



Cross polarisation photography process, cataloguing and storage

The CSIRO Australian National Fish Collection

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NATIONAL RESEARCH COLLECTIONS AUSTRALIA
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The CSIRO Australian National Fish Collection

- 1940's Australian National Fish Collection (ANFC) is founded
- 1990's The ANFC and the commercial fishing industry were working together to reduce catches and protect vulnerable and threatened species. The result was a production of image-based bycatch guides
- 2000's Codes for Australian Aquatic Biota (CAAB) was introduced, which is a numerical coding system. It was for logging fisheries-related data adopted by government and industry groups, and supported by both molecular and photographic identifications of species
- 2012 Fish Map developed with Atlas of Living Australia. This is a searchable map and image –based species identification and location database
<http://fish.ala.org.au/>
- 2014 A new research vessel arrived, called the *RV Investigator*. The ship is capable of deploying trawls to 4000m, providing significant improvement in biodiversity exploration. On board is a cross polarisation photography laboratory

About the ANFC

- Our image collection the largest of its kind the Southern Hemisphere
- Our current catalogue has over 81,000 images
 - 11,000 radiographs, both film and digital
 - 10,000 digitised 35mm film slides
 - 60,000 digital photographs
- It contains images of about half of Australia's fish species
- Mostly dead specimen “taxonomic” photos
- It includes underwater, laboratory and location photographs

Why do we take specimen photographs?

- To document the specimen prior to preservation or when a specimen is not retained
- To capture fresh colouration that often fades quickly after death or after freezing
- To capture colouration before preservation – yellows, oranges and reds are mostly lost during preservation
- Manuscript images for publication – often characters diagnostic for the species, or finer details, weren't captured in initial specimen photographs

Photographing specimens in different states

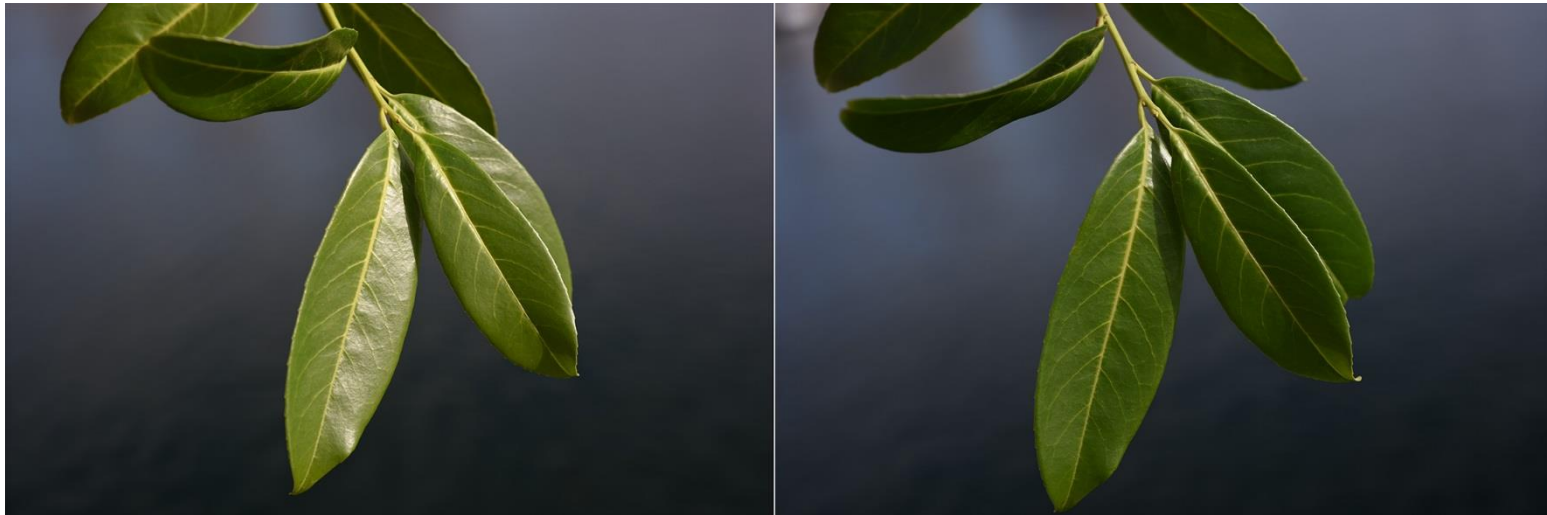
- Thawed from the freezer
- Freshly photographed in the field or on a vessel
- After collection in fish markets
- Preserved specimens that were stored in alcohol either in jars or tanks

