objects the catalogued value may not be meaningful.

`rel` – **reliability**

Statistical reliability of the source using the algorithm from Serra at al. (2012).[5] The reliability is calculated by comparing the density of detections with positive and negative flux in a three-dimensional parameter space consisting of the peak flux density, integrated flux and mean flux density across the source mask. The resulting values are in the range of 0 (unreliable) to 1 (reliable) and can be used to estimate the likelihood of a source being a false detection.

`qflag` – **source finding quality flag**

SoFiA quality flag with the following possible values: 0 = no issues; 1 = source near spatial edge of the data cube; 2 = source near spectral edge of the data cube; 4 = source affected by flagged data. Flag values are additive, e.g. a value of 5 means that the source is near the spatial edge of the cube and affected by flagging. Sources truncated at the edge of the cube were excluded from the WALLABY catalogue, and hence only flag values of 0 and 4 occur in the catalogue.

`kflag` – **kinematic modelling status flag**

Flag indicating the status of kinematic modelling of the source with the following values: 0 = no kinematic modelling attempted; 1 = kinematic modelling attempted but failed; 2 = kinematic modelling attempted and successful.

`n_pix` – **number of pixels in source mask**

The total number of spatial and spectral pixels contained in the 3D SoFiA source mask.

`f_min` – **minimum flux density (Jy)**

The smallest flux density value encountered within the SoFiA source mask in units of Jy per spectral channel and beam.

`f_max` – **maximum flux density (Jy)**

The largest flux density value encountered within the SoFiA source mask in units of Jy per spectral channel and beam.

`ell_maj`, `ell_min`, `ell_pa` – **ellipse fit to source (pix, pix, deg)**

Major axis in pixels, minor axis in pixels and position angle in degrees of an ellipse fitted to the moment-0 map of the source following the algorithm described in Banks et al. (1995).[6] The algorithm works by first calculating the second spatial moments of the image,

$$M_{xx} = \frac{\sum_i (x_i - \bar{x})^2 S_i}{\sum_i S_i}, \tag{4}$$

$$M_{yy} = \frac{\sum_i (y_i - \bar{y})^2 S_i}{\sum_i S_i}, \tag{5}$$

$$M_{xy} = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y}) S_i}{\sum_i S_i}, \tag{6}$$

[5] Serra, P., Jurek, R. & Flöer, L., 2012, PASA, 29, 296

[6] Banks, T., Dodd, R. J. & Sullivan, D. J., 1995, MNRAS, 272, 821

where the summation is over all spatial pixels, i, of the source, $\bar{x}$ and $\bar{y}$ denote the flux-weighted centroid position of the source and S_i is the flux density in pixel i. The ellipse parameters are then derived as

$$\texttt{ell\_maj} = \sqrt{2\left(M_{xx} + M_{yy} + \sqrt{(M_{xx} - M_{yy})^2 + 4M_{xy}^2}\right)}, \tag{7}$$

$$\texttt{ell\_min} = \sqrt{2\left(M_{xx} + M_{yy} - \sqrt{(M_{xx} - M_{yy})^2 + 4M_{xy}^2}\right)}, \tag{8}$$

$$\texttt{ell\_pa} = \frac{1}{2}\arctan\left(\frac{2M_{xy}}{M_{xx} - M_{yy}}\right). \tag{9}$$

Due to their derivation from the spatial second moments, the ellipse major and minor axis sizes (in units of pixels) for an elliptical Gaussian source correspond to **twice the standard deviation** about the centroid along the major and minor axis of the source, respectively. The position angle (in degrees) is measured counter-clockwise, with 0° pointing up, i.e. in the direction of increasing y. The largest flux density value encountered within the SoFiA source mask in units of Jy per spectral channel and beam.

`ell3s_maj`, `ell3s_min`, `ell3s_pa` – **ellipse fit to source (pix, pix, deg)**
Same as `ell_maj`, `ell_min` and `ell_pa`, but using only pixels with a signal-to-noise ratio of > 3 in the moment-0 map and applying equal weighting of $S_i = 1$ to all pixels. This will provide a better estimate of the size and orientation of the outer boundary of the source at the 3σ level.

