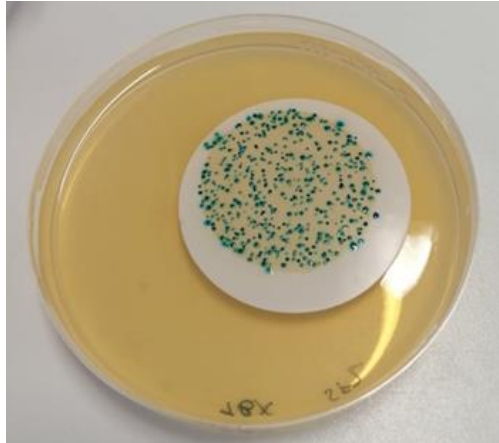


Sharing is not always caring: Antibiotic-resistant bacteria and their travelling genes

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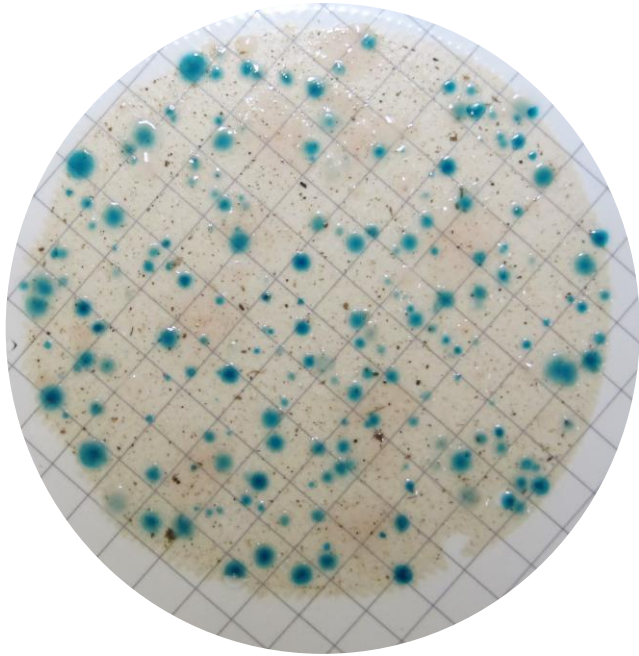


Are there coliforms in
the water?

What antibiotics are
they resistant to?

Can they share their
resistance genes?

Are there coliforms in the water?



