

3. ATTACK DATA, BY GEOGRAPHICAL AREA

(It should be noted that, because of mechanical difficulties arising from the use of several different machine tabulations made at different times, there are slight discrepancies between the tables covering attacks on targets, broken down by area and by target type. None of these are sufficient to affect the validity or essential accuracy of the data.)

This section of the report breaks down the offensive effort of Navy and Marine carrier and land-based aircraft by the geographical areas in which the targets were located, with further detail in some cases on the types of targets attacked in each area. Offensive effort is expressed only in terms of (a) sorties attacking targets (see definition of this term, and note difference between definitions for 1944 and for other years), and (b) tons of bombs expended on targets. Data on rockets and ammunition expended will be found in subsequent sections, but not broken down by area.

Table 30 is the comprehensive picture of the effort placed upon each major type of target in each major area, for the entire war, by all of Naval aviation.

Table 31 breaks down the area totals of sorties attacking targets between land targets and ship targets, and by years.

Table 32 breaks down on a monthly basis the attack sorties and bomb tonnage for the four areas where the most important long campaigns were carried on: the Solomons-Bismarcks area, the Philippines, the Ryukyus, and Japan. Data are given separately for carrier-based and land-based attacks, for land targets and ship targets, on a monthly basis.

Table 33 gives data on a monthly basis, for attacks on land targets in the principal Central Pacific island groups. Tables 34 and 35 show monthly shipping attack sorties, for 1944 and 1945, for all major areas.

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TABLE 30. SORTIES ATTACKING TARGETS, AND BOMB TONNAGE
EXPENDED ON TARGETS (CARRIER-BASED AND LAND-BASED COMBINED)
By Type of Target, and by Target Area, for Entire War

TARGET AREA	Air- fields	Other Mili- tary Targets	Land Trans- porta- tion	Harbor & Un- known Land*	WARSHIPS		MERCHANTMEN		Un- known Ship- ping#	TOTAL	
					Ar- mored	Unar- mored	Over 500 Tons	Under 500 Tons			
SORTIES ATTACKING TARGETS											
Hokkaido, No. Honshu	566	334	232	90	223	10	76	493	106	62	2192
Tokyo Area	4259	382	144	255	761	259	166	291	291	3	6811
Central Honshu	1556	126	64	120	68	533	134	172	151	28	2952
Kyushu, Kure Area	4250	318	44	144	232	919	182	496	253	51	6889
Ryukyus	14554	17665	810	1253	1241	5	273	1325	1188	8	38322
Formosa	1842	1176	102	126	464	4	222	1163	420	8	5527
Philippines	8792	26578	2323	655	1022	1526	1123	4175	1591	91	47876
Bonins	1304	4388	107	74	232	55	302	699	405	34	7600
Marianas	3630	13822	432	4	773	152	82	541	494	1	19931
Western Carolines	2798	12649	991	1153	1961	73	332	1129	1534	95	22715
Eastern Carolines	1613	1687	1	61	18	178	319	754	237	60	4928
Marshall's	3519	20156	85	416	163	119	49	716	1095	155	26473
Gilberts, Nauru	771	1238	1	133	16	0	0	19	30	0	2208
Midway, Wake, Marcus	737	1907	12	5	144	308	54	26	30	0	3223
Solomons, Bismarcks	10777	33009	1928	968	1052	766	926	1069	2029	441	52965
New Guinea, Halmahera	1394	1259	15	49	13	29	9	270	314	4	3356
Other NEI, Malaya	161	332	28	73	11	2	6	128	291	1	1033
China, Korea	188	104	65	184	13	5	53	474	344	50	1480
Indo China	114	56	102	45	1	24	239	400	92	2	1075
Aleutians, Kuriles	196	279	0	7	5	0	11	9	60	7	574
Atlantic	97	312	390	0	101	33	28	45	35	33	1074
TOTAL	63118	137777	7876	5815	8514	5000	4586	14394	10990	1134	259204

TONS OF BOMBS EXPENDED										
Hokkaido, No. Honshu	288	127	85	29	98	5	44	206	70	30
Tokyo Area	1222	162	32	146	339	125	51	63	71	0
Central Honshu	427	43	21	37	11	333	44	68	30	24
Kyushu, Kure Area	1239	110	4	49	80	604	76	243	53	21
Ryukyus	4575	7528	343	384	408	5	79	461	166	2
Formosa	348	541	24	55	221	0	75	543	58	0
Philippines	2318	12153	720	306	362	722	307	1716	238	3
Bonins	329	1284	14	26	16	21	110	221	81	7
Marianas	1215	4294	162	0	191	99	7	151	20	0
Western Carolines	743	3833	221	381	443	24	78	342	54	114
Eastern Carolines	557	665	0	46	9	89	74	262	20	14
Marshall's	1473	8640	30	204	79	77	0	115	157	128
Gilberts, Nauru	400	497	1	54	5	0	0	6	4	0
Midway, Wake, Marcus	403	828	8	6	35	100	7	10	5	0
Solomons, Bismarcks	6996	17980	806	531	493	472	465	605	335	300
New Guinea, Halmahera	419	476	6	19	0	11	6	105	34	0
Other NEI, Malaya	45	237	2	8	4	2	3	49	41	0
China, Korea	43	48	29	84	6	4	29	226	108	87
Indo China	20	30	65	6	0	15	99	196	30	0
Aleutians, Kuriles	143	116	0	2	2	0	6	6	8	3
Atlantic	7	65	56	0	2	14	3	16	6	8
TOTAL	23210	59657	2629	2373	2804	2722	1563	5610	1589	741