`x`, `y`, `z` – **flux-weighted centroid position (pix)**
Flux-weighted centroid position of the source within the source mask,

$$\vec{p} = (\mathtt{x}, \mathtt{y}, \mathtt{z}) = \frac{\sum_i \vec{p}_i S_i}{\sum_i S_i}, \tag{10}$$

where $\vec{p}_i$ and S_i are the pixel coordinate and flux density of pixel i, respectively, and the summation is carried out over all pixels of the source mask with **positive** flux density. The pixel coordinates are relative to the region of the data cube processed by SoFiA and thus arbitrary; see `ra`, `dec` and `freq` for the corresponding absolute world coordinates.

`err_x`, `err_y`, `err_z` – **statistical uncertainty of flux-weighted centroid position (pix)**
Statistical uncertainty of the flux-weighted centroid position, $\vec{p} = (\mathtt{x}, \mathtt{y}, \mathtt{z})$, calculated using a modified version of the standard error propagation law,

$$\texttt{err\_x} = \frac{\sqrt{\Omega}\sigma}{S}\sqrt{\sum_i (x_i - x)^2} \tag{11}$$

and likewise for `err_y` and `err_z`, where Ω is the beam solid angle, σ is the local noise level at the location of the source, $S = \sum_i S_i$ is the sum of all positive flux density values across the source mask, x_i is the pixel coordinate of pixel i, and x is the flux-weighted centroid position. This modified version of the error propagation law accounts for the fact that spatial pixels are correlated due to the finite beam size.

`x_min`, `x_max`, `y_min`, `y_max`, `z_min`, `z_max` – **source bounding box (pix)**
3D source bounding box (inclusive) in x, y and z. The pixel coordinates are relative to the region of the data cube processed by SoFiA and thus arbitrary; yet the relative differences still provide meaningful information on the spatial and spectral extent of the source bounding box in pixels.

`dist_h` – **Hubble distance (Mpc)**
Estimate of the Hubble distance, cz/H_0, in units of Mpc based on the barycentric redshift, z, of the source and a Hubble constant of $H_0 = 70\ \mathrm{km\,s^{-1}\,Mpc^{-1}}$. Note that the resulting Hubble distance could deviate significantly from the object's comoving distance due to peculiar motion and bulk flow, in particular for objects at low redshift. Hubble distances should therefore be used with caution.

`log_m_hi` – H I **mass estimate**

Estimate of the decadic logarithm of the H I mass in units of Solar masses,

$$\frac{M_{\mathrm{H\,I}}}{M_{\odot}} = 49.7 \left(\frac{d}{\mathrm{Mpc}} \right)^{2} \frac{F}{\mathrm{Jy\,Hz}} \tag{12}$$

where d is the Hubble distance (`dist_h`), F is the integrated flux (`f_sum`) and $M_{\odot} = 1.989 \times 10^{30}$ kg is the mass of the Sun. Due to large systematic errors in the Hubble distance, the H I masses provided in the catalogue should only be considered as rough order-of-magnitude estimates. Direct distance measures should instead be used to derive the H I masses of individual galaxies for scientific analysis.

`comments` – **comments on individual sources**

Comments on potential issues with individual sources, e.g. the presence of artefacts, partial detection of a galaxy, multiple objects merged into one H I detection, etc.

`team_release` – **internal data release version**

Specifies the internal WALLABY team data release version from which the source is derived (Hydra TR1, Hydra TR2, Norma TR1, NGC 4636 TR1).

3 Physical parameter conversion

Here we provide instructions on how to easily convert the observational parameters from the WALLABY catalogue into physical parameters for scientific analysis. Please see Meyer et al. (2017)[7] for further details.

3.1 Redshift

Barycentric frequencies, ν, provided in the WALLABY source catalogue can be converted to barycentric redshift using the definition of redshift,

$$z = \frac{\nu_0 - \nu}{\nu}, \tag{13}$$

where $\nu_0 \approx 1.420405751768 \times 10^9$ Hz is the rest frequency of the 21-cm H I transition. Redshift can be immediately converted to line-of-sight "recession velocity", cz, where c $= 2.99792458 \times 10^8$ m s^{-1} is the speed of light in vacuum.

Users are reminded that "recession velocity" is not a velocity, but an alternative way of expressing redshift, unless dealing with local objects at a cosmological redshift of zero which are moving at non-relativistic speeds. In particular, "recession velocity" differences must not be confused with actual peculiar velocity differences in the rest frame of the source (see Section 3.3 on how to calculate those).