You will note that all of these specimens are wet

Polarisation and natural light photography

- Polariser filters placed over the lens can be used to enhance contrast and saturation in landscape photography and can also reduce reflections or glare on shiny surfaces - it's just like putting on polarised sunglasses
- You do this by rotating the polariser filter ring on the camera so that the polarising direction is at a right angle to the sun

Tree leaves before filter and after filter is applied



Polarisation using artificial light

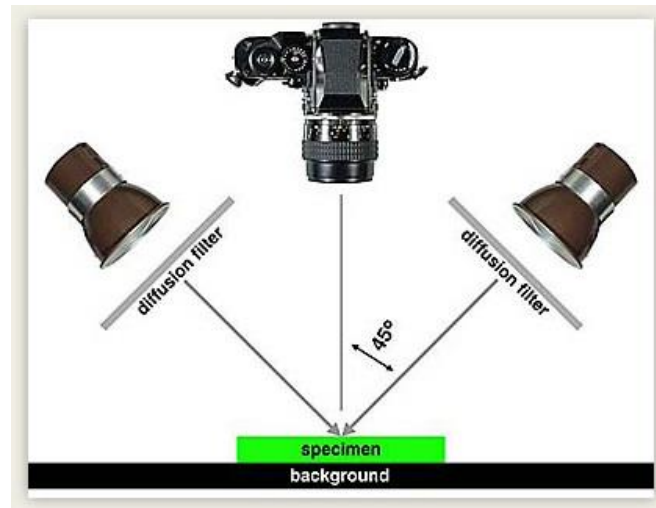
- While it is great to use a circular polariser in the field, sometimes you need more light than your camera will allow
- Or you would like to maintain a large depth of field in your image without disrupting exposure
- A cross polarisation process simply adds a flash and a linear sheet of polarising filter paper to your photography set up
- This enables the photographer to use a flash to make a better exposed image without 'blowing out' highlights
- Over exposed highlights are caused by the flash hitting reflective surfaces
- So cross polarisation will effectively retain detail in highlights contained in your image

What is cross polarisation photography?

- Polariser helps your camera capture details of an object that has naturally reflective qualities, like water, skin, metal and glass
- Specular reflection is most common, it's a mirror-like reflection in which light from a single incoming direction is reflected into a single outgoing direction
- Diffuse reflection is the reflection of light from a surface that scatters everywhere rather than at just one angle
- So when light hits a shiny or reflective surface, polariser filter out all but the scattered non-planar light

How do you set it up?

- Two or three polarisers are utilised - a circular polariser filter on your camera lens and a piece of linear filter paper over each flash
- Place each light at a 45 degree angle to your subject
- While looking through your view finder, rotate the polariser filter on your lens so it is at a right angle to your linear polariser filter paper
- Take the photo when you see the reflection of on the subject has disappeared



Camera settings

- I usually shoot at 1/160, f14, ISO 100
- My flash heads are at three quarter capacity – this is because a polariser filter will take off 2-3 stops of light

Why use flash at all?

- I find flash provides me with a catalogue of similar looking images, there's no fiddling with camera settings for each fish, my white Perspex background is bright and my subject is well lit
- But most of all, it's fast - speed is necessary when processing newly caught or thawed fish

Gear list – a fish photographer's lab kit

Digital camera	2 flash heads Bowens 500x kit
Lenses	Table top with white Perspex
Extender tubes	Polariser filter paper over flashes
Tripod	Circular polariser filter with rotating ring over lens

- Nikon D810 camera
- Nikon 28mm and 60mm lenses
- Kenko extension tubes 12mm, 20mm, 36mm
- Circular polariser filters