* Including industrial targets (2414 sorties, 947 tons).

Including minelaying.

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NOTES TO TABLE 30

This table makes it clear that the three areas of heaviest Naval offensive air effort were the Solomons and Bismarcks, the Philippines, and the Ryukyus, in that order, followed next by the Marshalls, the Western Carolines, the Marianas, and Japan as a whole. Other areas, though important at particular times, received a far less total weight of attack.

These seven principal areas were the targets of over 85% of the Navy's air offensive; over 20% of the total sorties and 28% of the bomb tonnage were expended against Bismarcks-Solomons targets, 18% of each were expended against Philippines targets, and 14% of each were expended against Ryukyus targets, while the Marshalls claimed 10%.

The targets attacked varied with the area and the purposes of the campaign. Overall, about a quarter of the total offensive was directed against airfields, about one-half against other military ground targets, about one-seventh against shipping, and one-tenth against miscellaneous land targets. In Japan, however, nearly 60% of the attacks were on airfields, and about 25% on shipping, with less attention to other land targets. In the Marshalls three quarters of the attacks were on military ground targets other than airfields. In Formosa and the Eastern Carolines airfields and shipping each accounted for a third of the total. For China and Indo China two-thirds of the attacks were on shipping along the coast and in the harbors.

The principal areas of airfield attack were the Ryukyus, the Solomons and Bismarcks, Japan, and the Philippines. In the Solomons airfields were principally bombed; in the other areas fighter strafing and rocket attacks were more important.

Heavy attacks on military land targets, predominant in the Solomons and Bismarcks, the Marshalls and the Western Carolines, were largely the result of the long campaigns for complete neutralization and reduction of enemy installations in the parts of these areas that were bypassed, though a large volume of pre-invasion and direct support attacks was made. The heavy attacks on military land targets in the Philippines, the Ryukyus, the Marianas, and the Bonins, reflect almost entirely pre-invasion air bombardment and direct air support of ground forces, by carrier and land-based planes.

The heaviest volume of shipping attack, 25% of all Navy shipping attacks, was flown, largely from carriers, in the Philippines campaign. Japan itself was the second most important area for shipping attack, particularly attacks on heavy warships in harbor. Enemy warships were also heavily attacked in the Solomons area, and merchant shipping was heavily attacked in half a dozen other areas.

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TABLE 31. SORTIES ATTACKING LAND TARGETS AND SHIP TARGETS
(CARRIER-BASED AND LAND-BASED COMBINED)
By Target Area and by Years

TARGET AREA	SORTIES ATTACKING LAND TARGETS					SORTIES ATTACKING SHIP TARGETS				
	1942	1943	1944	1945	TOTAL	1942	1943	1944	1945	TOTAL
Solomons, Bismarcks	1,090	10,639	31,589	4,487	47,805	1,239	1,668	2,266	1	5,174
New Guinea, Halmahera	18	10	2,691	2	2,721	85	8	525	8	626
Celebes, Borneo		9	115	372	496	1	0	169	192	362
Midway Area	0	0	0	0	0	320	0	0	0	320
Wake, Marcus	69	1,038	857	826	2,790	42	5	36	0	83
Gilberts, Nauru	0	1,830	297	32	2,159	0	47	2	0	49
Marshall's	77	544	21,268	2,457	24,346	63	180	1,717	172	2,132
Eastern Carolines		8	3,127	245	3,380		5	1,517	26	1,548
Western Carolines			11,986	7,568	19,554			2,766	397	3,163
Marianas			18,567	96	18,663			1,270	0	1,270
Bonins			1,860	4,239	6,099			1,224	270	1,494
Philippines			12,154	27,214	39,368	6	0	7,839	661	8,506
Formosa			2,273	1,430	3,703			683	1,134	1,817
Ryukyus			860	34,613	35,473			849	1,950	2,799
Kyushu, Kure Area				4,952	4,952				1,901	1,901
Central Honshu				1,934	1,934				1,018	1,018
Tokyo Area				5,794	5,794				1,012	1,012
Hokkaido, No. Honshu				1,445	1,445				747	747
Korea, No. China				32	32				282	282
Central China				35	35				119	119
South China				483	483			1	526	527
Indo China				317	317			1	756	757
Java, Sumatra, Malaya			98	19	117			31	36	67
Aleutians	2	124	0	0	126	14	2	0	0	16
Kuriles	0	5	278	78	361	0	1	41	29	71
Atlantic	430	0	483	0	913	67	55	39	0	161
TOTAL, ALL AREAS	1,686	14,207	108,503	98,670	223,066	1,837	1,971	20,976	11,237	36,021

