



REPORT FOR THE NIES/WORLDFISH CENTER PROJECT  
“SCENARIO-BASED ASSESSMENT OF THE POTENTIAL EFFECTS  
OF ALTERNATIVE DAM CONSTRUCTION SCHEMES  
ON FRESHWATER FISH DIVERSITY  
IN THE LOWER MEKONG BASIN”.

**ESTIMATION OF ANNUAL YIELD OF FISH  
BY GUILD  
IN THE LOWER MEKONG BASIN**

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This consultation is a contribution to an assessment of the impacts of basin development on fish production in the Lower Mekong Basin (LMB).

Fish of different species respond to development activities, in particular hydropower development, in different ways depending upon their migratory behaviour and their ability to adapt to and tolerate new environmental conditions. Halls & Kshatriya (2010) grouped the species of the LMB into 9 groups or “guilds” according to these characteristics.

In order to better assess the impact of hydropower development on fish production in each country and along main Mekong tributaries, it is necessary to assess i) how migratory a given species is (longitudinal/lateral migrations; scale of migration, resilience to environmental change), i.e. what guild it belongs; ii) what contribution this species makes to fish catches basinwide.

The present study builds the MRC AMCF catch monitoring survey undertaken between November 2003 and December 2004 – the 12 month period corresponding to maximum spatial and temporal coverage of the survey following the methodology reported by Halls & Kshatriya (2009).

This study deepens the work initiated by Halls & Kshatriya (2009) by adjustments aimed at better reflecting the proportion of *black fish* in the catch. This proportion is likely to have been underestimated by Halls & Kshatriya because of the predominance of mainstream habitat sampled by the AMCF survey which is typically not inhabited by blackfish species.

For the purposes of the assessment, the contribution made by each guild to the baseline total yield of each country is estimated. Whilst some ad hoc surveys have been undertaken in specific locations in the LMB to provide areal estimates of yield sometimes for specific habitat types, fisheries and seasons (e.g. Hortle et al (2008); Hortle & Suntornratana (2008); Sjorslev (2001); Coates (2000), no attempts have been made to conduct a nationwide CAS in the LMB.

In the absence of such a CAS, estimates of yield from the fish consumption survey described by Hortle (2007) were used as the baseline for the assessment (Table 1), assuming that the proportion of cultured fish consumed (approx. 10%) equals the proportion of the wild fishery used for animal feed or wasted.

**Table 1 Estimates of yield of inland fish and OAA in the LMB (tonnes/year). Source: Hortle (2007)**

	<b>Cambodia</b>	<b>Lao PDR</b>	<b>Thailand</b>	<b>Vietnam</b>	<b>Total</b>
<b>Inland Fish</b>	481,537	167,922	720,501	692,118	<b>2,062,077</b>
<b>OAA</b>	105,467	40,581	190,984	160,705	<b>497,737</b>
<b>Total</b>	<b>587,004</b>	<b>208,503</b>	<b>911,485</b>	<b>852,823</b>	<b>2,559,815</b>

These consumption-based estimates contain no information about the respective yields by species and therefore by guild. Instead, the contribution made by each species to total consumption-based yield estimates of each country was estimated from the AMCF catch monitoring survey undertaken between December 2003 and November 2004 – the 12 month period corresponding to maximum spatial and temporal coverage of the survey. This survey monitored the landings of fishers at 44 villages in the LMB mainly exploiting main channel, riverine and canal habitat but also lakes, reservoirs and floodplains to a lesser extent. Most observations corresponded to the village locations along the main channel of the Mekong (Figure 1). It is assumed that all guilds except Guild 6 (Blackfish) inhabit the main channel or riverine habitat at some period of the year. Therefore some indication of the relative contribution of species to the total catch in each country (except blackfish) can be estimated from the reported landings by species from the main channel and other riverine habitat. The contribution of blackfish to total yield can be estimated as the product of their mean areal yield and the total habitat area of blackfish.

Table 2 summarises the catch estimates by guild from riverine habitat. Averaged across fishing locations, blackfish species comprised less than 3 % of the reported landings from river habitat. The median blackfish proportion estimate for this habitat was less than 1 %.



Figure 1 Locations of the AMCF catch monitoring sites. Source: Halls & Kshatriya (2009).

**Table 2 Estimates of catch by guild from riverine habitat. Data source: AMCF catch monitoring programme (01 Dec 2003 – 30 Nov 2004).**

**(a) Cambodia**

Guild	Catch weight (g)	Village name												
		Banfang	Baren	Day Lo	Kang Memai	Kbal Chroy	Koh Khne	Ou Run	Peam chumnik	Pram	Pres Bang	Sandan	Sang Var	Sre Sronok
?	102147	15619	0	3340	36416	0	3570	1156	0	42047	382	660	41	5745
1	366426	53733	0	22310	135447	0	16198	1950	629	136159	10008	335	177	5694
2	8063514	273969	372954	1556482	1046271	78955	410544	827875	28193	3468271	41788	2415757	69398	498749
3	45025549	139212	2572625	150214	801394	836292	288073	887712	2166336	37183692	98847	2808901	65554	142218
4	14834747	209843	4258765	278780	717982	189626	677863	451229	132912	7917748	347406	666833	96216	303241
5	33084626	181035	7228505	712916	639545	1594717	898129	961415	401259	20467104	136364	786696	134584	387951
6	850395	48310	12658	67259	21179	595	139730	217359	3864	169416	43932	8185	30685	87224
7	302902	10738	58948	8865	19878	92290	18050	21165	2092	70875	2261	7850	27117	56155
8	80314	0	60	0	8415	100	3778	300	608	67053	410	640	672	1845
9	92274	335	9032	110	0	0	0	650	0	82147	0	4589	0	0
10	2989	500	15	190	140	0	1920	0	224	0	4477	0	0	330
	<b>101955488</b>	933294	14513561	2800466	3426666	2792575	2457855	3370810	2736118	69604513	685875	6700446	424444	1489151
	Blackfish %	5%	0%	2%	1%	0%	6%	6%	0%	0%	6%	0%	7%	6%

**(b) Lao PDR**

Guild	Catch weight (g)	Village name					
		Ban Done	Ban Mouang Sum	Ban Nam Ngieb	Ban Pha O	Ban Thamuang	Ban Xinh Xay
?	10400	140	1140	7460	1260		400
1	33956	2250	6655	15766	5155	660	3470
2	4943664	1780725	1277587	75598	257454	308500	1243800
3	9054123	7431230	571017	86955	271801	169690	523430
4	1741436	931052	422960	132074	103680	33010	118660
5	8340586	5555640	1177156	353959	306826	143415	803590
6	147925	1920		108955	1680	1060	34310
7	134810	39070	5900	46080	36000		7760
8	22440		17080	3840	20		1500
9	2400		1500	900			
10	2565	700		615	1250		
All	<b>24286380</b>	15742727	3480995	832202	985126	656335	2736920
	Blackfish %	0%	0%	13%	0%	0%	1%

