

# RAID recovery – Content analysis

## First step in RAID recovery

### Helps to determine RAID type

- incorrect RAID level – most common mistake
- no data recovery software detects RAID level automatically
- clients are often wrong about RAID level

### Content analysis in ReclaiMe Pro

- ratio of zeros and average entropy
- mirror analysis
- parity analysis

# Zeros and average entropy

Disks from one RAID have the same ratio of zeros and average entropy

Helps to exclude

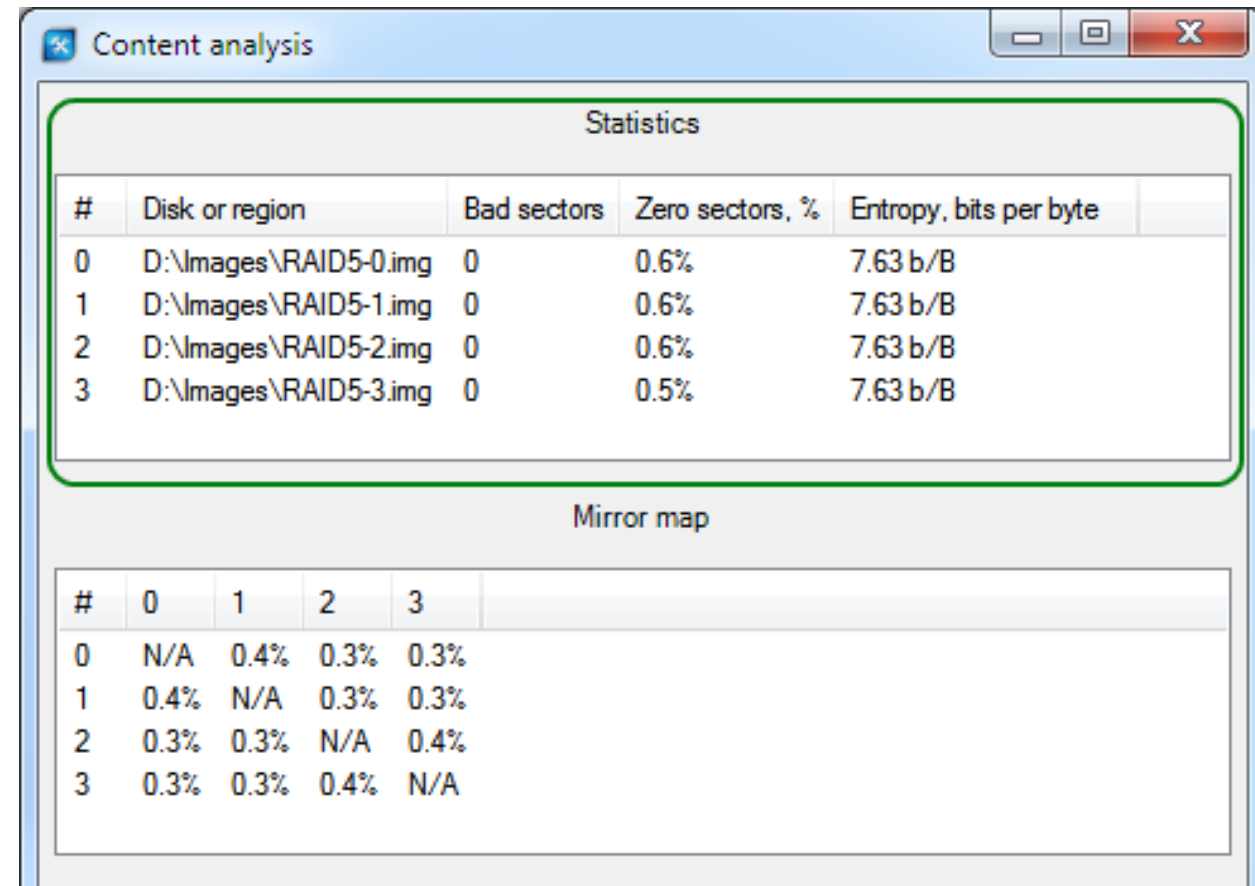
- blank disks
- hotspare disks
- stray disks

Applies to

- set of RAID disks

Can't be applied to

- RAID created over second hand drives



The screenshot shows a window titled 'Content analysis' with two tables. The first table, 'Statistics', lists four RAID disks with their respective bad sectors, zero sectors percentage, and entropy. The second table, 'Mirror map', shows the distribution of zeros across the four disks.

Statistics				
#	Disk or region	Bad sectors	Zero sectors, %	Entropy, bits per byte
0	D:\Images\RAID5-0.img	0	0.6%	7.63 b/B
1	D:\Images\RAID5-1.img	0	0.6%	7.63 b/B
2	D:\Images\RAID5-2.img	0	0.6%	7.63 b/B
3	D:\Images\RAID5-3.img	0	0.5%	7.63 b/B

Mirror map				
#	0	1	2	3
0	N/A	0.4%	0.3%	0.3%
1	0.4%	N/A	0.3%	0.3%
2	0.3%	0.3%	N/A	0.4%
3	0.3%	0.3%	0.4%	N/A