TBX

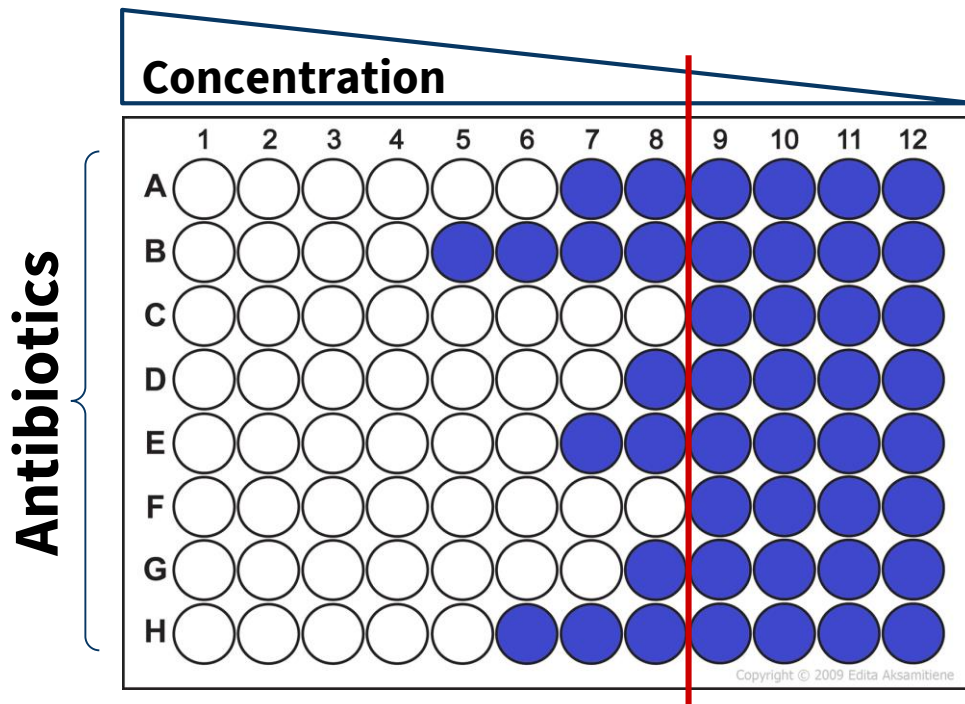
Tryptone Bile X-Glucuronide

All on WHO's list of essential medicines (2019)

- **TBX + Ampicillin (Amp)**
- **TBX + Chloramphenicol (Chl)**
- **TBX + Ciprofloxacin (Cip)**

What antibiotics are they resistant to?

- 8 clinically relevant antibiotics
- WHO's list of essential medicines (2019)
- Minimum inhibitory concentration (MIC) tested

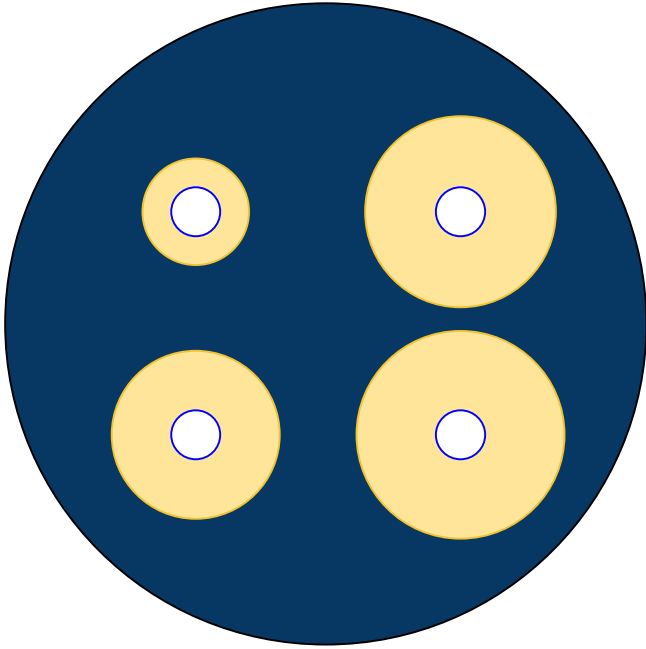


Growth



No Growth

Extended Spectrum β Lactamase Production (ESBL)



