

Water Quality at the Rio 2016 Olympics and Paralympics

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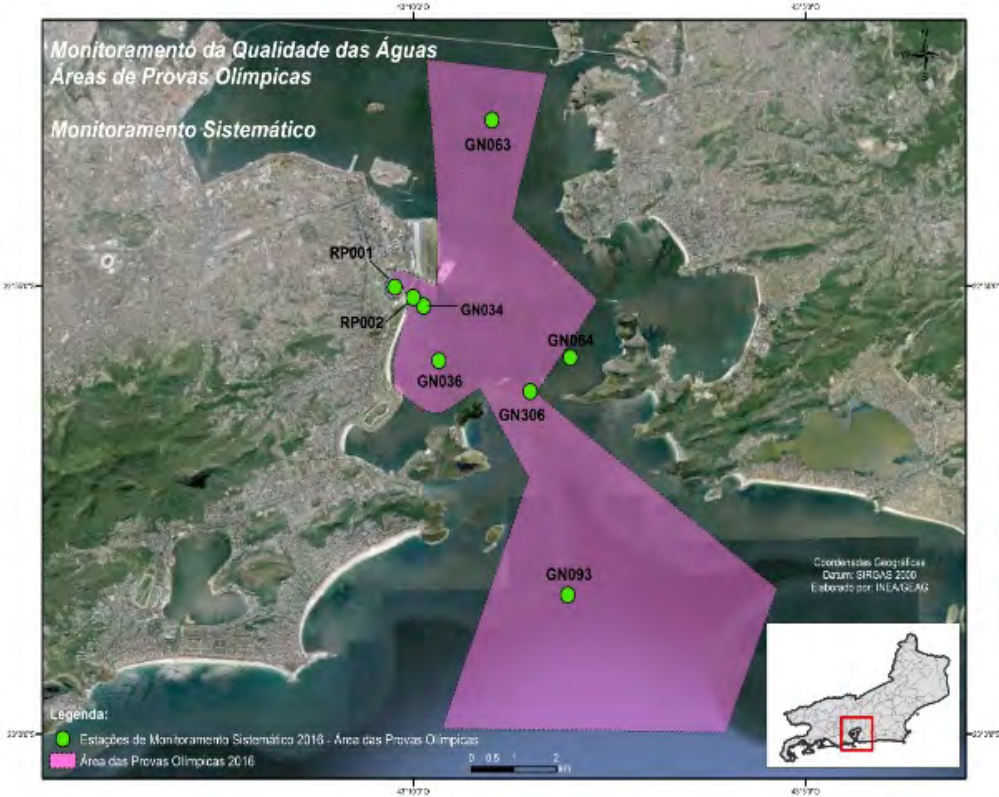
Water Quality Background



- **Water quality data**
 - We will have daily monitoring of water quality (E.Coli and enterococcus).
 - However, results take 48 hours.
- **Solution proposed**
 - Use method created by WHO, IFs, IPC, IOC and Rio2016 of combining sanitary inspections, monitoring data and weather forecasts to guide decision making.



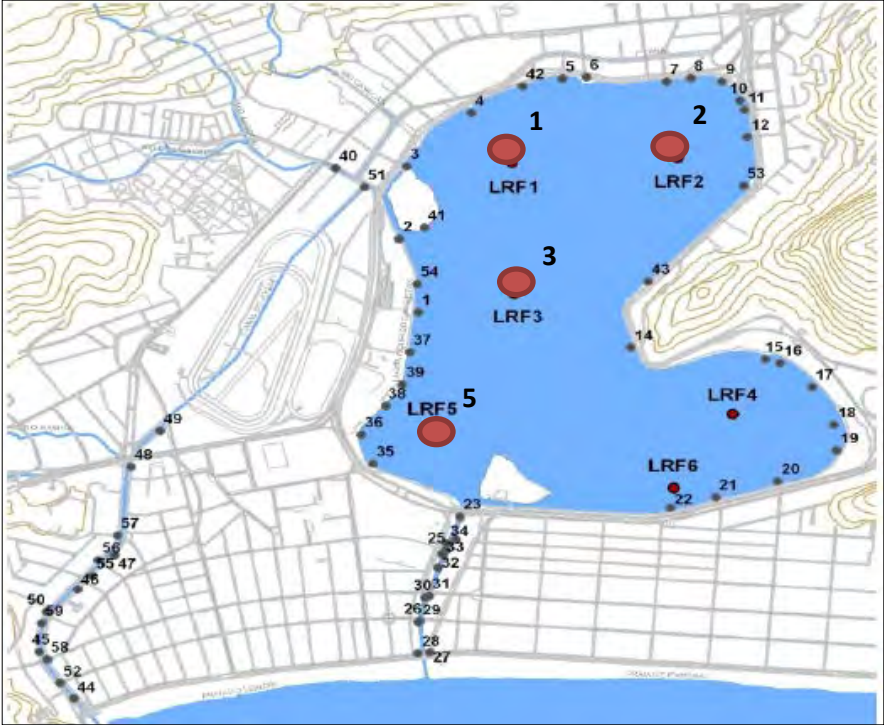
Water Quality - Sailing Monitoring 8 Points



Race Areas	Monitoring Points
Ramps	RP001
	RP002
G.Bay: Pão de Açucar	GN034
	GN036
G.Bay: Ponte	GN063
G.Bay: Escola Naval	GN064
	GN306
G.Bay: Copacabana	GN093



