Cross polarisation photography process, cataloguing and storage

The CSIRO Australian National Fish Collection

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NATIONAL RESEARCH COLLECTIONS AUSTRALIA
www.csiro.au
The CISRO 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?

• Polarisers 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, polarisers 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

<table>
<thead>
<tr>
<th>Digital camera</th>
<th>2 flash heads Bowens 500x kit</th>
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<tr>
<td>Lenses</td>
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<tr>
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<tr>
<td>Tripod</td>
<td>Circular polariser filter with rotating ring over lens</td>
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</table>
• 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.
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

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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
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

• Thanks to all of the staff in the Australian National Fish Collection who provided input into the presentation

• Thanks to Simon Checksfield (CSIRO) who arranged for me to travel to the workshop

• Thanks to Gil Nelson and Cathy Bester for the invitation to the workshop and for funding travel and organising workshop logistics
Thank you

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