3.2 Distance

Conversion of redshift to distance is non-trivial and requires the assumption of a cosmological model. In addition, there is no simple, unique concept of distance in a non-Euclidian four-dimensional space-time. The following cosmological distances may be useful in certain science cases based on WALLABY data:

Angular diameter distance

The angular diameter distance of an object connects the physical size, l, of the object with its angular size, θ, on the sky, hence $D_{\mathrm{A}} = x/\tan(\theta) \approx x/\theta$ in small-angle approximation. It can be used to convert angular scales on the sky into physical sizes at a given *cosmological* redshift, z.

Luminosity distance

The luminosity distance of an object is the distance across which an object of intrinsic luminosity, L, is observed to have a specific flux, F, hence $D_{\mathrm{L}} = \sqrt{L/(4\pi F)}$. It can be used to covert the fluxes from the WALLABY catalogue into luminosities at a given *cosmological* redshift, z.

[7] Meyer, M., Robotham, A., Obreschkow, D., et al., 2017, PASA, 34, 52

Comoving distance
The comoving distance of an object is the object's *proper* distance (as measured with a ruler) at the current time (i.e. at $z = 0$). Hence, comoving distance removes the effect of cosmic expansion and can be used to define and measure parameters such as galaxy space density at a fixed point in time.

At low redshift, where one can make the approximation of a three-dimensional Euclidian space, all of these distance metrics yield the same value. At the high-redshift end of the WALLABY frequency band, however, they will deviate significantly, and an appropriate distance measure will need to be adopted.

We recommend using the `astropy.cosmology` module from the Astropy library for Python to convert WALLABY redshifts to distances. A simple example could look like this:

```
from astropy.cosmology import FlatLambdaCDM
cosmo = FlatLambdaCDM(H0=70, Om0=0.3)
da = cosmo.angular_diameter_distance(z=0.05)   # angular diameter distance
dl = cosmo.luminsity_distance(z=0.05)          # luminosity distance
dc = cosmo.comoving_distance(z=0.05)           # comoving distance
```

Detailed information on how to set up and use the `astropy.cosmology` module is available from the Astropy website.[8] It is important to note that cosmological distance calculations are based on the assumption that the observed redshift of a source is equal to its cosmological redshift. This assumption is often broken at low redshifts where peculiar motions are dominant and direct distance measurements are often a much better and more accurate choice.

3.3 Line width

Line widths, $\Delta\nu$, in the WALLABY catalogue in units of Hertz can be converted to actual velocity widths, Δv, along the line of sight in the rest frame of the source via

$$\frac{\Delta v}{\mathrm{c}} = \frac{\Delta z}{1 + z} \approx (1 + z) \frac{\Delta\nu}{\nu_0}. \tag{14}$$

Under the assumption that z is the *cosmological* redshift of the source, this equation can be used to convert `w20`, `w50` and `wm50` from the catalogue to line-of-sight velocity width in the source rest frame. Note that additional corrections, such as for disc inclination or the finite ASKAP spectral channel width of 1/54 MHz, may need to be applied.

3.4 H I mass

The integrated flux, F, provided in the WALLABY catalogue can be converted to H I mass using

$$\frac{M_{\mathrm{H\,I}}}{M_{\odot}} \approx 49.7 \left(\frac{D_{\mathrm{L}}}{\mathrm{Mpc}} \right)^2 \frac{F}{\mathrm{Jy\,Hz}} \tag{15}$$

where D_{L} is the luminosity distance of the source and $M_{\odot} \approx 1.989 \times 10^{30}$ kg is the mass of the Sun. This conversion is non-trivial and based on a number of assumptions. Firstly, the H I gas is assumed to be optically thin. Secondly, it requires knowledge of the luminosity distance which is dependent on direct distance measurements at low redshift or the assumption of a cosmological model at higher redshift.

3.5 H I column density

The 0^{th} moment flux maps provided by WALLABY are calibrated in units of Jy Hz and can be converted to H I column density using

$$\frac{N_{\mathrm{H\,I}}}{\mathrm{cm}^{-2}} \approx 2.64 \times 10^{20} (1 + z)^4 \frac{F}{\mathrm{Jy\,Hz}} \left(\frac{\Omega}{\mathrm{arcsec}^2} \right)^{-1} \tag{16}$$

$$= 2.59 \times 10^{17} (1 + z)^4 \frac{F}{\mathrm{Jy\,Hz}} \tag{17}$$

[8] `https://docs.astropy.org/en/stable/cosmology/`

under the assumption of a 30″ Gaussian beam with a solid angle of $\Omega \approx 1020$ arcsec^2. This conversion is based on the assumption that the H I emission is optically thin as well as diffuse and extended across the entire synthesised beam. Note that $N_{\mathrm{H\,I}} \propto (1+z)^4$ where z is the *cosmological* redshift of the source.