Water Quality – Rowing and Canoe Monitoring 4 Points



Race Areas	Monitoring Points
Start Area	LRF 2
	LRF 3
500m mark	LRF 3
Finish line	LRF 5



Water Quality – Triathlon Monitoring 3 Points



Race Areas	Monitoring Points
Athlete ramp	CP0004
Race Area	CP0200
Additional point	CP0100

Water Quality Standards



Daily monitoring of water quality (E.Coli and Enterococcus)

Triathlon (ITU Standards - EEA and WHO Standards)

Enterococci 100 nmp/100ml

E.Coli 250 nmp/100ml

Rowing and Canoe (WHO and Brazil)

Enterococci 200 nmp/100ml

E.Coli 2000 nmp/100ml

Sailing (WHO and Brazil)

Enterococci 200 nmp/100ml

E.Coli 800 nmp/100ml

+ Enterococci 200 nmp/100ml

+ E.Coli 2000 nmp/100ml



Water Quality Results

Daily monitoring of water quality (E.Coli and Enterococcus)

Date of Sample	RA01	RA02	Enterococci Standard (NMP/100mL)
30/07/2016	10	10	200
29/07/2016	10	10	200
28/07/2016	10	10	200
27/07/2016	10	480	200
26/07/2016	10	10	200
25/07/2016	10	10	200

Date of Sample	GN34	GN36	E.Coli Standard (NMP/100mL)
30/07/2016	52	148	800
29/07/2016	10	104	800
28/07/2016	20	1222	800
27/07/2016	10	20	800
26/07/2016	158	15	800
25/07/2016	10	15	800



Water Quality Sanitary Inspections

All relevant pipes and all race areas inspected each morning and throughout the competition for all three venues

Site	Visual Pollution	Odour	Time of visit	Comments
Teixeira Freitas (Marina)	None	None	08.00hrs	
SEAERJ (Marina)	None	None	07.30hrs	
Silveira Martins (Flamengo)	None	None	07.45hrs	
Escola Naval FoP	None	None	10.00hrs	Considerable foam. Small quantities of waste. Ecoboats deployed.
Aeroporto FoP	None	None	09.50hrs	
Pão de Açúcar FoP	None	None	09.30hrs	Small amounts of floating waste. Ecoboats deployed to the FoP.

Sanitary Inspection

Rainwater and sewage galleries
Pipes leading to Marina da Glória



Teixeira de Freitas Gallery



SEAERJ Gallery



Silveira Martins Gallery



Water Quality Sanitary Inspections



Ranked from 'Very Low' to 'Very High'

Very Low	Zero visual sewage within the pipes entering the Marina and Flamengo, zero visual sewage within all FoPs and zero odour
Low	Slight visual sewage within one of the pipes entering the Marina or Flamengo, or, slight visual sewage within one of the FoPs areas and zero odour
Moderate	Moderate visual sewage within one or both of the pipes entering the Marina or Flamengo, or, moderate visual sewage within two of the FoPs areas and some odour
High	High visual sewage within one or both of the pipes entering the Marina or Flamengo, and/or, moderate visual sewage within three of the FoPs areas (excluding Pão de Açúcar FoP) and odour
Very High	High visual sewage within both of the pipes entering the Marina and Flamengo and high visual sewage within all of the FoPs (or only Pão de Açúcar foP) areas and odour

Water Quality

Water Results & Sanitary Inspections Ranking



Ranked from 1 to 4 for the race areas – Primary Contact

- 1** 'Excellent water quality' (E.Coli \leq 800 or Enterococci \leq 200). With a 'very low' sanitary inspection result.
- 2** 'Sufficient water quality' (One results higher than: E.Coli $<$ 800 or Enterococci $<$ 200) OR with some minor visual pollution during sanitary check or moderate rain forecast for the next 24 hours. With a 'low' sanitary inspection result.
- 3** 'Sufficient water quality' (Two results higher than: E.Coli: $>$ 800 or Enterococci $>$ 200 but below E.Coli 2000), with significant visual pollution during sanitary check and/or potential for forecast of heavy rain and/or heavy rain occurrence in previous 24 hours. With a 'moderate' or 'high' inspection result. Competition may commence if wave height, current, wind strength and wind direction are favourable.
- 4** 'Poor water quality' (More than two results higher than: E.Coli $>$ 2000 or Enterococci $>$ 200), with significant visual pollution during sanitary check and/or potential for forecast of heavy rain and/or heavy rain occurrence in previous 24 hours. With a 'high' or 'very high' sanitary inspection result.



Water Quality Summary

Matrix summarised and decision posted on Information board

5. Summary:	
	<p>Excellent water quality at both ramp launching areas.</p> <p>In the morning FoP check, Pão de Açucar FoP area and Ponte had small quantities of floating waste, ecoboats were deployed to the area. All other race areas were free of floating waste. One previous result has been over the secondary standard in Escola Naval, therefore giving a rating of 2. Medium volumes of floating waste has been present within the Marina this morning, Ecoboats deployed to the area.</p>
6. Decision	
	<p>No change to training schedule.</p>

Water Quality Contingency Plans



Rating 1:

- Not Applicable

Rating 2:

- Apply remediation if heavy rain forecast (continually for Lagoa)
- Remove floating waste (Ecoboats)

Rating 3 & 4:

- Intensify remediation
- Remove floating waste (Ecoboats)
- Isolate a polluted ramp
- Potentially change competition course or delay competition.



Thank you