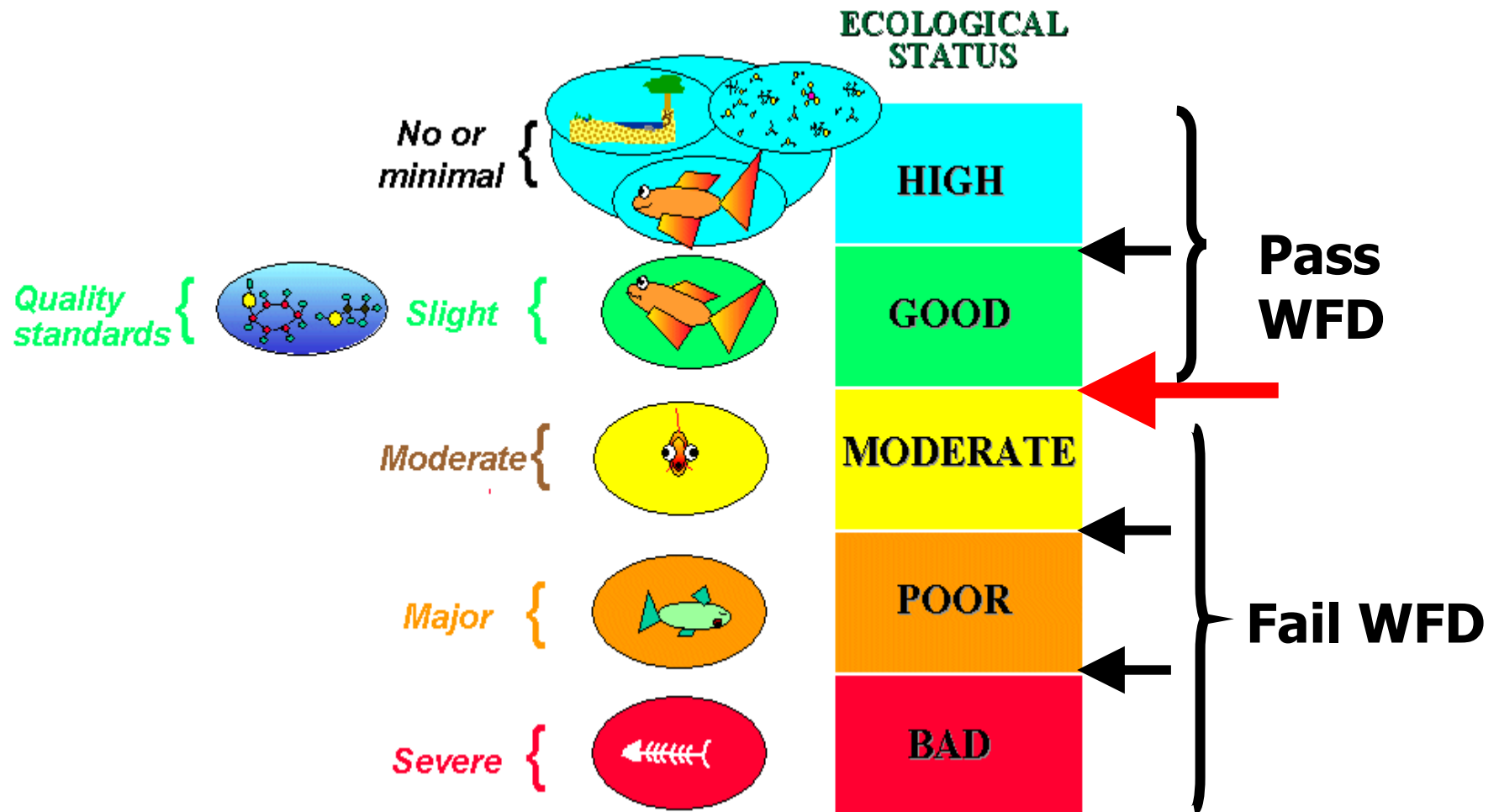




Water Quality in Wicklow



All Waterbodies must achieve "Good Ecological Status"