**(c) Thailand**

Guild	Catch weight (g)	Ban Nam Kum	Huasai	Nalair	Nongbeung	Pa-sak	Phaphang	Pi man thay	Song-khon
?	2060	1960	100	0	0	0	0	0	0
1	9115	300	4600	0	0	0	20	4195	0
2	1052992	275105	295131	76900	0	168800	2955	20451	213650
3	876131	117155	44640	156700	2300	84400	7225	47611	416100
4	551599	327523	38114	0	3645	36100	4865	35952	105400
5	1279574	335210	188192	169900	6710	170100	20605	35757	353100
6	41904	1420	7354	0	1220	0	70	30840	1000
7	41	0	0	0	0	0	0	41	0
8	5682	4190	1342	0	0	0	0	150	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3777194</b>	<b>1062863</b>	<b>579473</b>	<b>403500</b>	<b>13875</b>	<b>459400</b>	<b>35740</b>	<b>174997</b>	<b>1089250</b>
	Blackfish %	0%	1%	0%	9%	0%			

**(d) Vietnam**

Guild	Catch weight (g)	39/9A Tran Phu	An Binh A	Dai Thon	Khom Dinh	Khu 9	Kim Son	Phu Duc	Phu Thanh	Phuoc Hung	Thanh Binh	Thap Muoi
?	970745	0	649292	382	8023	1044	0	303382	325	8298	0	0
1	1500	0	0	0	1470	0	30	0	0	0	0	0
2	28066968	855750	2737616	131871	470943	631874	718023	18119925	77981	3529268	793717	0
3	103039057	27920	33636803	1340	74232	150966	96679	66458137	886	2056105	22516	513473
4	76014157	2370	30094323	4297	9479	15149	3643	43487090	2115	2123770	9852	262067
5	331738017	96330	40563719	61601	407539	857753	323217	281570646	50715	6037585	167608	1601303
6	63465260	500	3440650	23433	12401	0	7317	59720714	10852	34216	3548	211631
7	18918990	652750	5782155	23189	259877	7035206	258186	548903	95486	906262	3356976	0
8	29787	0	12651	4435	7908	0	634	0	2271	0	1888	0
9	4084543	849920	432928	296287	217308	156068	196485	0	6291	589887	1333496	5873
10	3325508	300	136190	57667	300513	37007	28850	1212636	136342	16129	1399872	0
<b>Total</b>	<b>566189270</b>	<b>2485840</b>	<b>117486327</b>	<b>604502</b>	<b>1769692</b>	<b>8885068</b>	<b>1633064</b>	<b>471421433</b>	<b>383264</b>	<b>15301520</b>	<b>7089475</b>	<b>2594346</b>
	Blackfish %	0%	3%	4%	1%	0%	0%	13%	3%	0%	0%	8%

The yield of each guild was expressed as a proportion of the total yield summed across guilds and villages (excluding the yield of blackfish). Each guild proportion was then adjusted to account for the estimated proportion of blackfish yield in each country (Table 3) as follows:  $Guild\ proportion \times (1 - blackfish\ proportion)$ .

**Table 3 Estimated yield proportion by guild for the LMB.**

	<b>0.29</b>	<b>0.27</b>	<b>0.43</b>	<b>0.12</b>
<b>Blackfish Proportion</b>				
<b>Guild</b>	<b>Cambodia</b>	<b>Lao PDR</b>	<b>Thailand</b>	<b>Vietnam</b>
1	0.003	0.001	0.001	0.000
2	0.056	0.149	0.159	0.044
3	0.314	0.273	0.132	0.160
4	0.103	0.052	0.083	0.118
5	0.231	0.251	0.193	0.514
6	0.289	0.268	0.430	0.122
7	0.002	0.004	0.000	0.029
8	0.001	0.001	0.001	0.000
9	0.001	0.000	0.000	0.006
10	0.000	0.000	0.000	0.005
<b>Total</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

The blackfish proportion of the yield of each country was estimated as the product of the estimate of total area of each blackfish habitat type, the mean areal yield for the habitat (all species) and the estimated mean proportion of the yield of blackfish reported in the literature (Table 4), expressed as a proportion of the total consumption-based yield estimate for each country given in Table 1. Blackfish were assumed to inhabit (i) (seasonally) river-inundated wetlands (floodplains, swamps, flooded forests etc) [Flood zone], (ii) rain-fed and irrigated ricefields [rainfed zone] and (iii) reservoirs and large waterbodies outside the flood zone. Estimates of each habitat area were taken from Hortle & Penroong (2009).

#### ***Flood zone and rainfed zone***

The distribution of areal yield estimates from the literature was positively skewed. The median areal yield estimate (all fish species) was approximately  $100\text{ kg ha}^{-1}\text{ year}^{-1}$  and  $50\text{ kg ha}^{-1}\text{ year}^{-1}$  for the flood zone and rainfed zones, respectively (Table 5). Yield estimates for rain-fed ricefields were more variable (CoV = 81 %) than those for the floodzone (CoV = 65 %) probably reflecting a wider range of eco-hydrological conditions in this habitat category (see below). Bambardeniya and Amerasinghe (2004) describe five different categories of ricefields based upon water regime, drainage, temperature, soil type and topography.

**Table 4 Estimation of the blackfish yield proportion by country from estimates of habitat area, areal yield and blackfish yield proportion by habitat type. \*and large waterbodies outside floodzone.**

<b>(a) Area estimates (km<sup>2</sup>)</b>						
		<b>Cambodia</b>	<b>Lao</b>	<b>Thailand</b>	<b>Vietnam</b>	<b>Total</b>
<b>Flood Zone</b>		28262	4617	7795	17343	58017
<b>Rainfed Zone</b>		17605	8962	93119	10149	129835
<b>Reservoirs*</b>		853	2143	3521	995	7512
<b>Total</b>		<b>46720</b>	<b>15722</b>	<b>104435</b>	<b>28487</b>	<b>195364</b>

<b>(b) Area yield estimates (tonnes y<sup>-1</sup>)</b>						
	<b>kg/ha/year</b>	<b>Cambodia</b>	<b>Lao</b>	<b>Thailand</b>	<b>Vietnam</b>	<b>Total</b>
<b>Flood Zone</b>	100	282620	46170	77950	173430	580170
<b>Rainfed Zone</b>	50	88025	44810	465595	50745	649175
<b>Reservoirs*</b>	200	17060	42860	70420	19900	150240
<b>Total</b>		<b>387705</b>	<b>133840</b>	<b>613965</b>	<b>244075</b>	1379585

<b>(c) Blackfish Yield Estimates (tonnes y<sup>-1</sup>)</b>						
	<b>Blackfish yield proportion</b>	<b>Cambodia</b>	<b>Lao</b>	<b>Thailand</b>	<b>Vietnam</b>	<b>Total</b>
<b>Flood Zone</b>	0.3	84786	13851	23385	52029	174051
<b>Rainfed Zone</b>	0.6	52815	26886	279357	30447	389505
<b>Reservoirs*</b>	0.1	1706	4286	7042	1990	15024
<b>Total</b>	<b>Total</b>	<b>139307</b>	<b>45023</b>	<b>309784</b>	<b>84466</b>	578580

<b>Consumption-based estimates of total yield (t/y)</b>	<b>481537</b>	<b>167922</b>	<b>720501</b>	<b>692118</b>	<b>2062078</b>
<b>Blackfish yield proportion (all habitats)</b>	<b>0.29</b>	<b>0.27</b>	<b>0.43</b>	<b>0.12</b>	<b>0.28</b>