4 Data products

For each object in the source catalogue we provide seven additional data products for scientific analysis or further parameterisation beyond the source parameters supplied with the catalogue. This includes a cubelet and associated mask cube of each source, maps of the 0$^{\mathrm{th}}$, 1$^{\mathrm{st}}$ and 2$^{\mathrm{nd}}$ spectral moment, a map of the number of spectral channels across the source mask in each spatial pixel and a spatially integrated spectrum of each source. The same assumptions apply as for the source parameterisation (see Section 2). A detailed description of the individual source data products is presented below.

4.1 List of data products

`_cube.fits` – **cubelet (Jy)**

3D cubelet of the source in 32-bit floating-point FITS format. The cubelet is extracted from the original, mosaicked ASKAP data cube and encompasses the entire source as defined by the extent of the SoFiA source mask plus some extra padding of 10 pixels around the edges (both spatially and spectrally).

`_mask.fits` – **source mask**

3D mask cube of the source in 8-bit integer FITS format. Pixels deemed to be part of the source by SoFiA have a value of 1, all other pixels (including those belonging to other sources) have a value of 0. The dimensions of the mask cube are identical to those of the associated cubelet, including the world coordinate system.

`_mom0.fits` – **moment-0 integrated flux map** (Jy Hz)

2D integrated flux map of the source in units of Jy Hz based on the zeroth spectral moment,

$$M_0(x,y) = \Delta\nu \sum_z S(x,y,z), \tag{18}$$

derived by summing the flux densities along the spectral axis for all channels, z, within the source mask and multiplying by the spectral channel width, $\Delta\nu = 1/54$ MHz. Pixels outside of the source mask are set to a value of 0.

`_mom1.fits` – **moment-1 frequency centroid map (Hz)**

2D frequency centroid map of the source in units of Hz based on the first spectral moment,

$$M_1(x,y) = \frac{\sum_z z S(x,y,z)}{\sum_z S(x,y,z)}, \tag{19}$$

where S is the flux density in pixel (x,y,z), and the summation is over all spectral channels, z, within the source mask that have a positive flux density of $S(x,y,z) > 0$. Spatial pixels outside of the source mask are blanked (floating-point value of NaN). Unlike in the moment 0 map, only channels with positive flux density are included in the moment-1 calculation to avoid numerical instabilities from negative noise peaks.

`_mom2.fits` – **moment-2 spectral dispersion map (Hz)**

2D map of spectral dispersion about the frequency centroid of the source in units of Hz based on the second spectral moment,

$$M_2(x,y) = \sqrt{\frac{\sum_z [z - M_1(x,y)]^2 S(x,y,z)}{\sum_z S(x,y,z)}}, \tag{20}$$

where the summation is over all spectral channels, z, within the source mask that have a positive flux density of $S(x,y,z) > 0$. As with the moment-1 map, channels with negative flux density are excluded to avoid numerical instabilities from negative noise peaks. Spatial pixels outside of the source mask are blanked (floating-point value of NaN).

_chan.fits – **number of channels**

2D map of the number of channels, $N_{\rm chan}$, across the source mask in each spatial pixel of the source. This can be used to derive the statistical uncertainty in each pixel of the moment-0 map via $\Delta\nu \times \sigma \times \sqrt{N_{\rm chan}}$, where $\Delta\nu = 1/54$ MHz is the spectral channel width, and σ is the local noise level in the data cube at the location of the source. Note that the number of channels used in the moment-1 and moment-2 maps is typically smaller due to the additional flux threshold of 0.