The ANFC photo laboratory set up



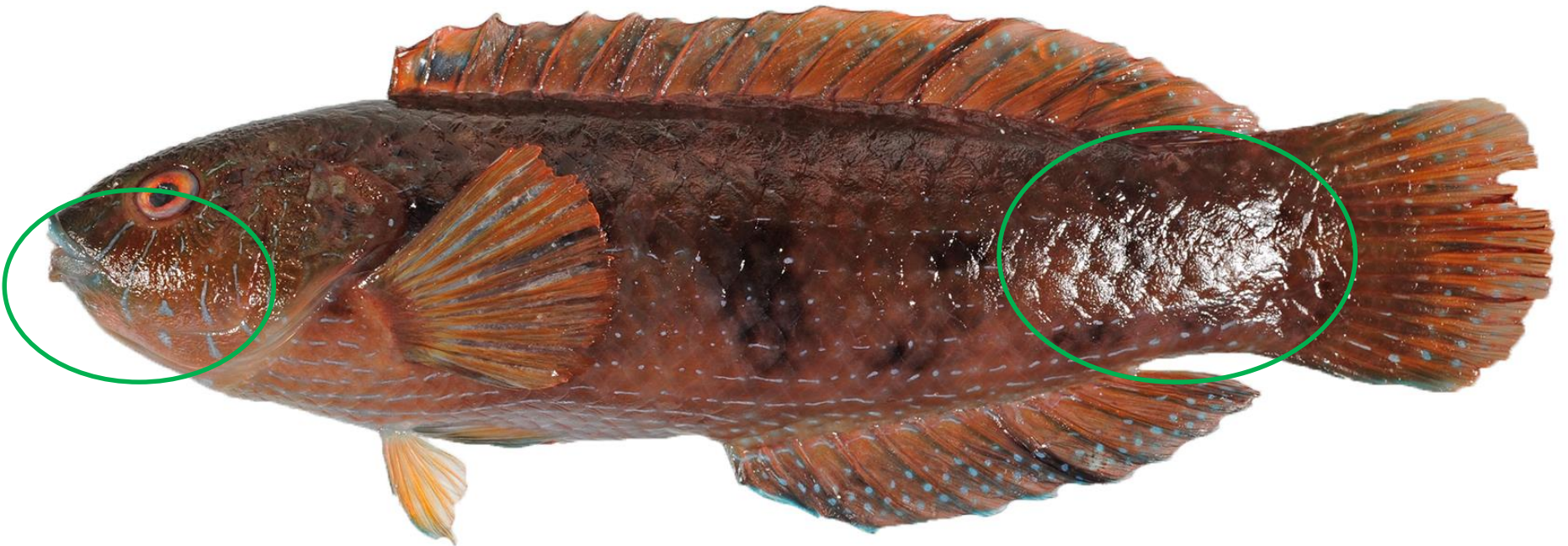
Polarising filter paper goes over flash head