**Table 5 Estimates of areal yield and blackfish yield proportion from ricefields and floodplains. Table excludes data from Troeung et al (2003) that is reported to underestimate yields by exclusion of artisanal catches, and Lim et al (2005) due to artificial nature of floodplains (see Hortle & Penroong 2009).**

Country	Location	Habitats	Flooded, Irrigated or Rainfed?	AEZ	Stocked?	Wildfish			Proportion of yield			Blackfish yield (kg/ha/year)	Source
						Yield all (kg/ha/year)	Yield fish (kg/ha/year)	Mid-range fish yield (kg/ha/year)	Fish	OAA	Blackfish		
Cambodia	Battambang	Ricefields, single crop	Rain-fed (& flooded?)		N	119	92	92	0.77	0.23	0.93	85	Hortle et al (2008)
Cambodia	Svay Rieng (L)	Ricefields, single crop	Rain-fed	Low	Y	40	30	30	0.75	0.25			Amilhat et al (2009)
Cambodia	Takeo (U)	Ricefields, single crop	Rain-fed	Dry	Y	5	3	3	0.54	0.46			Amilhat et al (2009)
Cambodia		Ricefields	?		?		25 - 61	43					Ahmed et al (1998)
Cambodia	Svay Rieng, Theap District	Ricefields, single crop	Rain-fed		?	100	82	82	0.82	0.18			Gregory et al (1996) as cited by Guttman (1999).
Cambodia							51	51					Gregory & Guttman (1999) as cited by Gregory and Guttman (2002)
Lao PDR	3 provinces in southern Laos	Ricefields, single crop	Rain-fed and irrigated		Y		60	60					Nguyen Khoa et al., 2005
Thailand	Khu Khat	Ricefields, single crop	Rain-fed		N		25 - 125	75					Fujisaka & Vejpas (1990) as cited by Little et al (1996)
Thailand	Koh Wang District, NE Thailand	Ricefields, single crop	Rain-fed		Y		33	33					Mang-Uphan et al (1990) cited by Middendorp (1992)
Thailand	Koh Wang District, NE Thailand	Ricefields, single crop	Rain-fed		Y		209	209					Middendorp (1992)
Thailand	NE Thailand	Ricefields, single crop	?		?		25	25					Spiller (1985) cited by Gregory & Guttman (1997)
Thailand	Yasothon (L)	Ricefields, single crop	Rain-fed	Low	Y	26	22	22	0.84				Amilhat et al (2009)
Thailand	Sisaket (U)	Ricefields, single crop	Rain-fed	Dry	Y	65	55	55	0.84				Amilhat et al (2009)
Vietnam	Hanoi (L)	Ricefields	Irrigated	Dry	Y	52	44	44	0.84				Amilhat et al (2009)
Vietnam	Phu Xuyen (U)	Ricefields	Irrigated	Low	Y	151	127	127	0.84				Amilhat et al (2009)
Cambodia	Tonle Sap	Floodplain, ricefield and perm. w/bs	Flooded	Low	N	243 - 532	310	310	0.8				Dubeau et al (2000) cites by Hortle & Penroong (2009)
Cambodia	Tonle Sap	Entire floodplain	Flooded	Low	N		230	230					Baran et al (2001) cited by Hortle & Penroong (2009)
Cambodia	Tonle Sap	Entire floodplain (1995-99)	Flooded	Low	N		139 - 190	164.5					Lieng & van Zalinge (2001) cited by Hortle & Penroong (2009)
Cambodia	Kratie	Rice fields in floodplain system	Flooded	Low	N						0.15		AMCF CAS Nov 03 - Dec 04
Thailand	Songkhram	River-floodplain system	Flooded, irrigated & ra	Low	N		79	79	0.63		0.37	29	Hortle & Suntornratana (2008)
Thailand	Nongbeung	River-floodplain system	Flooded	Low	N						0.43		AMCF CAS Nov 03 - Dec 04
Thailand	Nakornphanom	River-floodplain system	Flooded	Low	N						0.23		AMCF CAS Nov 03 - Dec 04
Vietnam	An Giang	Mainly floodplain canals and rivers	Flooded	Low	N						0.16		AMCF CAS Nov 03 - Dec 04
Vietnam	Mekong Delta	Floodplain ricefields	Flooded	Low	?	42 - 63	25	30	0.47	0.53			de Graaf and Chinh (2000) cited by Hortle & Suntornratana (2008)
Vietnam	Mekong Delta	Floodplain ricefields	Flooded	Low	?	119	106	106	0.89	0.11			de Graaf and Chinh (2000) cited by Hortle & Penroong (2009)
Africa	Various	Floodplain-river systems	Flooded				47	47					Halls et al (2006)
Asia	Various	Floodplain-river systems	Flooded				90	90					Halls et al (2006)
Bangladesh	Pabna (NW)	Floodplains	Flooded	Low	N		104 - 130	117					Halls et al (1999)
Bangladesh	Tangail	Floodplains & Perm. w/bs	Flooded	Low	N		165	165					de Graaf et al (2001)
Bangladesh	Tangail	Floodplains	Flooded	Low	N		83						de Graaf et al (2001)
Bangladesh	Various	Floodplains & beels	Flooded	Low	N			107					Ali (1997) Table 31
Asia		Ricefields	?		?		1.5 - 84	43					Gregory & Guttman (1997)
Malaysia		Ricefields, double crop	Irrigated		?		68 - 140	104					Tan et al (1973) cited by Hortle & Suntornratana (2008)
Malaysia		Ricefields	?		?		up to 150						Ali (1990)
							Aithmetic mean (rainfed)	63	0.78	0.28	0.93	85	
							Arithmetic mean (flooded)	123	0.70	0.32	0.27	29	
							Median (rainfed)	51	0.83	0.24	0.93	85	
							Median (flooded)	106	0.72	0.32	0.23	29	

The mean blackfish yield proportion from floodplains across the entire LMB is estimated to be approximately 30 % (Table 4). This is consistent with the opinions of 13 fisheries scientists from Lao PDR, Cambodia and international organisations operating in the LMB (see Barlow et al 2008).

Few studies have reported the relative contribution of different species to fish yields from rainfed or rainfed irrigated ricefields. Bambardeniya and Amerasinghe (2004) cite studies reporting the presence of up to 40 species of fish in ricefields in Sri Lanka and Malaysia. Nguyen Khoa et al (2005) recorded 124 species of fish in rainfed irrigated ricefield landscapes in southern Lao PDR. Only eight of the 21 most frequently reported species were blackfish. Hortle et al (2008) estimated that blackfish accounted for 93 % of rainfed ricefield yields in Battambang. The same authors cite estimates of blackfish yield proportions from other studies in the range of 80 % to 95 % but mainly from ricefields and their trap ponds.

The blackfish proportion of the yield from rain-fed ricefields is also expected to vary according to eco-hydrological conditions particularly the depth and duration of flooding and availability of dry season refuges (e.g. trap ponds, reservoirs, rivers). A greater proportion of blackfish would be expected in shallow ricefields with rapidly fluctuating water levels and with limited (access to) the river system of other dry season refuge habitat. Irrigated ricefields, on the other hand, are likely to have a higher diversity of fish species with greater contributions to yield from *greyfish* and *whitefish* because of more abundant and diverse dry season habitat and potentially greater connectivity to the river system provided by river and irrigation channels. Therefore, the inclusion of catches from nearby rivers, streams and permanent waterbodies forming the irrigated 'ricefield landscape' would be expected to lower estimates of the proportion of blackfish yield from ricefields alone.