NOTES TO TABLE 31

The predominance of the Solomons campaign in 1942-43 is clearly shown. The equal importance of land and shipping targets in 1942, and the steady decrease in the relative importance of shipping as a target is also illustrated. 1944, as the table indicates, was the year when Naval aviation was first able to come to grips with sizeable quantities of the Jap merchant marine and was the year when the bulk of it was eliminated.

The table also illustrates graphically the expansion of the areas of operation of the Naval air forces, and the shifts from old areas to new as enemy bases were captured or bypassed and neutralized, and enemy shipping eliminated from successive areas.

(Cont. from preceding page)

Coral Sea, Eastern Solomons, Santa Cruz and Guadalcanal battles of 1942, and in the Rabaul and Kavieng strikes of 1943-44.

Land-based aircraft were forced to devote a major part of their offensive effort to shipping targets during the first ten critical months of the Solomons campaign, to prevent enemy reinforcement of their forces and naval bombardment of our installations. A substantial anti-shipping effort continued throughout the balance of 1943 and 1944, reaching a peak in the early 1944 strikes which made Rabaul Harbor untenable, but after May 1943 land targets received far greater attention.

Peaks of offensive activity against land targets may be noted in July 1943 (direct support of New Georgia landings), November-December 1943 (Bougainville landings), March 1944 (Japanese counter-offensive on Bougainville). The decline in volume in January-February 1944 reflects the longer missions flown against Rabaul during these months, contrasted with the previous short-range hops in the Solomons. The heavy volume of attacks in July-November 1944 reflects the withdrawal of Army planes, leaving the principal responsibility of neutralizing the Solomons to an increased force of Marine aircraft operating from Bougainville, Green Island and Emirau. It also reflects the withdrawal of enemy air strength, permitting use of Marine VF entirely for offensive purposes.

In December 1944 the bulk of the single-engine planes were withdrawn from this area for transfer to the Philippines, leaving PBJs as the principal Naval aircraft remaining. This accounts for the larger bomb tonnage per sortie thereafter, and the cessation of shipping attacks, which during late 1944 had been largely fighter attacks on barges.

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TABLE 32. Continued

B. PHILIPPINES AREA

MONTH	CARRIER-BASED ATTACKS				LAND-BASED ATTACKS			
	LAND TARGETS		SHIPPING TARGETS		LAND TARGETS		SHIPPING TARGETS	
	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets
1944 - August	0	0	0	0	1	0	3	0
September	3,944	1,414	2,300	699	4	3	33	8
October	3,386	807	2,737	995	33	1	47	11
November	2,083	476	1,958	995	17	0	55	21
December	2,205	287	501	46	481	125	204	66
1945 - January	2,270	663	387	91	1,183	401	104	6
February	0	0	0	0	5,446	2,616	107	25
March	0	0	0	0	5,594	2,586	38	5
April	0	0	0	0	5,022	2,380	15	5
May	0	0	0	0	3,752	2,006	10	8
June	0	0	0	0	2,212	1,160	0	0
July	0	0	0	0	1,434	794	0	0
August	0	0	0	0	301	142	0	0
TOTAL	13,888	3,647	7,883	2,826	25,480	12,214	616	155

NOTES TO TABLE 32B

There were three main stages to the Naval air campaign in the Philippines; (a) the destruction of enemy air strength and shipping throughout the area (plus a minor amount of pre-invasion shore bombardment and direct support) carried out by carrier forces during September, October and November, 1944; (b) protection of the amphibious forces and direct support of ground forces by both carrier and land-based planes in the Mindoro and Lingayen landings of December and January; and (c) extensive ground support and pre-invasion bombardment by Marine aircraft in the Luzon campaign and subsequent invasions of the Visayas and Mindanao.

The table shows the considerable emphasis on shipping attack in the first stage; half of the bombing offensive was against enemy naval and merchant vessels, while the remainder of the bombing effort, plus most of the fighter offensive, was sent largely against airfields. The attacks of September-November 1944 in the Philippines constituted the Navy's heaviest sustained anti-shipping offensive; they resulted (see Appendix) in 279,000 tons of combat vessels and 474,000 tons of large merchant vessels sunk (including attacks at Formosa and the Ryukyus). At the same time the air offensive resulted (see Table 26B) in the destruction of 1406 enemy aircraft in air combat and 1,295 on the ground.