White Perspex with ruler and *WhiBal* grey card



Photograph of fish without cross polarisation



Photograph of fish with cross polarisation



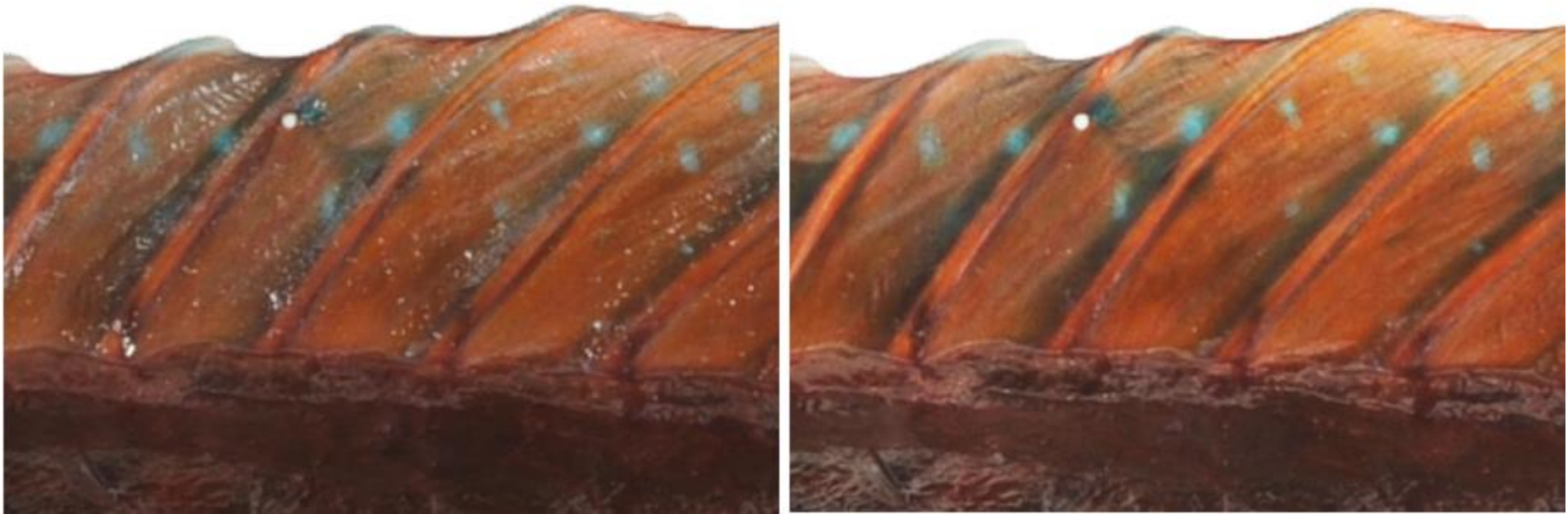
Removes water reflection



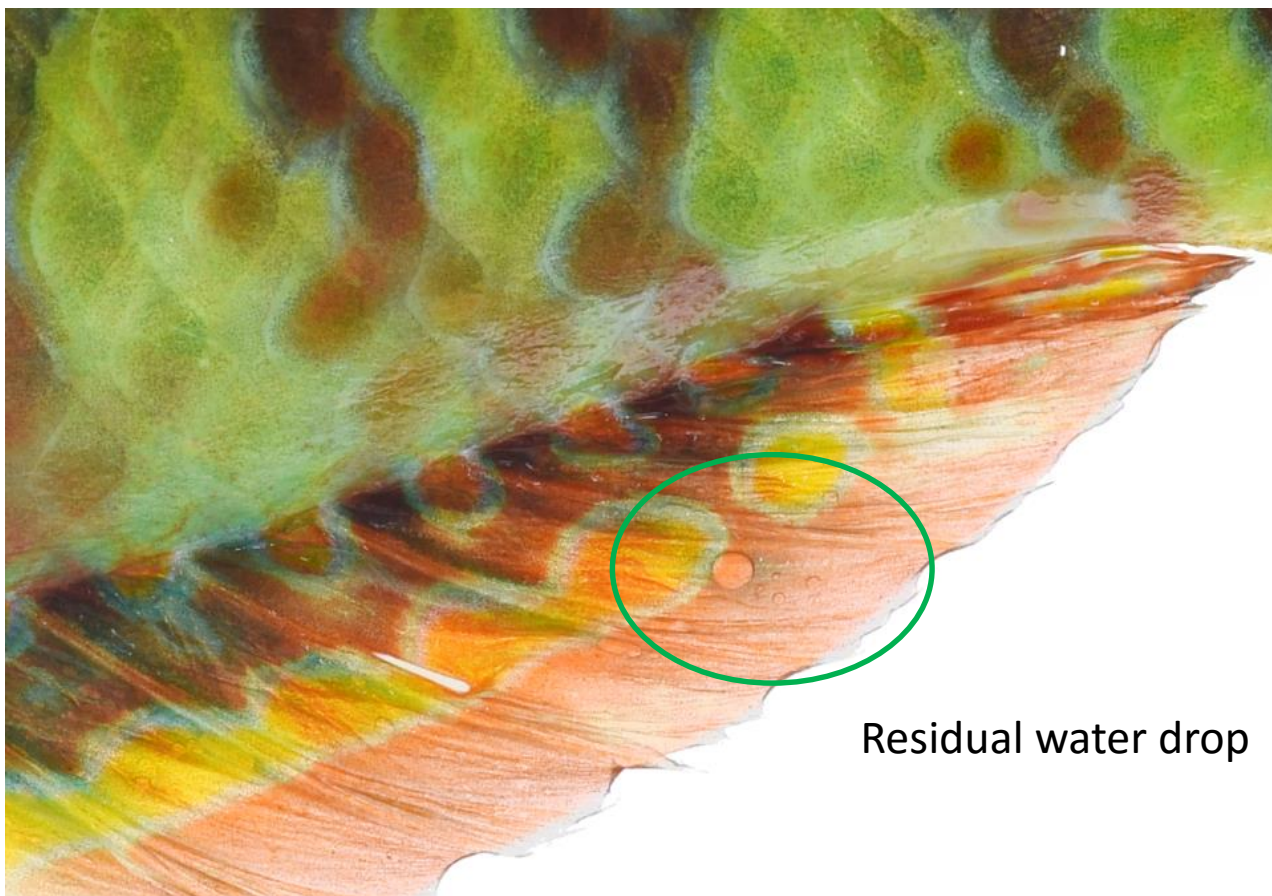
Results in a clearer, more detailed image