Most rice-fields in the LMB that are classified as 'rain-fed' appear to be associated with irrigation schemes (see Figures 4 and 5 in Hortle and Penroong (2009)). Therefore perhaps a more balanced estimate of the blackfish yield proportion for the irrigated 'ricefield landscape' outside the floodzone might be in the region of 30 % to 90 %. For the purposes of this assessment we might therefore assume the mid-range value i.e. 60 %.

#### ***Reservoirs and large waterbodies outside the flood zone.***

The mean areal yield estimate for reservoirs and large waterbodies outside the flood zone is estimated to be in the region of 200 kg ha<sup>-1</sup> year<sup>-1</sup> after Hortle & Penroong (2009). Many reservoirs in the LMB are stocked with exotic species particularly carps and Nile tilapia forming almost the entire catch in some cases (Table 9, Hortle & Penroong 2009). Whilst blackfish inhabit reservoirs, their contribution to the overall yield appears low in most cases. Here, it is assumed that the blackfish yield proportion for these habitats is in the region of 10 % after Nakkaew et al (2002) who found that the indigenous blackfish yield proportion in Hui Luang reservoir, Udon Thani, Thailand was less than 10 %.

### *Total yield by guild estimates*

The total yield by guild (Table 6) was estimated by combining the consumption-based yield estimates in Table 1 with the guild yield proportions in Table 3. The small differences (<0.1 %) in the total inland fish yield estimates for each country when compared to Table 1 reflect rounding errors.

It is estimated that blackfish (Guild 6) form almost 30 % of the total yield of the LMB, arising from the large area of the irrigated 'ricefield landscape' in Thailand. Generalist species (Guild 5) are also estimated to form approximately 30 % of the yield, whereas migratory whitefish (Guilds 2, 3 and 4) combine to form nearly 40 % of the total. The remaining proportion 2 % comprises mostly estuarine resident, and marine and catadromous species (Table 6).

**Table 6 Estimated yield by guild for the LMB.**

<b>Guild</b>	<b>Cambodia</b>	<b>Lao PDR</b>	<b>Thailand</b>	<b>Vietnam</b>	<b>Total</b>	<b>% Total inland fish</b>
1	1,230	172	991	2	2,395	0.1%
2	27,066	25,017	114,498	30,122	196,704	9.5%
3	151,135	45,818	95,267	110,585	402,805	19.5%
4	49,795	8,812	59,979	81,581	200,167	9.7%
5	111,054	42,207	139,136	356,032	648,428	31.5%
6	139,307	45,023	309,784	84,466	578,580	28.1%
7	1,017	682	0	20,304	22,003	1.1%
8	270	114	618	32	1,033	0.1%
9	310	12	0	4,384	4,706	0.2%
10	10	13	0	3,569	3,592	0.2%
<b>Inland Fish</b>	<b>481,194</b>	<b>167,869</b>	<b>720,273</b>	<b>691,076</b>	<b>2,060,412</b>	<b>100.0%</b>
<b>OAA</b>	<b>105,467</b>	<b>40,581</b>	<b>190,984</b>	<b>160,705</b>	<b>497,737</b>	
<b>Total</b>	<b>586,661</b>	<b>208,450</b>	<b>911,257</b>	<b>851,781</b>	<b>2,558,149</b>	

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## ANNEX: SPECIES AND GUILDS

	<b>Presence reported in:</b>	
<b>MC</b>	Main Channel	AMCF (Survey data)
<b>DP</b>	Deep Pools	Halls et al (in press)
<b>LARV</b>	Larvae Surveys (MRC)	Various larvae papers in Tech Symposium Proceedings
<b>FP</b>	FloodPlains	AMCF (Survey data)
<b>KF*</b>	* Species landed in significant quantities below Khone Falls (Baran et al 2005)	
<b>KF**</b>	** Species landed in significant quantities in HSY channel and dry season migrations in Champassak (Soukhaseum et al 2006)	
<b>Yunnan</b>	Yunnan Province	From MFD
<b>Impound</b>	Impoundments	From MFD