Disk diffusion test

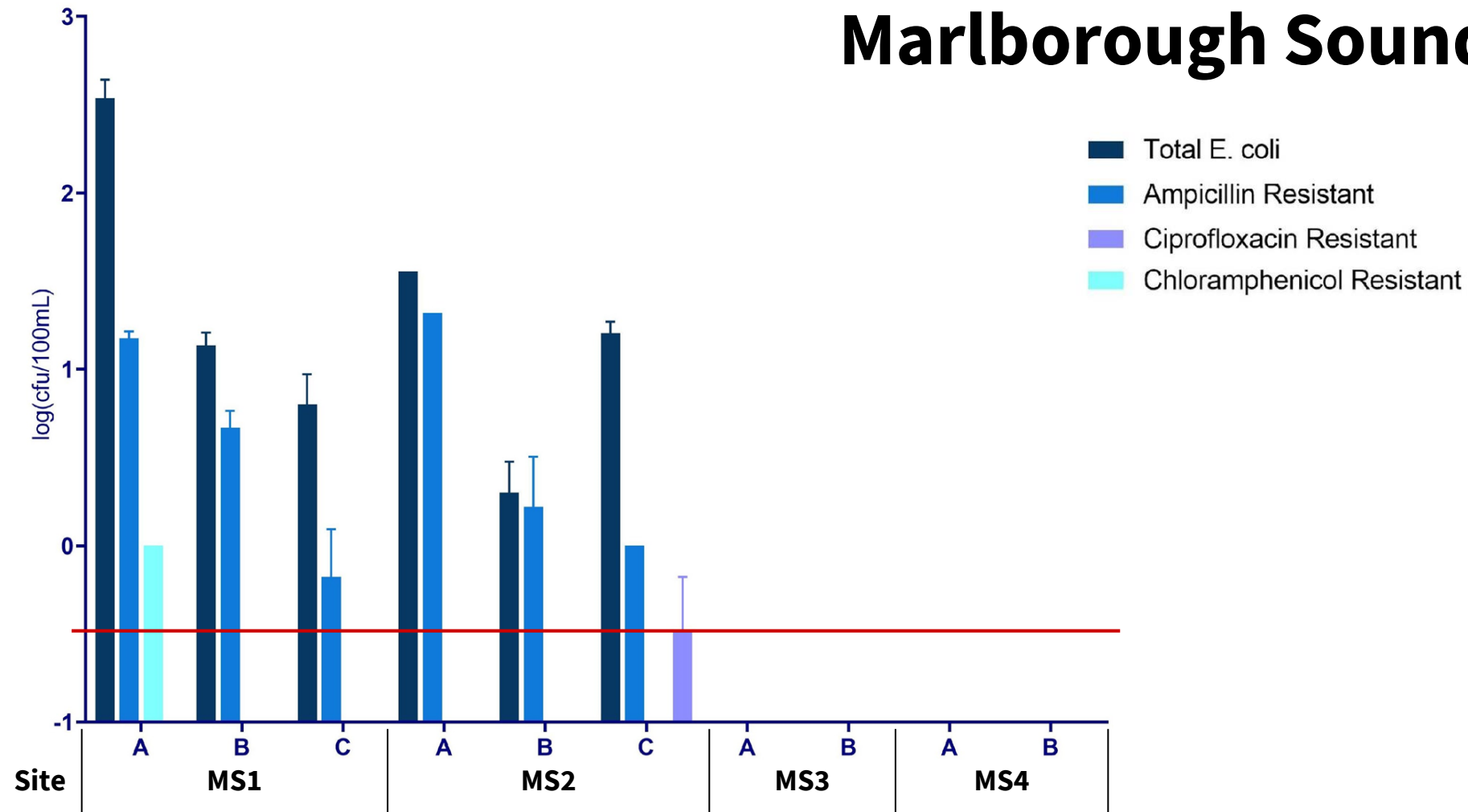
- Resistant to cephalosporins & β lactam antibiotics
- Common in hospitals
- Break down or destroy other antibiotics
- ESBL-related genes found on plasmids