Colour of animal can be more vibrant



Most residual water becomes see through rather than overexposed, resulting in no loss of detail



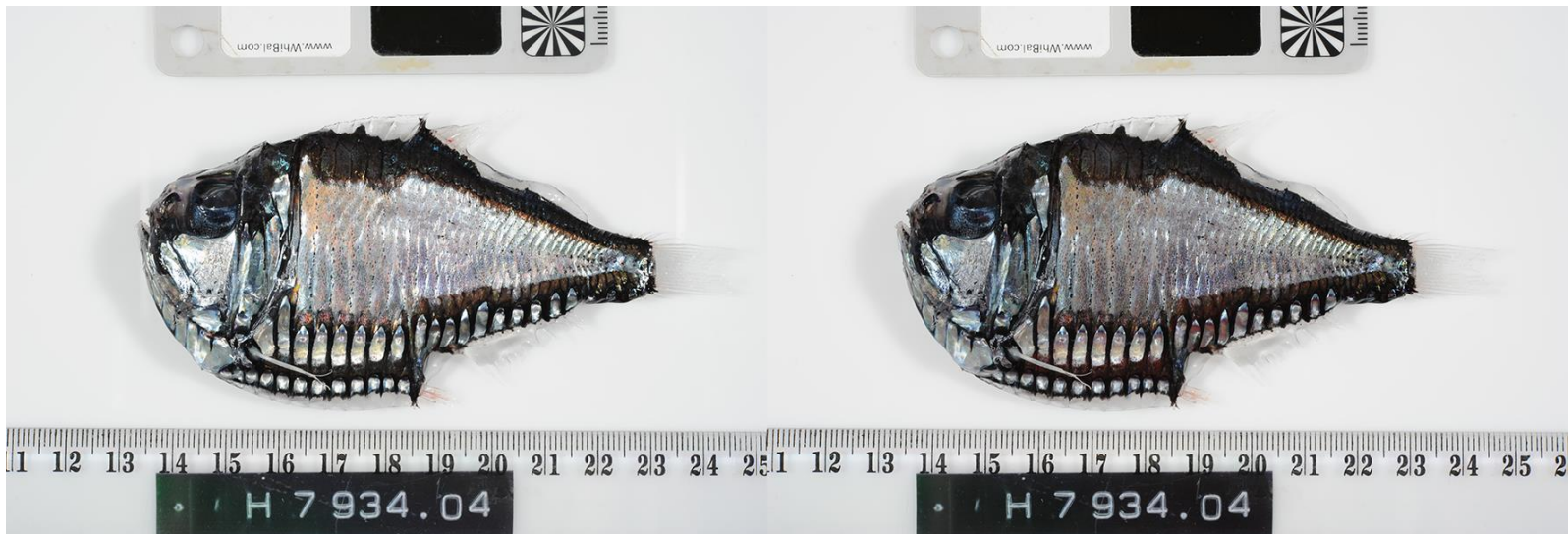
Residual water drop

Cross polarisation is fully adjustable

- By rotating the polarising filter on the lens, you can turn the effect off, on or partially on
- This comes in handy especially when photographing many different species on the one day, so you don't have to swap kits
- Some fish are naturally reflective, for example they can be silver
- Silver by nature is shiny, so you don't want to get rid of that natural shimmer in the specimen photograph
- So how do we use cross polarisation effectively?