WFD Water Bodies



Dargle River

- Rivers



Glendalough Upper

- Lakes



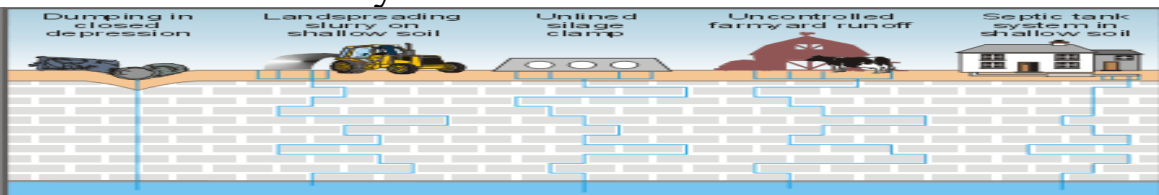
Broadlough Estuary

- Estuaries



Brittas Bay

- Coastal Waters



Groundwater Pressures

- Groundwater

Good Ecological Status

1. Biological fitness – good biodiversity
2. Good Physiochemistry – pH, O₂, nutrients
3. No Dangerous Substances – mining, industry
4. Good Morphology – fish impediments etc.
5. Good Hydrology – enough flow to maintain life

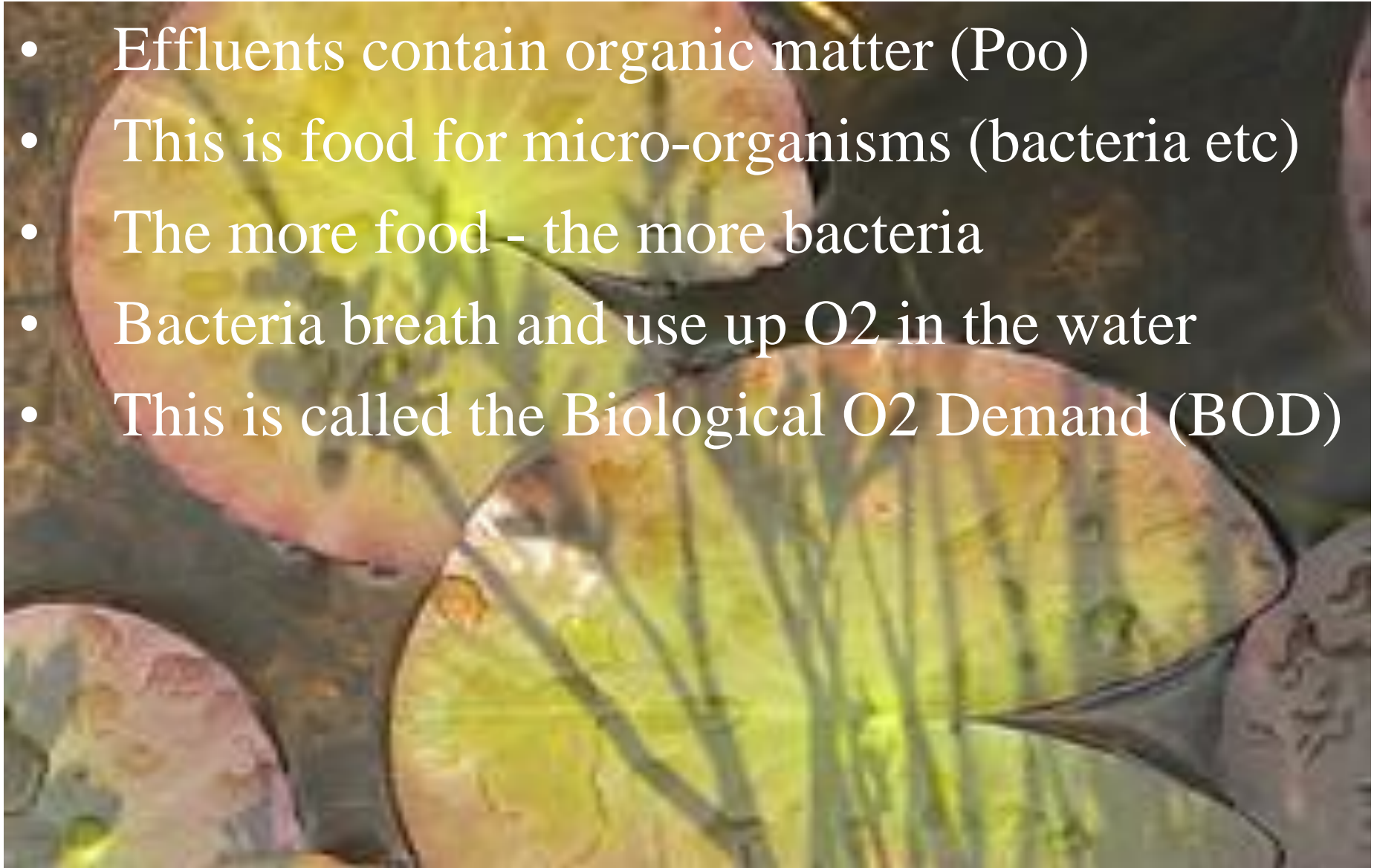


Eutrophication

- Effluents contain Nutrients (Phosphorous!)
- Phosphorous encourages plant growth
- Excessive plant growth - Change of Habitat
- less room, less light, less spawning for fish
- Aquatic Plants breath (Photosynthesis)
- Plants give O₂ during the day but take it at night
- Low O₂ at night can kill fish and insects

BOD

- Effluents contain organic matter (Poo)
- This is food for micro-organisms (bacteria etc)
- The more food - the more bacteria
- Bacteria breath and use up O₂ in the water
- This is called the Biological O₂ Demand (BOD)



Sedimentation

- Effluents contain Silt (Suspended Solids)
- These settle out on river bed
- Cloggs spaces between stones and gravel
- Loss of Habitat for insects (Fish Food)
- Less spawning grounds for fish



Physiochemical Analysis



Biological Fitness – Q-Rating





Q-Rating Rivers

Sensitive



Stonefly Larva

Tolerant



Leech

Less Sensitive



Figure 1 - Lateral view showing the gills of *Hydropsyche* sp. larvae (Hydropsychidae)

Caddis Fly larva

Indestructable



Tubificid Worm

Q-Value Rating System

Q-Rating	Diversity	Qualtiy
Q5	Mostly Sensitive species	High
Q4	Not as many Sensitive species and some tolerant forms	Good
Q3-4	Few sensetive species and more Tolerant forms	Moderate
Q3	Mostly Tolerant species and some indestructables	Poor
Q2	Mostly Indestructables and little else	Bad
Q1	Hardly anything - Indestructables	Bad