- Campsites
- Carparks
- Walking tracks
- Residential home



Marlborough Sounds

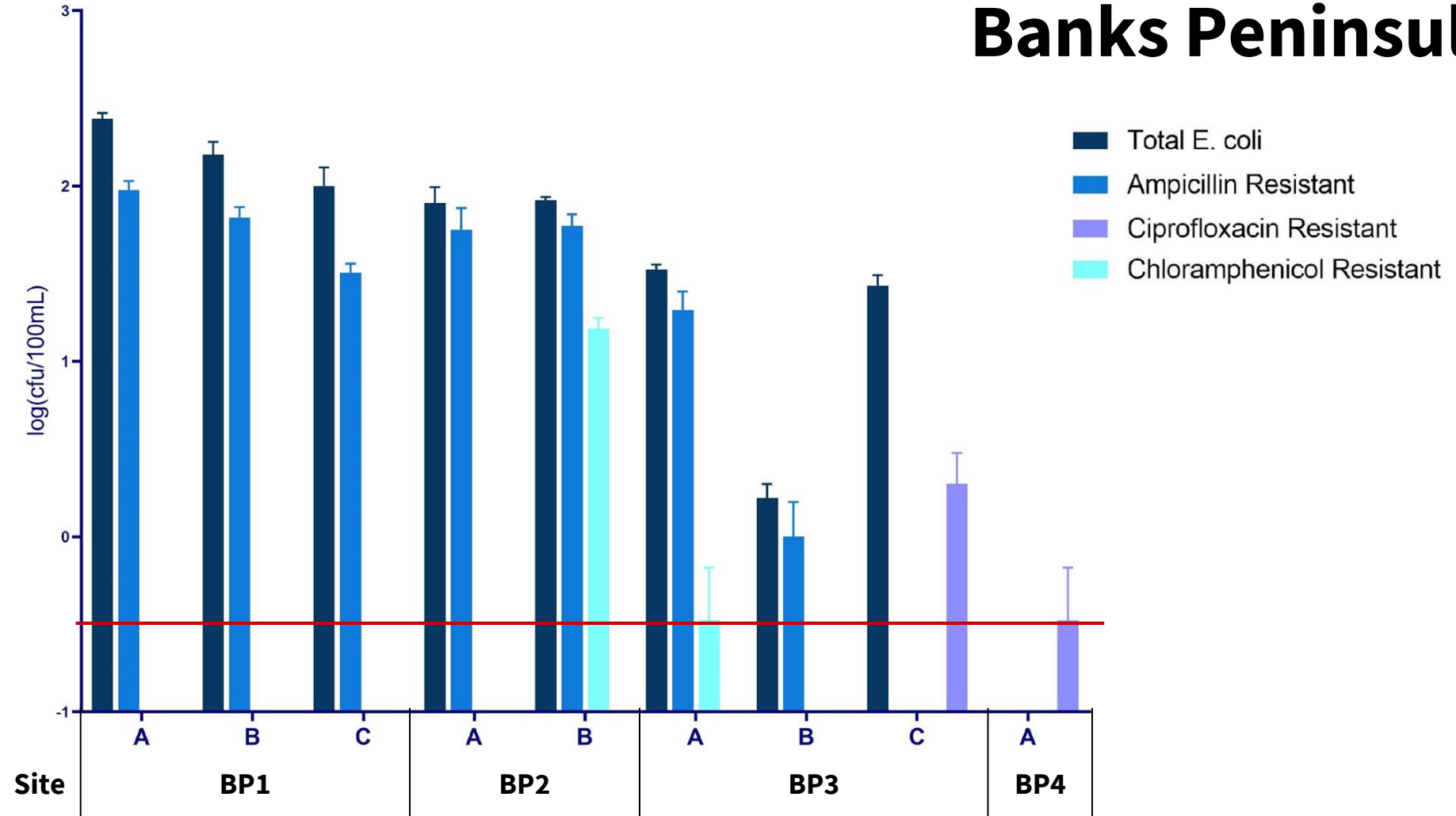


Marlborough Sounds

# of Resistances	# of Isolates
1	56
2	32
3	11
4	4
5	2
6	0
7	0
8	0