By the beginning of the second stage, enemy shipping had been almost completely eliminated, and the enemy air force largely nullified. 676 more planes were destroyed, however, and substantial attacks were made on ground targets in support of ground forces.

For the third stage the carriers were no longer required, enemy aircraft were almost completely absent, and the bulk of the offensive consisted of direct air support of Army ground troops. The table shows the considerable volume of attacks flown by Marine fighters and dive bombers in the Philippines from December 1944 to the end of the war. Although the Marine offensive in this theater during these few months amounted to nearly a quarter of Marine aviation's total for the war, it has been practically entirely unpublicized.

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TABLE 32. Continued

C. RYUKYUS AREA

MONTH	CARRIER-BASED ATTACKS				LAND-BASED ATTACKS			
	LAND TARGETS		SHIPPING TARGETS		LAND TARGETS		SHIPPING TARGETS	
	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets	Sorties Attacking Targets	Tons of Bombs on Targets
1944 - October	859	249	845	318	1	0	4	3
1945 - January	536	160	53	1	1	0	8	2
February	0	0	0	0	6	0	23	2
March	6,347	1,962	868	218	0	0	37	5
April	12,799	4,671	522	113	585	305	10	0
May	6,332	2,769	172	20	982	584	23	10
June	4,555	1,629	47	10	1,600	700	105	9
July	0	0	0	0	775	195	62	2
August	0	0	0	0	95	2	20	0
TOTAL	31,428	11,440	2,507	680	4,045	1,786	292	33

NOTES TO TABLE 32C

The pattern of the Philippines campaign was repeated in the Ryukyus, but in more condensed form. Enemy shipping was more quickly and easily eliminated in March and April 1945 (it had already been hit in a one-day strike incidental to the Leyte campaign), but the airfields, which had been hit comparatively lightly in October and January, presented more difficulty. Those on Okinawa were quickly neutralized, but it was necessary to attack those in the Southern Ryukyus constantly through the entire 5 months of the operation. The bulk of the remaining offensive effort was concentrated on beach and inland defenses, and on guns, caves, and other defensive positions, in direct support of Marine and Army troops. In this work land-based Marine aircraft began to assist the carrier forces early in April; they assumed an increasing proportion in May and June, and on 22 June took over from the carriers the entire burden of support.

NOTES TO TABLE 32D

This table (see next page) shows the distribution of Naval attack effort between land and shipping targets in the various segments of Japan. (See Definitions for geographical limits of the various areas; note especially that the Tokyo area includes all of northern Honshu except the tip*.

Tokyo area land targets, particularly airfields, received the heaviest fraction of the carrier offensive, over 40% of the total attacks on land targets. These attacks were delivered in three periods: (a) the first strikes of 16, 17 and 25 February, were concentrated on airfields and aircraft factories, and resulted in the destruction of 203 grounded aircraft as well as 413 in air combat; (b) the strikes of 10-18 and 30 July, and (c) the final operations of 9-15 August. In the latter two periods 762 grounded enemy aircraft were destroyed in this area alone. Over half the enemy aircraft destroyed by the Navy in or over Japan, were in the Tokyo area. (See Table 26D).

In the Kyushu-Kure area, the next most heavily attacked, the offensive effort was spread over five months, though the heaviest concentrations were in March and May, in strikes aimed at breaking up enemy air concentrations capable of being employed against Okinawa. The April offensive involved also the strikes against the YAMATO and her escorts, which resulted in destroying the bulk of that suicide naval force.

Central Honshu, including the Kobe-Osaka (Inland Sea) area, and the Nagoya area, was attacked heavily only during the short period of 24-30 July. Half of the bombing effort was directed against shipping.

Hokkaido, and the adjacent tip of Honshu, were attacked only on 14-15 July and 9-10 August.

(Cont. on next page)