Wicklow River Q-rating



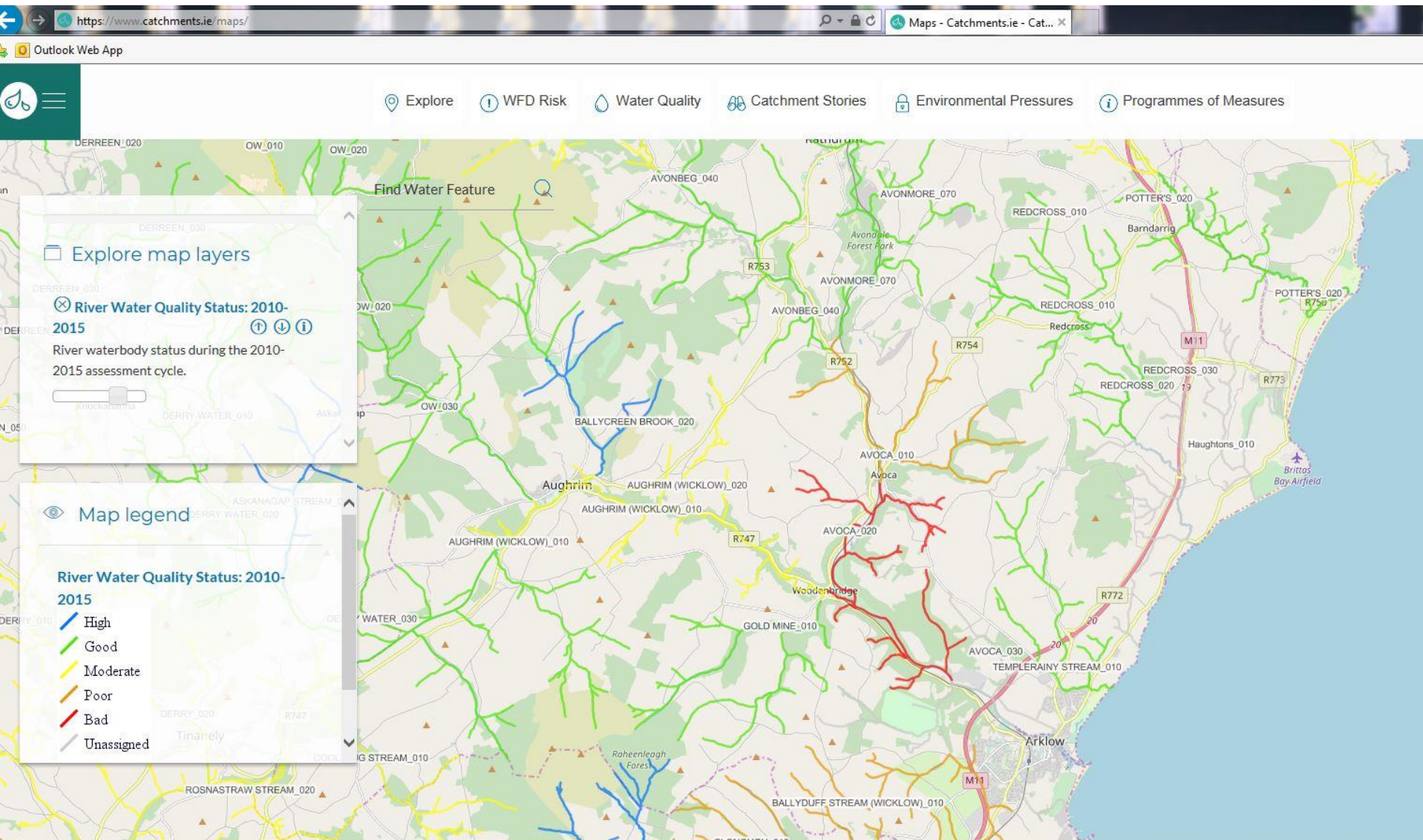
Dargle River

Wicklow River Biological Rating	1989	1993	1997	2000	2003	2006
% Stations meeting High Satus	61	44	53	39	36	40
% Stations meeting Good Status	21	31	28	30	37	39
% Stations failing Good Status	18	25	20	31	28	20