**2 x ESBL-
producing *E. coli*
isolate detected**

Banks Peninsula

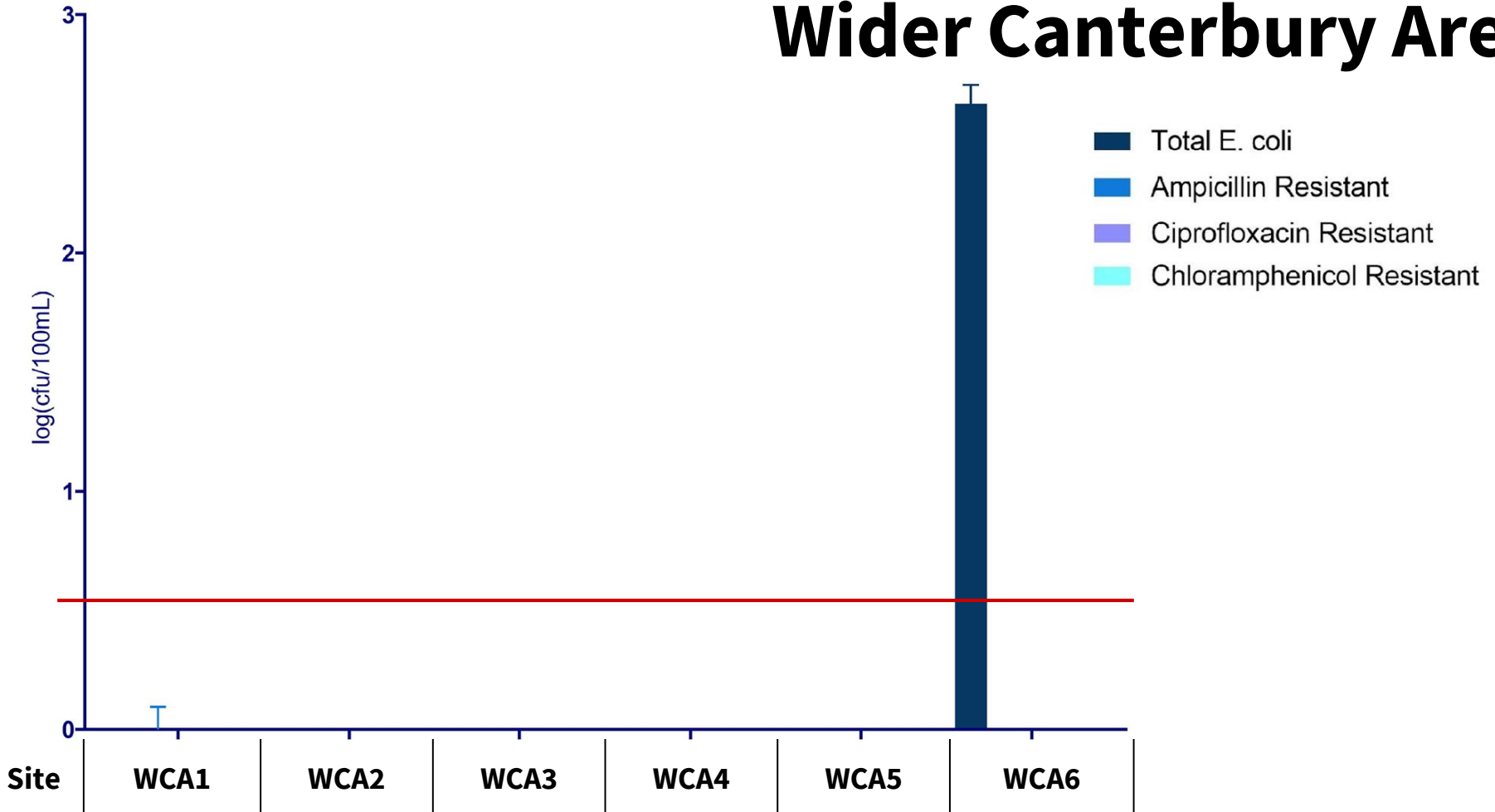


Banks Peninsula

# of Resistances	# of Isolates
1	150
2	77
3	15
4	7
5	2
6	0
7	0
8	0

**69 x ESBL-
producing *E. coli*