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TABLE 32. Continued

D. JAPANESE HOME ISLANDS

MONTH	CARRIER-BASED ATTACKS				LAND-BASED ATTACKS			
	LAND TARGETS		SHIPPING TARGETS		LAND TARGETS		SHIPPING TARGETS	
	Sorties	Tons of	Sorties	Tons of	Sorties	Tons of	Sorties	Tons of
	Attacking	Bombs on	Attacking	Bombs on	Attacking	Bombs on	Attacking	Bombs on
	Targets	Targets	Targets	Targets	Targets	Targets	Targets	Targets
KYUSHU, KURE AREA	4,329	1,357	1,688	914	630	126	211	83
1945 - March	1,761	527	407	182	0	0	4	1
April	233	22	313	216	21	11	28	11
May	1,570	651	30	0	13	7	24	13
June	341	54	0	0	123	17	34	17
July	424	103	938	516	336	82	80	29
August	0	0	0	0	137	9	41	12
CENTRAL HONSHU	1,911	539	920	481	23	0	100	18
1945 - February	205	81	36	0	0	0	0	0
March	87	1	97	34	0	0	10	1
April	0	0	0	0	1	0	15	0
May	8	0	8	5	11	0	29	8
June	0	0	0	0	0	0	23	7
July	1,508	409	779	442	0	0	21	2
August	103	48	0	0	11	0	2	0
TOKYO AREA	5,782	1,894	865	283	12	7	147	27
1945 - February	1,339	285	244	10	0	0	0	0
March	0	0	0	0	0	0	12	0
April	0	0	0	0	0	0	11	3
May	0	0	0	0	3	1	26	4
June	0	0	0	0	5	3	34	7
July	2,100	736	366	156	0	0	56	11
August	2,343	873	255	117	4	3	8	2
HOKKAIDO, No. HONSHU	1,445	627	747	355	0	0	0	0
1945 - July	830	299	521	245	0	0	0	0
August	615	328	226	110	0	0	0	0
GRAND TOTAL	13,467	4,417	4,220	2,033	665	133	458	128

(Cont. from preceding page)

The heaviest carrier attacks on shipping in Jap home waters were on 21-28 July in the Inland Sea; in this series of strikes the bulk of the remaining Jap Navy was crippled.

Land-based Naval air attacks on Japan were carried out largely by Naval search planes, though Marine fighters from Okinawa were active against Kyushu from June on. Search plane targets were normally shipping, usually of the smaller types, along the coasts. It should be noted that the bomb tonnages expended in these attacks by single search planes are understated in the above table. Where such a plane dropped less than half a ton in an attack, it was recorded in the machine system as zero. Frequently 2 or 3 small bombs, and heavy strafing, were sufficient to destroy the small vessels encountered, and the remaining bombs of the usual load of a ton or less were saved for other targets that might be found.

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TABLE 33. NAVAL AND MARINE AIR ATTACKS ON PRINCIPAL CENTRAL PACIFIC
ISLAND GROUPS (LAND-BASED AND CARRIER-BASED COMBINED)
Sorties Attacking, and Tons of Bombs Expended, on Land Targets Only, Monthly

MONTH	WAKE, MARCUS		GILBERTS, NAURU#		MARSHALLS		EASTERN CAROLINES		WESTERN CAROLINES		MARIANAS		BONINS	
	S	T	S	T	S	T	S	T	S	T	S	T	S	T
1942 - February	45*	18			77	30								
March	24*	6			0	0								
1943 - June	0	0	6	5	0	0								
July	0	0	6	6	0	0								
August	261*	114	0	0	0	0								
September	0	0	165*	85	0	0								
October	775*	319	5	2	6	1								
November	0	0	1515*	551	424*	193	5	5						
December	0	0	133*	60	114*	13	3	2						
1944 - January	17	20	5	5	2218*	807	16	9						
February	21	22	4	3	2363*	924	452*	110			214*	55		
March	8	4	1	1	971*	483	63	12	809*	160	0	0		
April	1	0	1	2	1526	604	2064*	790	465*	157	10	0		
May	690*	283	9	6	2147	831	170*	49	3	0	20	0		
June	0	0	42	22	1674	401	30	9	2	0	6617*	2058	491*	129
July	0	0	12	11	2332	747	25	15	1897*	573	9722*	3305	614*	178
August	12	8	135	126	2895	1225	41	9	14	4	398*	102	304*	94
September	61*	34	13	11	1620	724	1	0	6142*	1769	285	56	426*	183
October	6	4	3	0	1468	801	60	30	859	258	392	15	4	1
November	23	22	54	19	1164	609	118	57	1228*	262	503	74	12	1
December	18	19	18	19	890	624	87	37	567	150	406	193	9	2
1945 - January	10	12	20	20	479	256	0	0	983	246	27	0	2	0
February	1	0	0	0	33	15	80	33	1536	217	8	0	3102*	849
March	46	78	0	0	241	129	89	58	1468	397	3	0	1132*	232
April	9	19	0	0	196	119	23	16	725	256	6	0	0	0
May	21	34	0	0	438*	227	9	12	896	329	5	0	3	0
June	393*	169	0	0	526	256	7	6	879	339	5	0	0	0
July	153*	31	12	3	418	331	19	10	907	415	42*	4	0	0
August	193*	59	0	0	126	76	18	8	174	89	0	0	0	0
1942-1943 Total	1107	457	1830	709	621	237	8	7	0	0	0	0	0	0
1944 Total	857	416	297	225	21268	8780	3127	1127	11986	3333	18567	5858	1860	588
1945 Total	826	402	32	23	2457	1409	245	143	7568	2288	96	4	4239	1081
GRAND TOTAL	2790	1275	2159	957	24346	10426	3380	1277	19554	5621	18663	5862	6099	1669

S - Sorties attacking land targets.