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Cyprinidae	Aaptosyax grypus	20	1								2	Restricted to main channel, migratory and diminished abundance after dam construction	MFD also states found in deep pools
Siluridae	Acanthocobitis sp. cf. bilotorio	76	1									Not found in database	
Cobitidae	Acanthopsis sp.1	169	1	1		1						Not found in MFD	
Cobitidae	Acanthopsis sp.5	170	1								5	Not highly migratory	No commercial importance
Cobitidae	Acanthopsoides delphax	171	1	1							5	Not highly migratory	No commercial importance
Cyprinidae	Albulichthys albuloides	25	1		1				1		5	Displays lat and long migrations also present on FP (MFD)	
Cyprinidae	Amblyrhynchichthys truncatus	26	1	1	1	1				1	5	Seems to display only longitudinal migrations. BUT FOUND IN IMPOUNDMENTS	
Anabantidae	Anabas testudineus	123							1	1	6	Morphological adaptations to low D.O. concs.	
Anguillidae	Anguilla marmorata	2	1	1							9	Catadromous spp	
Sciaenidae	Argyrosomus sp.	3027									10	Stated as Marine in AMCF species look-up table	
Ariidae	Arius maculatus	150	1	1		1					7	Coastal/estuarine species not found outside of Vietnam and Cambodia	
Ariidae	Arius malacanthus	153									7	Found only in Vietnam delta	
Sisoridae	Bagarius bagarius	91	1	1		1			1		5	Remains in main channel but not highly migratory; protracted spawning period;	
Sisoridae	Bagarius suchus	174	1	1							2	Found only in mainstream and seems to display only longitudinal migrations.	It is an important food fish
Sisoridae	Bagarius yarrelli	90	1	1		1		1	1		5	Remains in main channel but not highly migratory; protracted spawning period; juveniles of only 2 cm in length are seen all the year	
Bagriichthidae	Bagrichthys macracanthus	1329									7	Found only in Vietnam delta	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Bagriichthidae	Bagrichthys obscurus	82	1	1		1					5	Restricted to mainstream with limited migration	Little information available
Cyprinidae	Bangana behri	54	1	1		1		1			2	Riverine species preferring rocky stretches of the mainstream from Sambor and upstream. Larvae may not reach sampling locations in Phnom Penh or may remain close to spawning locations	It is not known to persist in impoundments
Cyprinidae	Bangana sp.	168	1	1		1					2	Riverine species preferring rocky stretches of the mainstream from Sambor and upstream. Larvae may not reach sampling locations in Phnom Penh or may remain close to spawning locations	It is not known to persist in impoundments
Cyprinidae	Barbichthys nitidus	55	1	1							4	Floodplain spawner and main channel in dry season	Not known to persist in impoundments
Cyprinidae	Barbonymus altus	40	1	1	1	1		1		1	5	Floodplain spawner. BUT FOUND IN IMPOUNDMENTS	
Cyprinidae	Barbonymus gonionotus	39	1	1	1	1				1	5	Inhabits diverse habitats. Most fishers report that it is a "local migrant"	Important food fish
Cyprinidae	Barbonymus schwanefeldii	38	1	1		1					5	Inhabits diverse habitats. Omnivorous	
Batrachoididae	Batrachichthys grunniens	3028									7	Found only in Vietnam delta	
Siluridae	Belodontichthys truncatus	92	1	1	1	1		1			5	Generalist largely restricted to mainstream with some migrations	Little information available
Osphronemidae	Betta smaragdina	999									6	Morphological adaptations to low D.O. concs.	
Sciaenidae	Boesemania microlepis	121	1	1		1					5	Limited non-critical migrations in mainstream only	
Gobiidae	Boleophthalmus boddarti	1631									7	Found only in Vietnam delta	
Cobitidae	Botia helodes	79	1	1	1	1					3	Spawning migrations with larval drift	Little information available
Cobitidae	Botia modesta	77	1	1	1	1		1			3	Strong upstream spawning migrations and pelagic larval stage.	
Cobitidae	Botia sidhimunki	81	1								5	Little data and very rare	Very rare and fished only for the aquarium trade.
Cobitidae	Botia sp. cf. beauforti	78	1								2	Botia spp generally found in lotic environments and reported to be migratory or highly migratory	Little information available
Cobitidae	Botia sp. cf. lecontei	80	1								2	Botia spp generally found in lotic environments and reported to be migratory or highly migratory	Little information available
Soleidae	Brachirus harmandi	139	1	1	1	1					2	Found mainly in the mainstream. Floodplain catches may be incidental	Little information available
Soleidae	Brachirus orientalis	140	1	1		1					7	Estuarine and main channel species	Little information available
Cyprinidae	Catlocarpio siamensis	52	1	1	1	1					4	Appears to spawn on floodplains. Extent of migrations uncertain.	Rare. Large size, late maturity.
Channidae	Channa gachua	184							1	1	6	Morphological adaptations to low D.O. concs.	
Pongasiidae	Channa grandinosa	130									6	Morphological adaptations to low D.O. concs.	
Channidae	Channa lucius	185							1	1	6	Morphological adaptations to low D.O. concs.	
Channidae	Channa maruloides	183									6	Morphological adaptations to low D.O. concs.	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Channidae	Channa melasoma	182									6	Morphological adaptations to low D.O. concs.	
Channidae	Channa micropeltes	129								1	6	Morphological adaptations to low D.O. concs.	
Channidae	Channa striata	128							1	1	6	Morphological adaptations to low D.O. concs.	
Cyprinidae	Chela laubuca	12									7	Found only in Vietnam delta	
Notopteridae	Chitala blanci	4	1	1		1					4	Migrates locally and moves into smaller tributaries and flooded areas including inundated forest. Returns to the main river channel when waters recede.	
Notopteridae	Chitala lopis	142	1	1	1	1					4	Very little information. Categorisation based upon other notopterus spp.	
Notopteridae	Chitala ornata	3	1	1	1	1				1	5	Migrates locally and moves into smaller tributaries and flooded areas including inundated forest. Returns to the main river channel when waters recede. BUT FOUND IN IMPOUNDMENTS	An important commercial food fish
Cyprinidae	Cirrhinus cirrhosus	166	1	1							5	Appears to be a generalist	Introduced sp. Also cultured.
Cyprinidae	Cirrhinus jullieni	61	1	1		1					5	Due to taxonomic confusion, there is little reliable information that pertains to this species (Ref. 12693).	
Cyprinidae	Cirrhinus microlepis	59	1	1	1	1		1			3	Migratory pelagic spawner. Eggs are buoyant or semi-buoyant and drift downstream and out onto flooded areas.	Reported in impoundments but also reported not to persist in impoundments. Very important commercial species
Cyprinidae	Cirrhinus molitorella	60	1	1				1	1		3	Upstream spawning migration with pelagic egg stage	Wild stocks are strongly migratory
Cyprinidae	Cirrhinus prosemion	164	1	1							3	Synonym of Cirrhinus molitorella	
Cyprinidae	Cirrhinus spilopleura	165	1	1		1					5	It spawns in floodplains and mainstreams of large rivers during wet-season (Ref. 1037982, 30857); It is a pelagic spawner, which produces buoyant or semi-buoyant eggs (Ref. 1037982).	Found in some impoundments
Clariidae	Clarias batrachus	116								1	6	Morphological adaptations to low D.O. concs.	
Clariidae	Clarias cataractus	181									6	Morphological adaptations to low D.O. concs.	
Clariidae	Clarias gariepinus	180								1	6	Morphological adaptations to low D.O. concs.	
Clariidae	Clarias macrocephalus	158									6	Morphological adaptations to low D.O. concs.	
Clupeidae	Clupeichthys aesarnensis	143	1	1		1				1	5	Found in diverse range of habitats.	Adapts well to larger reservoirs with a substantial pelagic zone
Schilbeidae	Clupisoma sinensis	114	1	1					1		2	Found mainly in main channels as far north at Yunnan	Some importance as a food fish
Engraulidae	Coilia lindmani	1050									7	Found only in Vietnam delta	
Engraulidae	Coilia macrognathos	1051									7	Found only in Vietnam delta	
Characidae	Colossoma macropomum	1813									7	Found only in Vietnam delta	
Clupeidae	Corica laciniata	1039									7	Found only in Vietnam delta	
Cyprinidae	Cosmochilus harmandi	27	1	1	1	1	1	1			3	Seems to display only longitudinal migrations.	



Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Cyprinidae	Crossocheilus atrilimes	72	1					1			4	Floodplain/forest spawner and main channel in dry season	
Cyprinidae	Ctenopharyngodon idella	1121								1	7	Found only in Vietnam delta	
Cyprinidae	Cyclocheilichthys enoplos	29	1	1	1	1		1			3	Eggs and larvae are pelagic) and drift from the spawning ground. Smaller individuals occur near the river-bank	Not found in impoundments
Cyprinidae	Cyclocheilichthys furcatus	30	1	1		1					2	Found mainly in mainstream and undertakes significant longitudinal migrations	Does not occur in impoundments. Little information available.
Cyprinidae	Cyclocheilichthys repasson	31	1	1	1	1			1	1	5	Inhabits diverse habitats. Some migration.	Readily adapts to reservoirs
Cyprinidae	Cyclocheilichthys tapiensis	28	1	1		1					4	A white fish species (Ref. 1036978), which lives in rivers during the dry season and migrates to floodplains to spawn in the rainy season (Ref. 12693).	
Cynoglossidae	Cynoglossus microlepis	136	1	1	1	1					2	Found only in the mainstream below khone falls. Floodplain catches may be incidental	Little information available
Cyprinidae	Cyprinus carpio	19	1	1	1	1				1	5	Generalist	Introduced spp.
Dasyatidae	Dasyatis laosensis	1	1	1							2	Found in mainstream and tributaries above and below GFL	It is of some importance as a food fish and believed to be migratory
Datnioididae	Datnioides quadrifasciatus	1522									7	Found only in Vietnam delta	
Datnioididae	Datnioides undecimradiatus	133	1	1							5	Found in mainstream and tributaries above and below GFL	Little information available
Cyprinidae	Discherodontus ashmeadi	32	1	1		1				1	5	Mainstream generalist with limited migrations. Found in localized populations and encountered sporadically in the Middle Mekong (Ref. 12693, 27732); Recorded in the Xe Bangfai Basin (Ref. 26580).	
Eleotridae	Eleotris fusca	1571									7	Found only in Vietnam delta	
Polynemidae	Eleutheronema tetradactylum	1530									10	Stated as Marine in AMCF species look-up table	
Mugilidae	Ellochelon vaigiensis	187									10	Stated as Marine in AMCF species look-up table	
Cyprinidae	Esomus metallicus	14								1	7	Found only in Vietnam delta	
Poeciliidae	Gambusia affinis	190								1	10	Stated as Marine in AMCF species look-up table	
Cyprinidae	Garra fasciacauda	73	1	1	1	1					2	Appears to be restricted to lotic environments	
Gobiidae	Glossogobius aureus	1591									7	Found only in Vietnam delta	
Gobiidae	Glossogobius giuris	132									7	Found only in Vietnam delta	
Gobiidae	Glossogobius sparsipapillus	1594									7	Found only in Vietnam delta	
Gobiidae	Gobiidae sp2.	3031									7	Found only in Vietnam delta	
Gobiidae	Gobiidae sp3.	3032									7	Found only in Vietnam delta	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Gobiidae	Gobiopterus brachypterus	1604									7	Found only in Vietnam delta	
Gyrinocheilidae	Gyrinocheilus pennocki	75	1	1	1	1	1	1			2	Appears to be restricted to lotic environments particularly tributaries	Little information available
Cyprinidae	Hampala dispar	50	1	1		1				1	5	Inhabits diverse habitats. Some migration.	Adapts easily to reservoirs
Cyprinidae	Hampala macrolepidota	51	1	1	1	1			1	1	5	Generalist	Frequently found in impoundments
Harpadontidae	Harpadon nehereus	1415									10	Stated as Marine in AMCF species look-up table	
Pangasiidae	Helicophagus waandersii	101	1	1	1	1		1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Ariidae	Hemiarus stormii	115	1	1		1					7	Sea catfish - not found above GFL	
Bagridae	Hemibagrus filamentus	1330	1	1	1	1		1			4	Floodplain spawner and main channel refuge seeker	
Bagridae	Hemibagrus spilopterus	84	1	1		1					4	Migrations between floodplain spawning habitat and main channel.	
Bagridae	Hemibagrus wyckii	86	1	1		1					4	Migrations between spawning habitat and main channel.	Little information available
Bagridae	Hemibagrus wyckioides	87	1	1		1		1	1	1	5	Migrations between spawning habitat and main channel. BUT FOUND IN IMPOUNDMENTS	Little information available. Reported to be a blackfish by one Bardach
Siluridae	Hemisilurus mekongensis	93	1	1	1	1		1	1		5	Generalist largely restricted to mainstream with some migrations	Little information available
Cyprinidae	Henicorhynchus lobatus	62	1	1		1	1	1			3	Highly migratory. Main channel spawner although reports of spawning on floodplains also exist. Henichryncus lobatus larvae may be included in Henichryncus spp.	
Cyprinidae	Henicorhynchus siamensis	63	1	1	1	1		1			3	Highly migratory	Very abundant. Not known to persist in impoundments
Bagridae	Heterobagrus bocourti	89	1	1	1	1					5	Generalist	Reported to be a blackfish
Cyprinidae	Hypophthalmichthys molitrix	167	1		1					1	5	Generalist that does well in impoundments	Introduced sp.
Cyprinidae	Hypophthalmichthys nobilis	138	1	1						1	5	Generalist that does well in impoundments	Introduced sp. Breeding requirements are very specialized and stocks are maintained by artificial reproduction or continuous importation
Hemiramphidae	Hyporhamphus limbatus	188									10	Stated as Marine in AMCF species look-up table	
Loricariidae	Hypostomus plecostomus	1387								1	7	Found only in Vietnam delta	
Cyprinidae	Hypsibarbus lagleri	45	1	1		1					2	Appears restricted to main channel with some spawning migration behaviour	Not known to persist in impoundments (Ref. 12693).