isolate detected**

Wider Canterbury Area

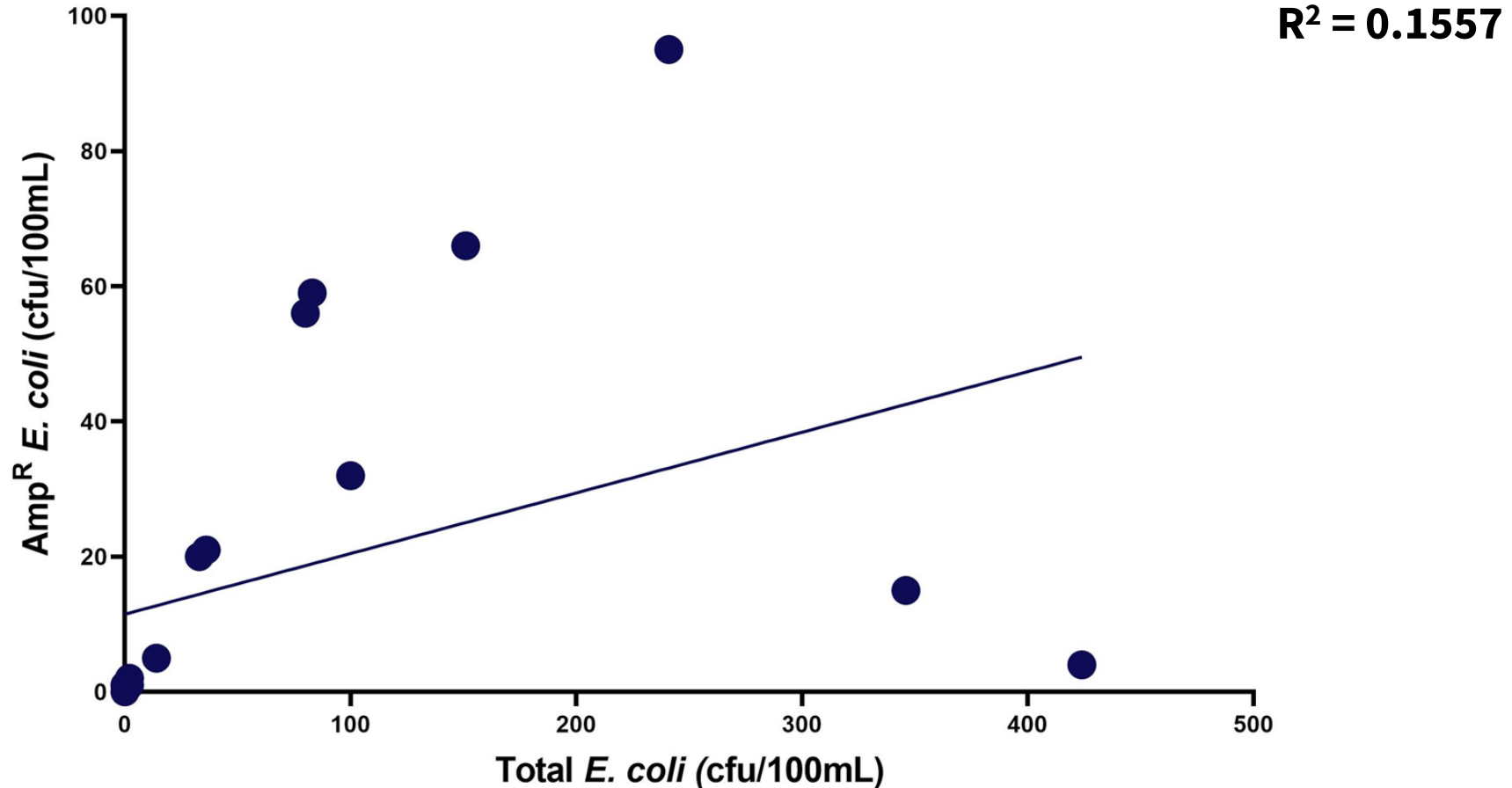


Wider Canterbury Area

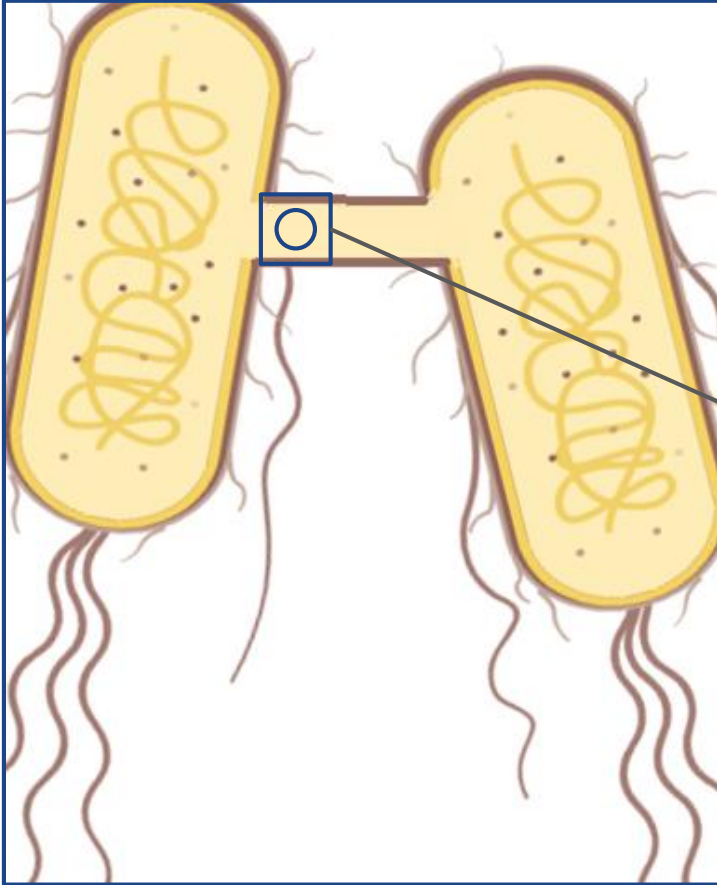
# of Resistances	# of Isolates
1	1
2	3
3	3
4	4
5	1
6	0
7	0
8	0