# Mirror analysis

Ratio of data similarity points to mirror pair and copyback hotspare

Ratio of data similarity is calculated for

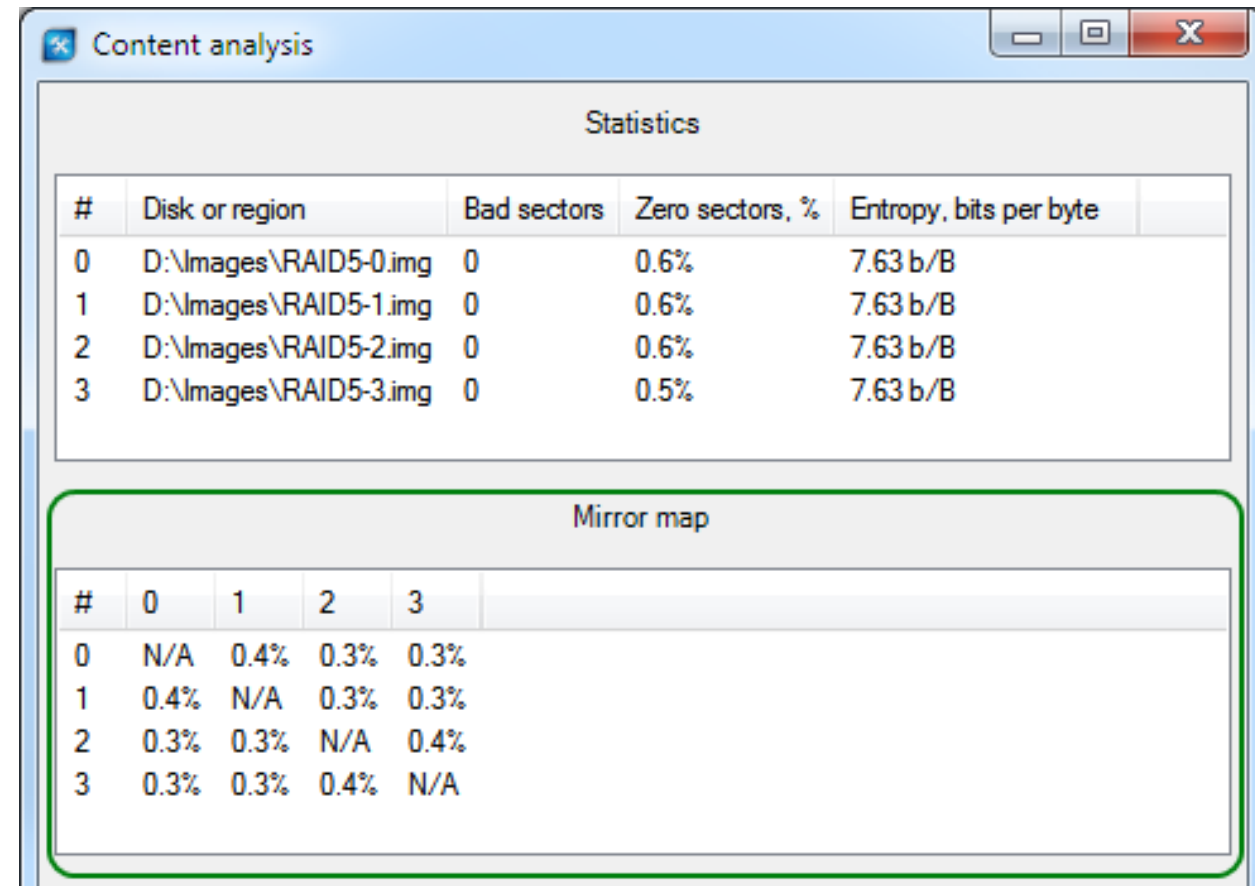
- all possible disk pairs

Possible values

- 1-5% - different disks
- 95-100% - mirror pair
- 60-80% - ex-hotspare, out-of-sync mirror

Possible cases

- one mirror pair – RAID 1
- several mirror pairs – RAID 10
- one partial mirror pair – ex-hotspare



The screenshot shows a window titled "Content analysis" with two main sections: "Statistics" and "Mirror map".

**Statistics**

#	Disk or region	Bad sectors	Zero sectors, %	Entropy, bits per byte
0	D:\Images\RAID5-0.img	0	0.6%	7.63 b/B
1	D:\Images\RAID5-1.img	0	0.6%	7.63 b/B
2	D:\Images\RAID5-2.img	0	0.6%	7.63 b/B
3	D:\Images\RAID5-3.img	0	0.5%	7.63 b/B

**Mirror map**

#	0	1	2	3
0	N/A	0.4%	0.3%	0.3%
1	0.4%	N/A	0.3%	0.3%
2	0.3%	0.3%	N/A	0.4%
3	0.3%	0.3%	0.4%	N/A

# Parity analysis

Rows in parity-based RAID are always even

## Applied after

- zero analysis – blanks litter the result
- mirror analysis – mirrors are always even

## What is calculated

- Percent of parity matches in disk set

## Parity tests for

- full disk set
- all combinations with one disk excluded

Parity tests					
Combination	Disk 0	Disk 1	Disk 2	Disk 3	Parity
Include all	+	+	+	+	100.0%
Exclude #0	-	+	+	+	0.6%
Exclude #1	+	-	+	+	0.6%
Exclude #2	+	+	-	+	0.6%
Exclude #3	+	+	+	-	0.5%

# Parity analysis

## Interpreting typical results

Full disk set	One disk excluding	RAID level
100% parity	0% parity	Regular RAID 5
0% parity	100% parity	RAID 5 with hotspare
1/N parity	0% parity	Certain RAID 6 cases
0% parity	0% parity	RAID 5 missing disk, RAID 0