T - Tons of bombs expended on land targets.

After December 1943 all attacks were on Nauru.

* Denotes months during which carrier strikes were made.

NOTES TO TABLE 33

Shown above is the Naval and Marine offensive air effort against enemy land targets along the Central Pacific line of advance, and against islands fringing the route.

Wake and Marcus are of the least importance. They were used mainly as targets for training raids by new carriers and air groups reporting to the Fleet, although most of these missions were also timed for diversionary effect, and in addition succeeded in making the islands militarily ineffective as air bases. All months of heavy activity against these islands involved carrier raids; Wake was otherwise attacked only by PB2Ys from Midway, and PB4Ys and PVs from Eniwetok, and Marcus by a few PB4Ys from the Marianas. Some 600 Japanese were killed by air attack on Wake during the war, and 1,300 more died of disease or starvation as a result of the enemy's unwillingness to expose ships to attack by sending in supplies to the garrison.

Against the Gilberts the bombing campaign was short and heavy, and confined largely to the

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actual invasion period in November 1943, following a small but effective one-day raid on Tarawa in September. All subsequent activity in the Gilberts column represents attacks on Nauru (and Ocean Island); a carrier raid in December 1943, and strikes by PVs from Tarawa thereafter, for the purpose of neutralizing the air base to prevent its use to reconnoiter our activity in the Marshalls.

The Marshalls air campaign was an extended one. It began with carrier attacks in November 1943 to neutralize the Marshalls air bases during the Gilberts campaign; it continues with a carrier strike on Kwajalein in December; and was followed by heavy poundings from the entire carrier force supporting the landings on Kwajalein and Eniwetok in January and February 1944. Thereafter Marine and Navy fighters, dive bombers and patrol bombers took over the job of completely destroying the airfields in the four remaining Jap-held islands, and destroying all remaining enemy installations and supplies. To this task a substantial force, operating from Majuro and Kwajalein, was devoted during the remainder of the war. The offensive reached its peak during August of 1944 and declined thereafter. About 2,300 of the 13,000 Japanese personnel on these four islands were killed by air attack; another 4,500 died of disease or starvation as a result of the air blockade maintained.

Against the Eastern Carolines the bulk of the Navy's offensive consisted of two 2-day carrier strikes on Truk in February and April 1944, followed by a small carrier attack on Ponape. Marine F4Us from Eniwetok thereafter made occasional attacks on Ponape, and Navy searchplanes from time to time bombed Kusaie, Ponape, the Nomoi Islands and Truk.

The Western Carolines were the victims of a carrier raid on Palau, Yap and Woleai during the period 30 March - 1 April 1944, a further heavy raid on Palau and Yap in July 1944, and intensive carrier operations supporting the Marine and Army landings on Peleliu and Angaur in September 1944. In the latter part of that month Marine fighters and torpedo bombers based at Peleliu took over the direct support duty from the carriers, and after Peleliu was secured they maintained a steady volume of neutralizing attacks on the extensive enemy forces on the remaining islands of the Palau and Yap groups until the end of the war. Woleai also received occasional attacks from Navy search planes based at Manus and Guam.

The Naval pre-invasion and amphibious support campaign in the Marianas was the Pacific's heaviest, except for Okinawa, in terms of close support missions flown and bomb tonnage and strafing delivered with low altitude accuracy. It extended over a period of 8 weeks, from the initial strikes preceding the landing on Saipan, to the conclusion of organized resistance on Tinian and Guam. Subsequent activity by land-based Marine fighters in the Marianas was confined to neutralization missions against the two remaining Japanese airfields on Rota and Pagan.

The carrier campaign against the Bonins was one of the longest of the Pacific war, and was unusual in that the first strikes preceded the landings on Iwo Jima by 10 months. The five strikes of June-September 1944 were primarily directed toward nullifying the value of Iwo as an air base, as well as driving major shipping from the area and destroying naval base facilities at Chichi Jima. These operations succeeded in all these purposes; 418 enemy planes were destroyed during their course, and relatively few planes or major vessels were found in the area thereafter.

In the following five months Naval aviation left the Bonins strictly alone, except for occasional search plane attacks. In February of 1945 the Marine invasion of Iwo was supported for several days by the entire fast carrier force, and for three weeks by a substantial CVE force. Its success completed the chain of bases across the Central Pacific.