Status Elements

WFD EQS Classification		Wicklow County Council 2007 Updated Risk Assessment																													
High	PASS																														
Good																															
Moderate		FAIL																													
Poor																															
Bad																															
		Overall	Biology							General Physiochem										Dangerous Substances								Morphology			Hydrology
HA09	Liffey WMU	ES	88	91	96	98	02	05	07	Amm	Phos	TON	BOD	DO	DO	Temp	pH	pH	Hardne	As	Cr	Cu	Pb	Nick	Zn	Cya	F-	Bank	Fish	Dredge	Abstractions
Annaleeka Brook	1 Annaleeka Br				4.5	3.5	5.0	4.5	4.5	0.009	0.027	0.07	1.2	102	100	13.3	6.53	4.22	8	2	2	3	2	3	23	<5	<90				
Ballydonnell	1 Br u/s Ballylow Brook confl		5.0	5.0	4.5	4.5	5.0	5.0	5.0	0.003	0.009	0.08	1.3	99	94	12.2	7.34	4.24	6												
Ballylow	1 Br u/s Ballydonnell Brook		5.0	5.0	4.5	4.5	4.5	4.5	4.0	0.005	0.015	0.04	1.4	99	94	12.9	7.19	3.91	6												
Brittas	1 Kilbride Br	G	4.0	3.0	3.5	3.5	4.0	4.5	4.0	0.037	0.017	2.15	1.2	98	92	12.9	7.70	6.31	91	2	3	4	1	2	11	6	<90				
Ballinagee	1 Ballinagee Br. (Tributary of		5.0	4.5	4.5	4.5	5.0	4.5	4.0	0.005	0.008	0.08	1.2	101	96	14.3	7.06	4.23	8	2	1	4	1	1	10	<5	190				
Cock Brook (Ball	1 Br. NW of Kilmore		5.0	5.0	5.0	4.5	4.5	4.5	4.5	0.002	0.005	0.11	1.1	99	94	13.7	7.87	4.26	9												
Douglas (Liffey)	1 Granamore Br u/s King's R	G	4.0	4.5	4.5	4.0	4.5	4.0	4.5	0.007	0.013	0.19	1.5	97	97	8.9	5.36	5.36	16	1	1	2	1	1	8						
Glashaboy Brook	1 Glashaboy Br.				4.0	3.5	3.0	4.0	4.0	0.002	0.009	0.07	0.9	101	97	12.0	6.50	4.90	9	1	1	2	1	1	14	7	<90				
Kings	2 Br 100m u/s Ballingee river						3.5	4.5	4.0	0.007	0.012	0.13	1.3	100	95	13.9	7.60	3.99	6												
	Lockstowns Bridge		5.0	4.5	4.5	4.0	4.5	4.0	4.5	0.005	0.011	0.18	1.4	103	94	15.4	7.08	4.22	9	2	3	4	2	2	11	8	95				
Lernonstown	1 Br E of Athgrean		5.0	4.5	4.5	4.0	5.0	4.5	4.5	0.004	0.010	0.99	1.3	105	97	11.9	8.21	5.58	25												
Liffey	3 2 Km NW Sally Gap		4.0	4.5	4.5	4.5	5.0	5.0	4.5	0.008	0.021	0.08	1.5	100	95	12.4	5.17	3.83	8												
	Ballysmuttan Br		4.5	4.5	4.5	4.0	5.0	4.0	4.0	0.003	0.010	0.10	1.4	100	94	13.8	5.97	4.10	6												
	0.5 km d/s Ballyward Br.	M	5.0	5.0	5.0	5.0	4.0	4.0	3.5	0.008	0.016	0.49	1.7	99	93	13.8	6.93	4.85	21	2	2	4	3	2	12	<5	<90				
HA10	Avoca WMU	ES		90	94	97	00	03	06	Amm	Phos	TON	BOD	DO	DO	Temp	pH	pH	Hardne	As	Cr	Cu	Pb	Nick	Zn	Cya	F-	Bank	Fish	Dredge	Abstractions
Aughrim	2 Coat's Br			4.0	5.0	4.5	4.5	3.0	4.0	0.019	0.010	2.24	1.3	108	100	13.8	7.10	5.91	30										Significant		
	Wooden Br.			5.0	4.5	4.5	4.0	4.0	4.0	0.045	0.015	2.39	1.5	106	94	14.0	7.06	5.92	32	1	3	5	3	3	18	<5	<90				
Avoca	2 1km d/s Avonbeg R confl									0.007	0.008	0.89	1.4	104	97	14.0	7.95	5.84	27	1	1	6	4	2	40	<5	<90				