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Cyprinidae	Hypsibarbus malcolmi	44	1	1	1	1	1	1			2	Mainstream pelagic spawner not found in floodplains. Catches in floodplains may be incidental.	Does not persist in impoundments
Cyprinidae	Hypsibarbus vernayi	148	1	1							4	Found in mainstream and tributaries, undertakes migrations	Does not tolerate impoundment
Cyprinidae	Hypsibarbus wetmorei	149	1	1		1					2	Appears restricted to main channel with some spawning migration behaviour	Does not tolerate impoundments
Unknown	Inmicus didactylus	3029									7	Found only in Vietnam delta	
Siluridae	Kryptopterus bicirrhis	94	1	1	1			1			2	Found mainly in main channel under tree shade, sometimes found hiding among plant roots near the stream bank.	Little information available
Siluridae	Kryptopterus kryptopterus	95	1	1	1	1					5	Generalist largely restricted to mainstream with some migrations	Little information available
Siluridae	Kryptopterus micronema	1345	1	1							5	Appears to be a generalist. Found in rivers, streams, and lakes as well as impoundments	
Cyprinidae	Labeo chrysophekadion	58	1	1	1	1	1	1		1	5	Generalist. Extent of migrations uncertain	
Cyprinidae	Labeo dyocheilus	57	1		1						5	Migratory with pelagic eggs and larvae but appears to be a generalist given that it proliferates in impoundments	Known to proliferate in impoundments
Cyprinidae	Labeo rohita	56	1	1						1	5	Found in a variety of habitats and spawns on floodplain but also found in deep pools AND RESERVOIRS	Introduced spp
Cyprinidae	Labiobarbus lineata	162	1	1		1			1		5	It readily adapts to reservoirs	
Cyprinidae	Labiobarbus siamensis	163	1	1	1	1					3	Migratory upstream spawner	Little information available
Cyprinidae	Labiobarbus sp. cf. lineata	65	1	1		1					5	It readily adapts to reservoirs	
Schilbeidae	Lrides longibarbis	113	1	1	1	1					5	Generalist largely restricted to mainstream with some migrations	Little information available
Centropomidae	Lates calcarifer	154									10	Stated as Marine in AMCF species look-up table	
Leiognathidae	Leiognathus sp.	195									10	Stated as Marine in AMCF species look-up table	
Cyprinidae	Leptobarbus hoevenii	18	1	1							4	Appears to be somewhat migratory but spawns on floodplain and found in deep pools	Info in MFD appears contradictory
Cyprinidae	Lobocheilos melanotaenia	64	1	1	1	1			1		4	Reported to migrate laterally to spawn on floodplains	Little information available
Cyprinidae	Luciocyprinus striolatus	144	1						1		4	Migrates into small and medium sized streams in May-June to spawn	Mainly found in upper part of basin. Little information. Appears unimportant
Cyprinidae	Luciosoma bleekeri	17	1	1	1	1					3	Appears to be a mainstream spawner with downstream nursery locations	Little information available
Engraulidae	Lycorhissa crocodilus	9	1	1		1					8	Could belong to Guild 2. Usually found in brackish water in the estuaries of large rivers, but it often ascends into fresh water (Ref. 12693, 189); Reported to inhabit deep pools in the mainstream Mekong at least part of the year (Ref. 1037921).	
Palaeomonidae	Macrobrachium sp.	192									9	Found only in Vietnam delta	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yu nn an	Im po und	Gu ild	Reason	Notes
Cyprinidae	Macrochirichthys macrochirus	13	1	1		1			1		5	Mainstream generalist with limited migrations.	
Mastacembelidae	Macrogathus circumcinctus	141	1	1							6	Recorded as blackfish in MFD	Little information available
Mastacembelidae	Macrogathus siamensis	119	1	1	1	1					5	Reported to be non-migratory and a blackfish but found in main channel	
Mastacembelidae	Mastacembelus armatus	118	1	1	1	1			1	1	5	Found in diverse range of habitats. Believed to perform only short local migrations	
Megalopidae	Megalops cyprinoides	6	1								9	Catadromous - A marine and estuarine carnivore that often enters lowland rivers; It breeds offshore	It is used as food fish, but is more important as a sports fish
Cyprinidae	Mekongina erythrospila	74	1	1			1	1			2	Distribution appears restricted to main channel	Reported to be highly migratory
Siluridae	Micronema apogon	96	1	1	1	1					5	Generalist largely restricted to mainstream with some migrations	Little information available
Siluridae	Micronema bleekeri	97	1	1	1	1			1		5	Generalist largely restricted to mainstream with some migrations	Found in impoundments
Siluridae	Micronema cheveyi	175	1	1	1	1			1		5	No evidence of significant migrations but found in mainstream and floodplain	Little information available
Synbranchidae	Monopterus albus	120							1	1	6	Morphological adaptations to low D.O. concs.	
Tetraodontidae	Monotretes barbatus	191	1		1	1				1	5	Found in diverse range of habitats.	Little information available
Mugilidae	Mugil cephalus	186									10	Stated as Marine in AMCF species look-up table	
Muraenesocidae	Muraenesox cinereus	1028									10	Stated as Marine in AMCF species look-up table	
Cyprinidae	Mystacoleucus marginatus	33	1	1					1	1	5	Found in a diverse range of habitats	Rarely sold therefore likely to be insignificant. Little information available.
Bagridae	Mystus gulio	1333									7	Found only in Vietnam delta	
Bagridae	Mystus micracanthus	1334									7	Found only in Vietnam delta	
Bagridae	Mystus mysticetus	173	1	1	1	1				1	5	Inhabits diverse habitats. No evidence of significant migrations	
Bagridae	Mystus singaringan	88	1	1	1	1				1	5	Generalist	Reported to be a blackfish
Cyprinidae	Neolissochilus blanci	145	1			1					1	Found in pools of clear forest streams and rivers	
Ariidae	Netuma thalassinus	151									10	Stated as Marine in AMCF species look-up table	
Notopteridae	Notopterus notopterus	5	1	1	1	1				1	5	Migrates locally and moves into smaller tributaries and flooded areas including inundated forest. Returns to the main river channel when waters recede. BUT FOUND IN IMPOUNDMENTS	An important commercial food fish
Siluridae	Ompok bimaculatus	98	1	1	1	1				1	5	Generalist	Found in impoundments
Siluridae	Ompok hypophthalmus	177	1	1	1	1						Not found in MFD	
Cichlidae	Oreochromis niloticus	137								1	6	Morphological adaptations to low D.O. concs.	
Osphronemidae	Osphronemus exodon	126								1	6	Morphological adaptations to low D.O. concs.	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yun nan	Im pon d	Gu ild	Reason	Notes
Osphronemidae	Osphronemus goramy	127								1	6	Morphological adaptations to low D.O. concs.	
Cyprinidae	Osteochilus hasseltii	66	1	1		1				1	5	Generalist	Inhabits reservoirs. It is the most abundant fish in Nam Ngum reservoir (Ref. 6459).
Cyprinidae	Osteochilus lini	67	1	1	1	1					4	Reported to migrate laterally to spawn on floodplains	Little information available
Cyprinidae	Osteochilus melanopleura	68	1	1	1	1					5	Generalist	No evidence of extensive migrations
Cyprinidae	Osteochilus microcephalus	70	1	1	1	1					5	Generalist	No evidence of extensive migrations
Cyprinidae	Osteochilus schlegeli	69	1	1		1					4	A white fish species (Ref. 1036978), which moves into flooded forests and grasslands during the flood season, it returns to the rivers later, with highest numbers appearing from December to February (Ref. 12693).	
Cyprinidae	Osteochilus waandersii	71	1	1	1	1					2	Appears to be restricted to lotic environments particularly highland streams	
Ariidae	Osteogeneiosus militaris	152									7	Found only in Vietnam delta	
Eleotridae	Oxyeleotris marmorata	131	1	1	1	1				1	5	Reported to be non-migratory and a blackfish but found in main channel	Inhabits reservoirs.
Eleotridae	Oxyeleotris siamensis	1574									7	Found only in Vietnam delta	
Pangasiidae	Pangasianodon gigas	109	1								2	Highly migratory, only found in main channel and TS. Mainstream spawner	It is not known if the fish can mature in reservoir environments
Pangasiidae	Pangasianodon hypophthalmus	104	1	1	1	1					2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	This species appear to be very rare above the Khone Falls (Ref. 1037570)
Pangasiidae	Pangasius bocourti	103	1	1	1	1	1	1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Pangasiidae	Pangasius conchophilus	102	1	1	1	1	1	1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Pangasiidae	Pangasius krempfi	105	1	1			1	1			2	catadromous	Migrates extensively in the mainstream and crosses the Khone Falls
Pangasiidae	Pangasius kunyit	108	1	1	1	1			1		2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	Found in the high estuary (freshwater tidal zone) as juveniles, moving to brackish water as sub-adults, and finally as adults to river mouths and inshore areas (Ref. 12693). impacted by the Pak Mun Dam

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yu nn an	Im po und	Guild	Reason	Notes
Pangasiidae	Pangasius larnaudii	107	1	1	1	1	1	1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Pangasiidae	Pangasius macronema	110	1	1	1	1	1	1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Pangasiidae	Pangasius micronemus	179	1	1		1			1		2	Only seems to display longitudinal migrations.	
Pangasiidae	Pangasius pangasius	159	1	1		1		1			2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental or in TS. Synonym of P. Hypophthalmus	
Pangasiidae	Pangasius pleurotaenia	111	1	1	1	1					2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	Synonym for hypophthalmus
Pangasiidae	Pangasius polyuranodon	106	1	1	1	1	1				2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	
Pangasiidae	Pangasius siamensis	112	1	1	1	1					2	Appears to be a main channel resident with strong longitudinal migrations. Floodplain catches may be incidental.	Synonym for macronema
Pangasiidae	Pangasius spp.	161									2	Found only in Vietnam delta	
Cyprinidae	Paralauca typus	11	1	1	1	1		1			3	Strongly migratory in mainstream; Moves into floodplains during the flood; Spawns in the beginning of the flood season both in the mainstream and in floodplain habitats. May belong to Guild 4	Mainly processed to Prahoc; A very important species in the fisheries
Chandidae	Parambassis siamensis	135	1	1	1	1				1	5	Found in diverse range of habitats.	A common species proliferating in impoundments
Chandidae	Parambassis wolffii	189	1	1	1	1					5	Found in diverse range of habitats.	Little information available
Gobiidae	Parapocryptes serperaster	1633									7	Found only in Vietnam delta	
Gobiidae	Periophthalmodon schlosseri	1635									7	Found only in Vietnam delta	
Ophichthidae	Pisodonophis boro	1034									10	Stated as Marine in AMCF species look-up table	
Platycephalidae	Platycephalus indicus	1489									10	Stated as Marine in AMCF species look-up table	
Platycephalidae	Platycephalus sp.	3037									10	Stated as Marine in AMCF species look-up table	
Plotosidae	Plotosus canius	157	1	1		1					7	Could belong to Guild 2. Usually found in brackish water in the estuaries of large rivers.	
Poeciliidae	Poecilia reticulata	1463								1	6	Morphological adaptations to low D.O. concs.	
Polynemidae	Polynemus longipectoralis	156	1	1		1					7	Could belong to Guild 2. Usually found in brackish water in the estuaries of large rivers.	
?	Poropuntius deauratus	43	1			1						Not in MFD	
Nandidae	Pristolepis fasciata	122	1	1	1	1				1	5	Inhabits diverse habitats. No evidence of significant migrations	Inhabits reservoirs. Also reported to be a blackfish