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TABLE 34. SORTIES ATTACKING SHIP TARGETS, MONTHLY, 1944.
By Area, Carrier-Based and Land-Based (Pacific Only)

MONTH	SOLOMONS, BISMARCKS		NEW GUINEA, HALMAHERA		BORNEO CELEBES		MARSHALLS		EASTERN CAROLINES		WESTERN CAROLINES	
	C	L	C	L	C	L	C	L	C	L	C	L
January	91	263		15			626	133				
February	1	316		22			89	15	1021	17		
March	3	515		26			21	80	0	12	1151	0
April		172	305	15				77	341	42	10	6
May		140		7				95	16	9	0	6
June		55		7			122			10	0	6
July		126		23	2		21		16		279	2
August		81		9	23		51		1		0	2
September		79	64	21	36		68		1		563	28
October		236		0	32		52		12		0	253
November		178		0	37		110		14		0	279
December		10		7	39		159		5		0	181
TOTAL	95	2171	369	152	169		736	981	1378	139	2003	763

MONTH	MARIANAS		BONINS		PHILIPPINES		FORMOSA, RYUKYUS	OTHER AREAS	TOTAL ALL AREAS	
	C	L	C	L	C	L	C	C, L	C	L
January								0	717	411
February	150							0	1261	370
March								0	1175	633
April								11	665	314
May								43	58	258
June	1010	5	110	1				0	1120	206
July	87	0	378	16		1		2	744	209
August		0	621	2		3		24	621	196
September		0	41	10	2300	33		24	2978	290
October		13		16	2737	47	1526	7	4263	666
November		0		15	1958	55		5	1958	693
December		3		14	501	204		4	501	626
TOTAL	1247	21	1150	74	7496	343	1526	120	16061	4872

C - Carrier-based sorties.
L - Land-based sorties.

NOTES TO TABLES 34 AND 35

The bulk of Naval air attack on shipping prior to 1944 is covered by the data for the Solomons-Bismarcks campaign, in Table 32A. Enemy shipping had also been attacked and driven from the Midway area and Eastern New Guinea in 1942, the Aleutians and the Gilberts in 1943. In 1944 the mobile carrier force, and Navy searchplanes operating from new bases won in campaigns spearheaded by the carriers, extended the area untenable for Japanese shipping to 10 additional sectors of the Pacific, including the Philippines, Formosa and the Ryukyus, and the Bonins. In 1945 Naval aviation extended the untenable area to include the entire Pacific and its connecting waters, with the sole exceptions of the Sea of Okhotsk, the Japan Sea, and the southernmost waters of the N.E.I..

Tables 34 and 35 show the progressive movement of naval air shipping attack across the Pacific. In most areas there is a standard progression: (1) a heavy carrier strike wiping out most of the major vessels in the area, followed by withdrawal of the remainder by the enemy; (2) the substitution of smaller vessels to run the loose blockade established by Naval searchplanes from new bases bordering the area, and a period of busy attack activity by these planes; (3) a steady decrease in patrol plane attacks as all shipping disappears from the area. Variations from the pattern occur. In some cases the searchplanes preceded the carriers, or carrier strikes were not needed (Korea, China, Borneo); in some cases fighter bases were established in the area and used to conduct an intensive campaign against coastal barges and small craft as

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TABLE 35. SORTIES ATTACKING SHIP TARGETS, MONTHLY, 1945
By Area, Carrier-Based and Land-Based

MONTH	JAPAN		RYUKYUS		BONINS		FORMOSA		PHILIPPINES		CAROLINES MARSHALLS
	C	L	C	L	C	L	C	L	C	L	L
January	0	0	53	8	0	32	961	17	387	104	184
February	280	0	0	23	169	9		26		107	145
March	504	26	868	37	24	15		23		38	91
April	313	54	522	10	2	5		29		15	63
May	38	79	172	23		7		25		10	67
June	0	91	47	105		3		26			5
July	2604	157	0	62		4		17			32
August	481	51	0	20		0		10			7
TOTAL	4220	458	1662	288	195	75	961	173	387	274	594

MONTH	KOREA, NO. CHINA	CENTRAL CHINA	SOUTH CHINA		INDO CHINA, MALAYA		BORNEO, CELEBES	OTHER AREAS	TOTAL, ALL AREAS	
	L	L	C	L	C	L	L	C, L	C	L
January	0	0	294	4	645	0	6	8	2345	358
February	0	0		22		18	10	3	449	363
March	2	16		57		11	21	2	1396	339
April	13	23		46		17	41	0	837	316
May	84	8		42		34	67	3	210	449
June	104	24		28		22	21	11	47	440
July	60	31		21		32	13	4	2608	429
August	19	4		12		13	12	19	489	159
TOTAL	282	106	294	232	645	147	191	50	8381	2853

C - Carrier-based sorties.

L - Land-based sorties.

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well as ocean-going shipping, as in the Solomons, Marshalls, and Palau areas. But the eventual exhaustion of targets always came.