	Avoca Br	B		1.0	1.0	1.0	1.0	1.0	1.0	0.036	0.008	0.86	0.9	101	98	14.5	7.45	5.99	25	1	1	21	7	2	159	<5	95				
Avonbeg	4 Ford nr Barravore	H		5.0	3.5	4.0	3.5	3.5	4.5	0.001	0.004	0.17	1.0	104	96	15.5	7.11	5.44	10												
	Drumgoff Br			5.0	4.0	4.0	4.0	3.0	4.0	0.001	0.004	0.16	0.9	100	91	14.8	6.78	5.30	8												
	Greenan Br	M		4.0	4.0	4.0	3.5	3.5	3.5	0.003	0.005	0.49	0.8	105	96	14.3	6.85	5.41	8												
	Meetings Br	H		4.5	4.0	4.5	4.0	3.0	4.5	0.002	0.005	1.33	1.3	105	96	14.1	6.71	5.87	21	1	3	4	5	3	40	<5	<90				
Avonmore	7 Br d/s Lough Tay	H		5.0		4.5	5.0	4.5	4.5	0.022	0.008	0.14	0.9	105	97	15.1	6.89	5.08	6												
	Br in Annamoe			4.0	4.0	4.0	4.0	4.0	4.0	0.030	0.007	0.44	1.0	105	93	15.8	6.81	5.38	12												
	Br SE of Bookey's Br	H		4.5	4.0	4.0	4.0	4.5	5.0	0.014	0.008	0.68	1.0	104	95	15.0	6.85	5.67	12												
	Clara Br	H		4.5	4.5	4.5	4.0	4.0	5.0	0.010	0.005	0.68	1.2	101	93	15.0	6.85	5.89	15												
	Rathdrum Br								4.0	0.010	0.008	0.85	1.3	102	94	14.7	6.98	5.97	18										Significant		
	Avondale 3km d/s Rathdrum									0.013	0.008	1.00	1.1	104	95	14.7	7.03	6.04	18												
	Lion's Br	H		5.0	4.0	4.0	4.5	4.0	4.5	0.010	0.010	1.17	1.0	104	96	14.9	7.03	5.96	20	1	1	4	4	2	35	<5	95				
Askanagap	1 Br u/s Derry Water confl	H		4.0	5.0	4.5	4.5	4.5	5.0	0.003	0.006	1.47	1.4	105	99	13.2	6.90	5.84	24												
Ballyduff Stream	1 Ballyduff Br	M		3.5	3.5	3.0	3.0	3.5	3.5	0.051	0.067	4.49	3.1	103	94	13.8	6.57	6.45	92	1	3	6	2	2	18	<5	<90		Moderate		
Ballyreen Brook	1 Tinnakilly Br	M		5.0	4.5	4.0	4.5	4.5	3.5	0.005	0.007	2.02	1.0	104	99	13.0	6.46	6.39	29										Significant		
Cloghoge Brook	1 Br u/s Annamoe R confl	H		5.0	5.0	5.0	4.5	4.5	5.0	0.004	0.007	0.03	0.8	100	96	14.7	7.24	4.93	8												
Coolalug Stream	1 Br d/s Killavenny Br	M		3.5	3.5	4.5	3.0	4.0	3.5	0.008	0.009	3.03	1.1	110	94	13.7	7.33	6.45	48	1	3	4	2	3	16	<5	<90				
Derry Water	3 Br NW of Moyne	H			4.5	4.0	4.0	4.5	4.5	0.009	0.012	1.74	1.1	109	101	14.2	7.36	6.54	36												
	Ballinglen Br			5.0	5.0	4.5	4.5	5.0	4.5	0.005	0.007	2.25	1.0	105	98	13.6	7.30	6.58	32										Moderate		
	Annacurragh Br.			4.0	4.0	4.5	3.5	4.0	4.0	0.007	0.007	2.76	1.2	106	96	13.6	7.06	6.58	39	1	2	4	2	2	10	8	<90				
Glenmacnass	2 Ford SE of Mall hill								5.0	0.000	0.004	0.22	1.0	105	98	15.2	6.67	4.59	8												
	Laragh Br	H							5.0	0.000	0.004	0.44	0.9	103	100	14.6	7.49	4.84	7	2	1	3	2	1	19	<5	95				
Goldmine	2 Agric. Br u/s confl with Main Chan.									0.016	0.020	5.17	1.1	104	99	12.1	7.74	6.77	45												
	Br u/s Aughrim R confl	G		5.0	4.5	4.5	3.0	3.5	5.0	0.010	0.027	5.14	2.0	105	98	12.1	7.41	6.64	53	1	3	5	3	1	21	10	<90		Significant		