It's really up to you, but things to consider

- What are you trying to capture?
- Do you want to show that the fish is shiny and not simply grey?
- How much detail are you willing to lose to show the specimen's naturally reflective qualities?



- How does it affect anatomical features?

Close up of before and after cross polarisation



What else can the technique be used for?

- It is commonly used to digitise paintings that have a shiny varnish finish

But it's not only used to remove reflection

- Cross-polarised photography has been used in the study of enamel defects in dental paediatrics – finding enhanced visual detail of enamel defects
- Crime scenes – digitising evidence such as a fingerprint or footprint inlaid on shiny plastic
- Human skin – identifying finer details when utilising a cross polarisation digital capture process

Processing raw images in *Photoshop CC*

- Adjust colour balance using the *WhiBal* card
- Remove any pins, if it's not a type specimen photograph
- Etch image on to white background, as necessary for publications
- Image manipulation sometimes when not a type specimen - replacing fin rays, scales, eyes
- Image stacking can also now be done really easily in *Photoshop* for those really rotund fishes to produce a single all in focus image

Before and after retouch and etch



Image filing and storing

- Fish species are often re-identified as more information comes to hand
- So a unique number for every photograph is simpler than naming and storing by Family or Species
- The camera is set to a prefix of “DL#”
- An image file example is “DL3_9999”
- Next number would be “DL4_0001”, “DL4_0002” and so on
- These are then stored in a folder called “DL3_originals” where they stay put

Microsoft Excel is used to store data

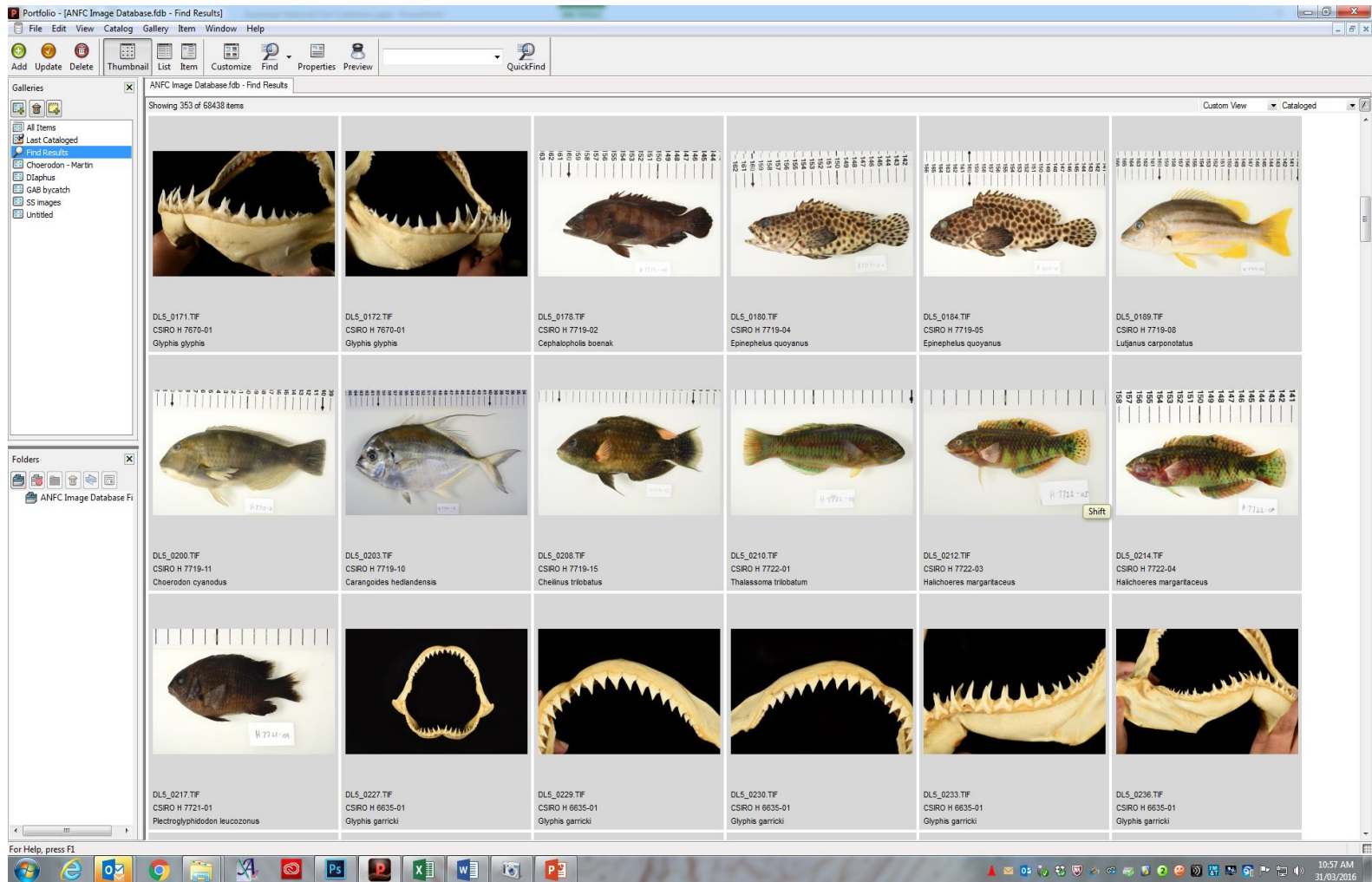
The screenshot shows a Microsoft Excel spreadsheet with the following data:

	A	D	E	F	G	H	I	J	L	M	N	Q
1	Filename	Image kept	Rego no	Subject	Fam #	Family	Image type	Status	Date collected (photographed)	Photographer	Copyright	Camera ID
31000	DL5_1204.TIF	no	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	TL	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31001	DL5_1205.TIF	additional	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	TL	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31002	DL5_1206.TIF	yes	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	TL	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31003	DL5_1207.TIF	no	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	D	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31004	DL5_1208.TIF	no	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	D	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31005	DL5_1209.TIF	yes	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	D	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31006	DL5_1210.TIF	yes	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	D	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31007	DL5_1211.TIF	yes	CSIRO H 7900-01	Amblyraja hyperborea	031	Rajidae	D close	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31008	DL5_1212.TIF	additional	CSIRO H 7900-04	Coryphaenoides cf filicauda	232	Macrouridae	L	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31009	DL5_1213.TIF	yes	CSIRO H 7900-04	Coryphaenoides cf filicauda	232	Macrouridae	L	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31010	DL5_1214.TIF	yes	CSIRO H 7900-03	Coryphaenoides cf loricata	232	Macrouridae	L	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
31011	DL5_1215.TIF	additional	CSIRO H 7900-03	Coryphaenoides cf loricata	232	Macrouridae	L	Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
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31021	DL5_1225.TIF	yes	CSIRO H 7900-06	Bathysauropsis gracilis	120	Bathysauroidid: HV		Raw	27 Oct 2015	Carlie Devine (CSIRO)	CSIRO	Nikon D810
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We access images on a daily basis

- The ANFC use an image catalogue software called *Extensis Portfolio*
- Images are dragged and dropped into the database and the matching Excel data is imported as a text file
- The database is used everyday by the collection for comparing specimens
- Database fields are fully customisable, so we can add anything we like
- We currently have 3 image databases
 - Fish images
 - X-ray images
 - Publicity images we can use for promotion of the collection

Extensis Portfolio front page



Portfolio fish database preview of an image



Digital asset management

- Our *Extensis Portfolio* image catalogue lives on a remote server
- While our images live on a local server for quick access
- We have been using this system for almost 12 years and it works really well

Cross polarisation benefits summary

- Removes almost all water reflection
- Able to photograph brighter without worrying about blowing out highlights
- Generally the colour of the animal is more vibrant
- Finding a correct exposure is faster for wet or shiny fish
- And is also useful if you need to capture fine detail in other objects

It's easy to add to your kit

- Easy to set up or adjust your flash photography kit
- If you are already making photographs using flash heads or strobes, just add polarising filter paper and a circular polariser
- You have complete control over the set up, it's fully adjustable and can be tailored to promote each animal's attributes

Acknowledgements

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Thank you

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