**1 x ESBL-
producing *E. coli*
isolate detected**

Can resistant populations be predicted from total *E. coli* numbers?



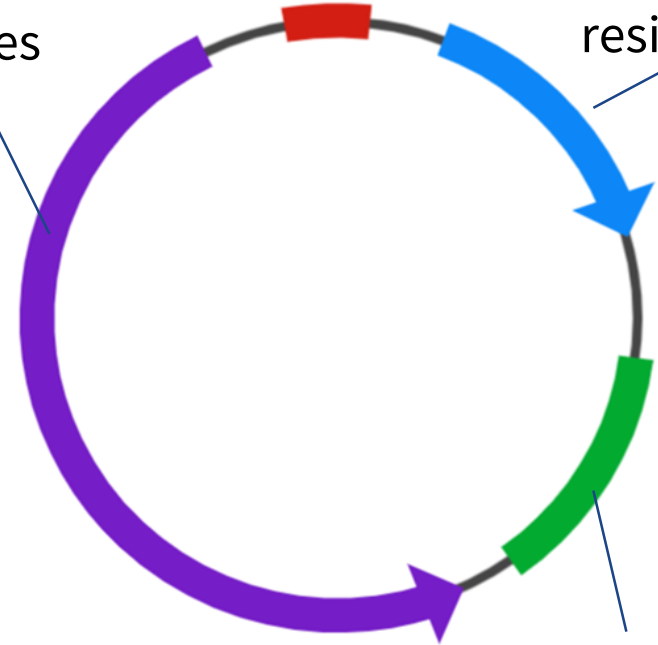
Can they share their resistance genes?