_spec.txt – **integrated spectrum (Jy)**

1D spatially-integrated spectrum of the source across the entire source mask in units of Jy,

$$S(z) = \sum_{x,y} S(x,y,z)/\Omega, \tag{21}$$

where $\Omega \approx 28.3$ is the solid angle of the $30''$ Gaussian restoring beam of WALLABY (in units of pixels). The spectrum is provided as a plain text file with four space-separated column containing (1) the (arbitrary) spectral channel number, (2) the corresponding barycentric frequency in Hz, (3) the spatially integrated flux density in Jy and (4) the number of spatial pixels included in the summation. The latter can be used to calculate the statistical uncertainty of the flux density in each channel via $\sigma \times \sqrt{N_{\rm pix}/\Omega}$, where σ is the local noise level of the data cube at the location of the source, and $N_{\rm pix}$ is the number of spatial pixels from column 4 of the spectrum.

Only channels covered by the source mask contain valid data, while channels outside of the mask are set to a value of zero. This maximises the signal-to-noise ratio of the integrated spectrum, but results in a statistical uncertainty that varies from channel to channel.

5 Comments on individual sources

Comments on individual detections from the WALLABY source catalogue are listed below for each field/team release in the order of increasing right ascension.

5.1 Hydra TR1

WALLABY J103758−252035	Potential sidelobe.
WALLABY J103732−261917	Partial detection of galaxy; other half is WALLABY J103726−261843.
WALLABY J103726−261843	Partial detection of galaxy; other half is WALLABY J103732−261917.
WALLABY J103442−283406	Interacting system.
WALLABY J103407−270622	Partial detection of galaxy; other half is WALLABY J103405−270612.
WALLABY J103405−270612	Partial detection of galaxy; other half is WALLABY J103407−270622.

5.2 Hydra TR2

WALLABY J100321−291708	Questionable.
WALLABY J101049−302538	Missing flux due to flagged continuum source.
WALLABY J101434−274133	Missing flux due to flagged continuum source.
WALLABY J101443−263328	Close galaxy pair?
WALLABY J101448−274240	Close galaxy pair?
WALLABY J101934−261721	Questionable.
WALLABY J101945−272719	Close galaxy pair?
WALLABY J102019−285220	Close galaxy pair?
WALLABY J102054−263844	Close galaxy pair?
WALLABY J102207−282201	Partial detection of galaxy?
WALLABY J102447−264054	Partial detection of galaxy; other half is WALLABY J102448−264152.
WALLABY J102448−264152	Partial detection of galaxy; other half is WALLABY J102447−264054.
WALLABY J102605−280710	Partial detection of galaxy; other half is WALLABY J102608−280840.
WALLABY J102608−280840	Partial detection of galaxy; other half is WALLABY J102605−280710.
WALLABY J103405−270612	Partial detection of galaxy; other half is WALLABY J103407−270622 from Hydra TR1.
WALLABY J103442−283406	Interacting system of mutiple galaxies.

WALLABY J103508−283427	Questionable.
WALLABY J103540−284607	Close galaxy pair; WALLABY J103546−284602 and WALLABY J103539−284606 in Hydra TR1.
WALLABY J103543−255954	Questionable.
WALLABY J103726−261843	Partial detection of galaxy; other half is WALLABY J103732−261920.
WALLABY J103732−261917	Partial detection of galaxy; other half is WALLABY J103725−261841.
WALLABY J103809−260453	Partial detection of galaxy?
WALLABY J103818−285023	Questionable.
WALLABY J103853−274100	Questionable.
WALLABY J103858−300500	Close galaxy pair?

5.3 NGC 4636 TR1

WALLABY J122713−020236	Partial detection of galaxy?
WALLABY J122745+013601	Affected by strong continuum residuals.
WALLABY J123138+035620	Affected by strong continuum residuals.
WALLABY J123407+023905	Affected by strong continuum residuals.
WALLABY J123424+062511	Interacting system and tidal streams.
WALLABY J123427+021108	Affected by strong continuum residuals and high noise near tile edge.
WALLABY J123541−001253	Interacting system?
WALLABY J123734+042150	Affected by flagged spectral channel range at low-frequency end.
WALLABY J123905−022950	Close galaxy pair?
WALLABY J124109+041725	Affected by strong continuum residuals.
WALLABY J124318+015754	H I emission covers only small region of optical disc.
WALLABY J124421+042536	Close galaxy pair.

5.4 Norma TR1

WALLABY J164821−583425	Questionable.
WALLABY J165145−590915	Part of gas bridge between NGC 6215 and NGC 6221.
WALLABY J170550−620939	Close galaxy pair.
WALLABY J170753−602717	Close galaxy pair.
WALLABY J171828−574719	Debris associated with WALLABY J171804−575135?