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Cyprinidae	<i>Probarbus jullieni</i>	23	1	1	1	1	1	1			2	Appears to be a mainstream or tributary spawner (lithophil/psammophil). Juveniles feed in river margins. Migratory over large distances over GFL. Reported landings in FP habitat likely to be incidental	Incapable of breeding in reservoirs. Expected to disappear as more impoundments are constructed in the Mekong
Cyprinidae	<i>Probarbus labeamajor</i>	24	1	1				1			2	Found only in mainstream and tributaries. Lithophilic	Postulated not to be able to complete life cycle in reservoirs or impoundments. Similar behaviour to <i>P.jullieni</i> .
Gobiidae	<i>Pseudapocryptes elongatus</i>	1641									7	Found only in Vietnam delta	
Gobiidae	<i>Pseudapocryptes lanceolantus</i>	3026									10	Stated as Marine in AMCF species look-up table	
Gobiidae	<i>Pseudogobioptis lanceolatus</i>	3033									7	Found only in Vietnam delta	
Bagridae	<i>Pseudomystus siamensis</i>	83	1	1	1	1					5	No significant longitudinal migrations	
Cyprinidae	<i>Puntioplites bulu</i>	36	1								2	Found mainly in mainstream	Now uncommon and threatened.
Cyprinidae	<i>Puntioplites falcifer</i>	35	1	1		1					4	Spawns on floodplains and in main channel. Often found in deep pools in dry season.	
Cyprinidae	<i>Puntioplites proctozysron</i>	34	1	1	1	1			1		3	It is a riverine species, which seems to avoid standing water. A pelagic spawner, which lays buoyant or semi-buoyant eggs; It spawns in floodplains and mainstreams of large rivers.	Important food fish
Cyprinidae	<i>Puntioplites waandersi</i>	37	1						1		2	Found mainly in mainstream downstream of GFL.	Now uncommon.
Cyprinidae	<i>Puntius brevis</i>	1178	1		1						5	Generalist found in a variety of habitats	Proliferates in impoundments
Cyprinidae	<i>Puntius orphoides</i>	42	1	1		1				1	5	Spawns on floodplains but returns to main channel or tributary BUT FOUND IN IMPOUNDMENTS	
Cyprinidae	<i>Puntius rhombeus</i>	41	1	1		1					1	Appears to be restricted to small (highland) streams	
Cyprinidae	<i>Raiamas guttatus</i>	10	1	1		1			1		1	Found in rapidly flowing rivers and streams with clear water	Little information available
Cyprinidae	<i>Rasbora borapetensis</i>	15								1	7	Found only in Vietnam delta	
Cyprinidae	<i>Rasbora trilineata</i>	16	1			1				1	5	Non-migratory generalist	
Synodontidae	<i>Saurida</i> sp.	1788									7	Found only in Vietnam delta	
Cyprinidae	<i>Scaphognathops bandanensis</i>	48	1	1		1		1			4	Spawns on floodplains but returns to main channel or tributary	
Cyprinidae	<i>Scaphognathops stejneri</i>	49	1	1		1		1			4	Spawns on floodplains but returns to main channel or tributary	It is not known to migrate longitudinally (Ref. 12693)
Scatophagidae	<i>Scatophagus argus</i>	155									10	Stated as Marine in AMCF species look-up table	
Osteoglossidae	<i>Scleropages formosus</i>	147									6	Morphological adaptations to low D.O. concs.	
Scombridae	<i>Scomberomorus</i> sp.	1778									10	Stated as Marine in AMCF species look-up table	

Family	ScienceName	Code	MC	DP	LA RV	FP	KF *	KF **	Yunnan	Impound	Guild	Reason	Notes
Carangidae	Selaroides leptolepis	1509									10	Stated as Marine in AMCF species look-up table	
Gobiidae	Taenioides anguillaris	1646									7	Found only in Vietnam delta	
Gobiidae	Taenioides cirratus	1647									7	Found only in Vietnam delta	
Gobiidae	Taenioides gracilis	1648									7	Found only in Vietnam delta	
Clupeidae	Tenualosa thibaudeaui	7	1	1	1	1					8	Appears to be a mainstream spawner with downstream nursery locations	Highly migratory; An important food fish
Clupeidae	Tenualosa toli	8	1	1							8	Anadromous	
Tetraodontidae	Tetraodon biocellatus	1696									7	Found only in Vietnam delta	
Cyprinidae	Thynnichthys thynnoides	53	1	1	1	1					4	Appears to spawn on floodplains. Extent of migrations uncertain.	
Cyprinidae	Tor laterivittatus	146	1			1			1		1	Large adults are found in deep pools; juveniles are most frequently found in shallow areas with sandy substrate	
Cyprinidae	Tor sinensis	22	1			1			1		1	Occurs in pools and runs over gravel and cobble in clear rivers in forest areas (Ref. 12693).	
Cyprinidae	Tor tambroides	21	1						1		1	Found in lotic upstream habitats	
Toxotidae	Toxotes chatareus	134									7	Found only in Vietnam delta	
Toxotidae	Toxotes microlepis	193	1	1		1					5	Main channel (fringe) species.	Little information available
Carangidae	Trachurus sp.	1772									10	Stated as Marine in AMCF species look-up table	
Osphronemidae	Trichogaster pectoralis	124								1	6	Morphological adaptations to low D.O. concs.	
Osphronemidae	Trichogaster trichopterus	125							1	1	6	Morphological adaptations to low D.O. concs.	
Gobiidae	Trypauchen vagina	1651									7	Found only in Vietnam delta	
Siluridae	Wallago attu	99	1	1	1	1			1	1	5	Generalist	Readily adapts to impoundments
Siluridae	Wallago leerii	100	1	1							4	Spawns on floodplains and undertakes longitudinal migrations	May in practice belong to guild 5.
Belonidae	Xenentodon cancila	117	1	1	1	1				1	5	Inhabits diverse habitats. No evidence of significant migrations	