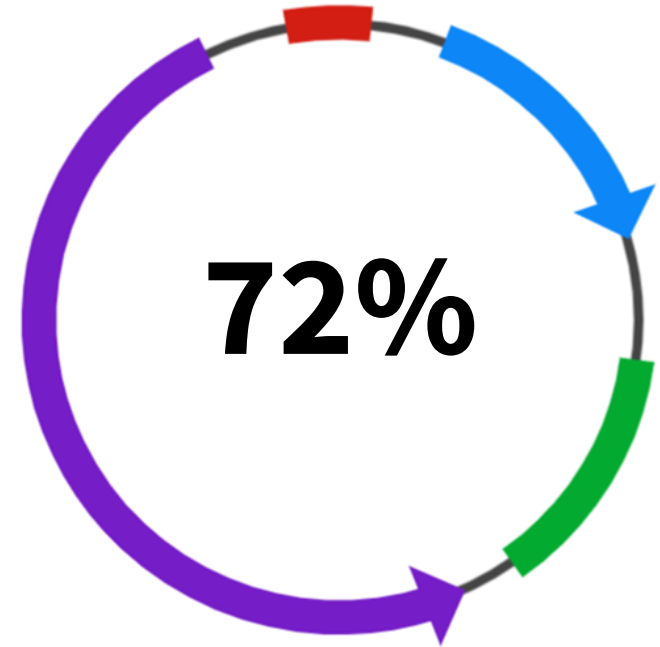
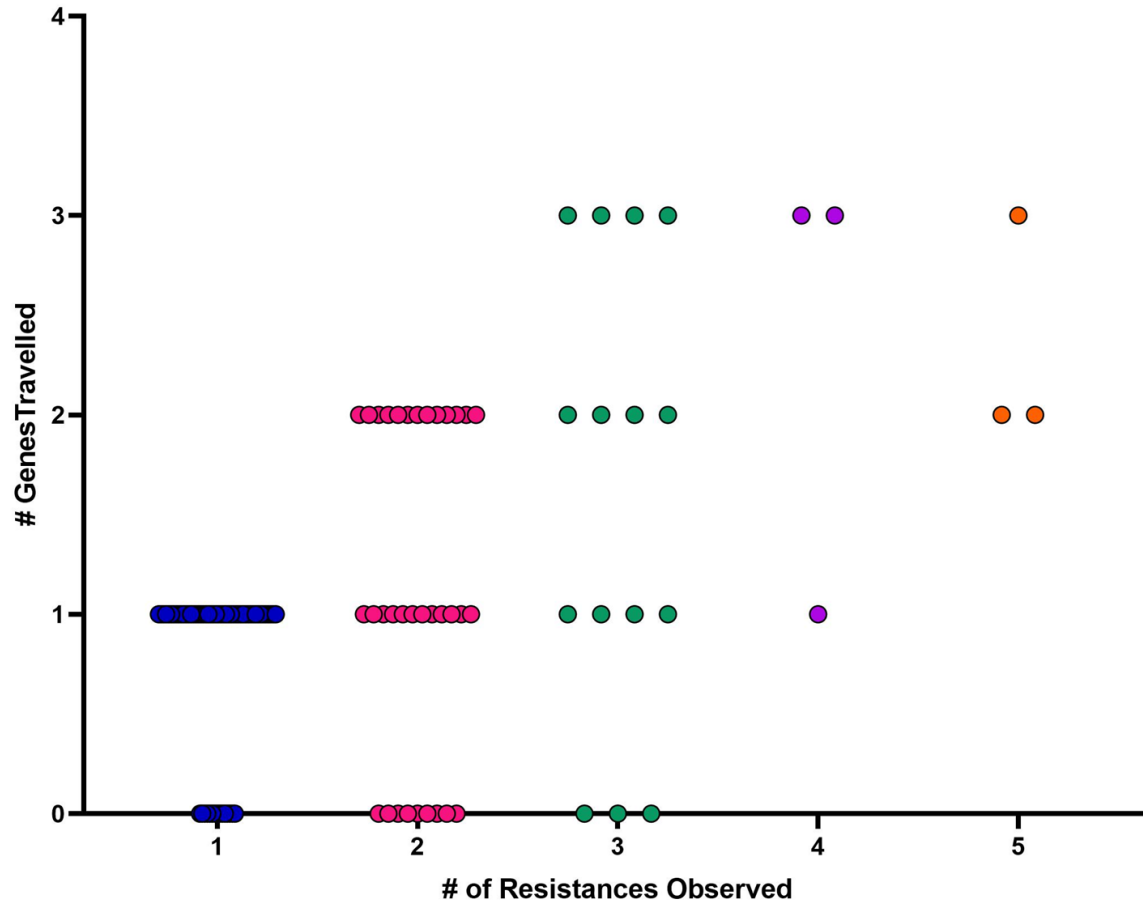
Transfer
genes

Ampicillin
resistance

Chloramphenicol
resistance



Do resistance genes travel, and do they travel together?



Are there coliforms in
the water?

Yes and no

What antibiotics are
they resistant to?

Up to 5 clinically
relevant antibiotics in
some cases

Can they share their
resistance genes?

Yes and no

Phenotype vs Genotype

Strain	Phenotype	Genotype
WB3A6	Ciprofloxacin resistant	
<i>Marlborough Sounds</i>	Gentamicin resistant	
	ESBL ⁺	
	Conjugative	

Antibiotic-resistant bacteria are present in NZ surface waters

Isolates are MDR and able to share genes conferring resistance

Underlying genotype supports the phenotype

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Department of
Conservation
Te Papa Atawhai