Water Quality Status Maps



WFD National Monitoring Programme

- WCC Samples 54 Rivers & 12 Lakes
- This comprises over 120 sampling Stations
- EPA analyse the samples
- EPA carries out Biological assessments
- EPA updates the Status every 3 years
- Catchments.ie has the most recent status
- EPA return Irelands Data to The EU

Typical Wicklow Rivers



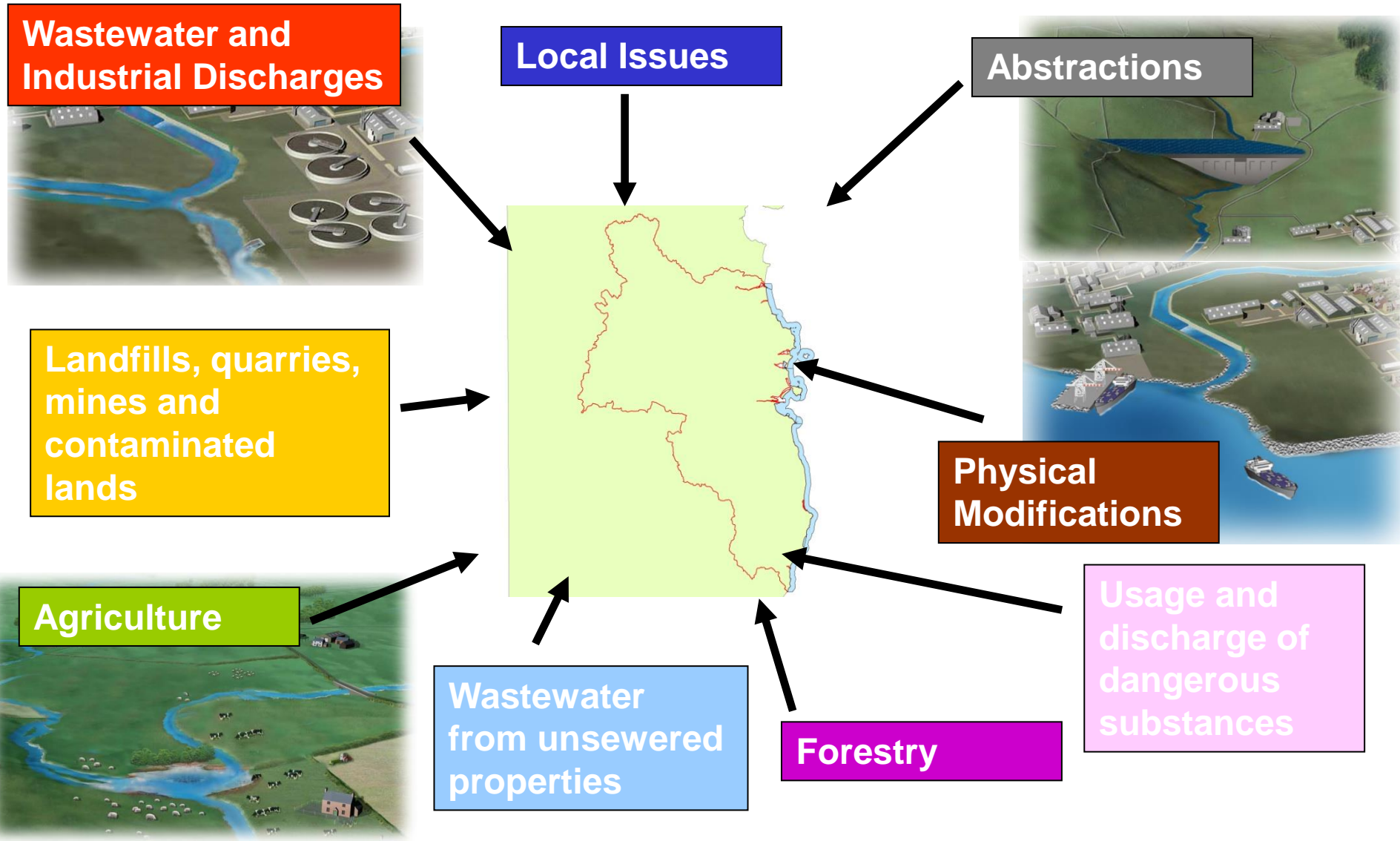
Clean River Bed

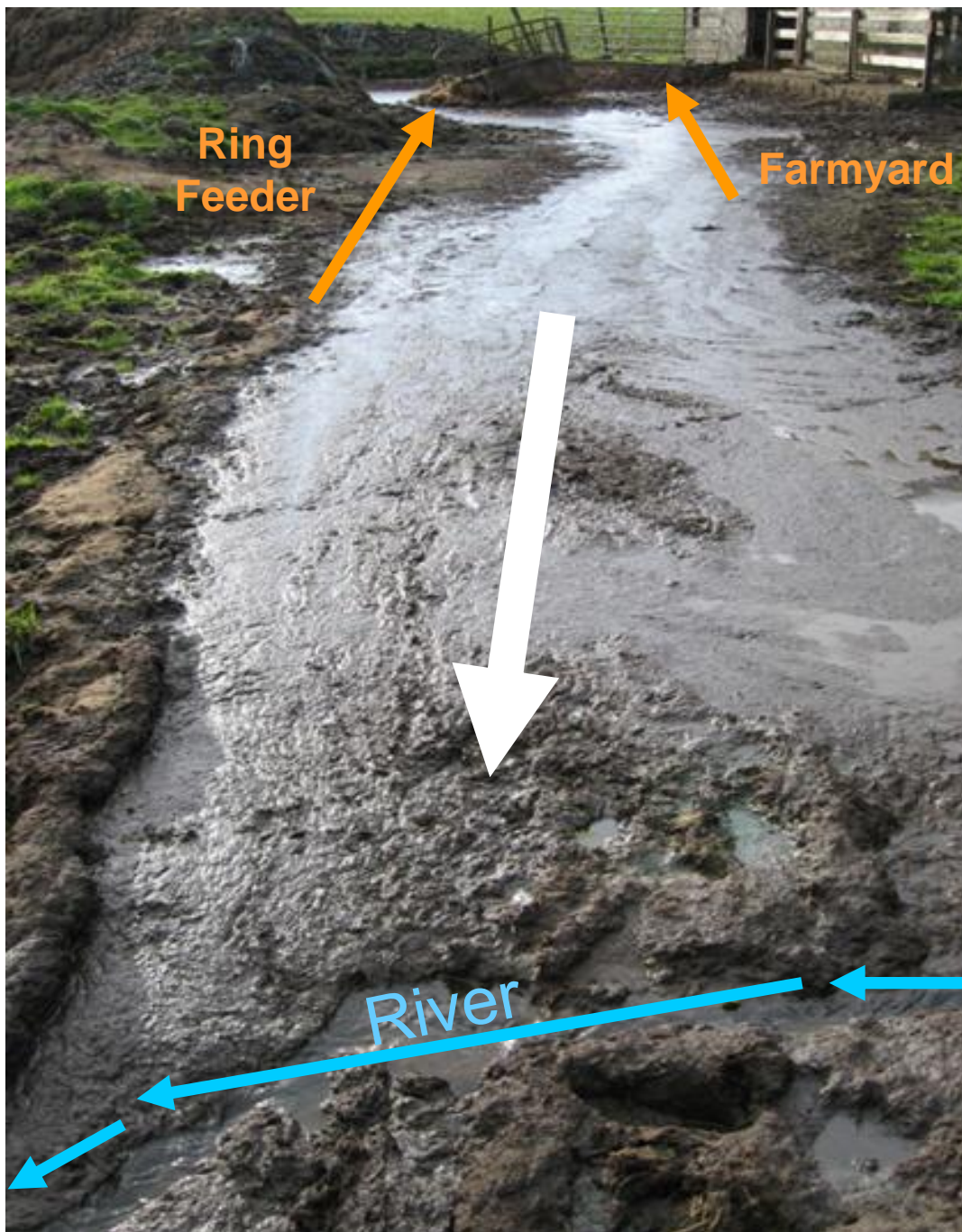


Salmon



What are the main Pressures





Agriculture

- Dirty Yard
- Cattle Access to Rivers
- Direct runoff of nutrient rich substances (nitrogen, phosphorus)
- Eutrophication

Cattle Access



Agricultural Discharge



Below Agricultural Discharge



Avoca River – Mine Runoff



- Heavy Metals dissolve in water
- Runoff into River and Groundwater bodies
- High concentration of metal – acidic for fish

Urban Waste Water



Industrial Discharge



Effluent Discharge
from factory that
continues to breach its
licence

Discharges directly to
river

Septic Tank



- Effluent from Septic Tank in Co. Meath
- Sample recorded Phosphorus over 9.9mg/l – 300 times over limit for P in surface waters
- Ammonium 67.7mg/l

Missconnections



Downstream of Missconnection



Urban Influence



Section 4 Licenced Discharge



S4 Meeting River



Downstream of S4 Discharge



Forestry



Kings River

Wicklow River Biological Rating	1989	1993	1997	2000	2003	2006
% Stations meeting High Status	61	44	53	39	36	40
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Wicklow Rivers