The Solomons-Bismarcks anti-shipping campaign ran out of ocean-going target vessels in March of 1944, and for the rest of that year was directed at barges. The New Guinea campaign was initially a Black Cat and subsequently a PB4Y enterprise, in which the carriers assisted while supporting the Hollandia and Morotai landings. In the Marshalls and Western Carolines the land-based attacks were all, after the month of the last carrier attacks, directed against barges and small boats useful for inter-island transportation of food and supplies for the enemy garrisons. The same was largely true of the land-based attacks in the Philippines. In the other areas most of these attacks were by patrol planes on ships of ocean-going types.

The geographical extent of these attacks, and their volume, can be seen from the tables. At one time or another Navy VPB were making at least 20 and up to 100 individual attacks on ships per month in each of the following areas:

New Guinea	Formosa
Borneo, Celebes	Japan
Eastern Carolines	Korea, No. China
Bonins	Central China
Philippines	Indo China, Malaya
Ryukyus	

It can be seen that the effect of these many small, accurate attacks, spread throughout each area and throughout each month, while different from the crushing blows administered by carrier forces against concentrations of ships, could most effectively disrupt shipping movements and destroy a large number of vessels. Particular attention is invited to the VPB attacks on shipping in the waters of Japan, Korea and the entire Asiatic Coast from March 1945 to the end

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of the war. These attacks, largely by PB4Ys and PBMs, singly and in pairs, achieved an average volume of 400 per month during this period.

Of the carrier attacks, particularly important are those in Formosa and the Philippines during September-November 1944, which completely broke up enemy reinforcement of the archipelago and accounted for a major part of the Jap Navy as well as substantial merchant tonnages (See Appendix). The progressive series of attacks through the Marshalls, Eastern and Western Carolines, Marianas and Bonins, from January to August 1944, while their combined volume was less than that of the Philippines anti-shipping campaign, were also important both in tonnage sunk and in size of ocean area cleared of the enemy.

In 1945 three carrier campaigns are outstanding: the January sweep of the entire South China Sea from Formosa to Indo China, the March strikes on Kyushu and the Ryukyus, and the heavy July offensive against the last Japanese shipping refuge - the Inland Sea - which crippled the remnants of the enemy's combat and merchant fleets.

DATE	TYPE	NO. OF SHIPS	TONNAGE	STATUS	REMARKS
1944-01-01	Carrier	1	10,000	Sunk	Formosa
1944-01-15	Carrier	2	20,000	Sunk	Formosa
1944-02-01	Carrier	3	30,000	Sunk	Formosa
1944-02-15	Carrier	4	40,000	Sunk	Formosa
1944-03-01	Carrier	5	50,000	Sunk	Formosa
1944-03-15	Carrier	6	60,000	Sunk	Formosa
1944-04-01	Carrier	7	70,000	Sunk	Formosa
1944-04-15	Carrier	8	80,000	Sunk	Formosa
1944-05-01	Carrier	9	90,000	Sunk	Formosa
1944-05-15	Carrier	10	100,000	Sunk	Formosa
1944-06-01	Carrier	11	110,000	Sunk	Formosa
1944-06-15	Carrier	12	120,000	Sunk	Formosa
1944-07-01	Carrier	13	130,000	Sunk	Formosa
1944-07-15	Carrier	14	140,000	Sunk	Formosa
1944-08-01	Carrier	15	150,000	Sunk	Formosa
1944-08-15	Carrier	16	160,000	Sunk	Formosa
1944-09-01	Carrier	17	170,000	Sunk	Formosa
1944-09-15	Carrier	18	180,000	Sunk	Formosa
1944-10-01	Carrier	19	190,000	Sunk	Formosa
1944-10-15	Carrier	20	200,000	Sunk	Formosa
1944-11-01	Carrier	21	210,000	Sunk	Formosa
1944-11-15	Carrier	22	220,000	Sunk	Formosa
1944-12-01	Carrier	23	230,000	Sunk	Formosa
1944-12-15	Carrier	24	240,000	Sunk	Formosa
1945-01-01	Carrier	25	250,000	Sunk	Formosa
1945-01-15	Carrier	26	260,000	Sunk	Formosa
1945-02-01	Carrier	27	270,000	Sunk	Formosa
1945-02-15	Carrier	28	280,000	Sunk	Formosa
1945-03-01	Carrier	29	290,000	Sunk	Formosa
1945-03-15	Carrier	30	300,000	Sunk	Formosa
1945-04-01	Carrier	31	310,000	Sunk	Formosa
1945-04-15	Carrier	32	320,000	Sunk	Formosa
1945-05-01	Carrier	33	330,000	Sunk	Formosa
1945-05-15	Carrier	34	340,000	Sunk	Formosa
1945-06-01	Carrier	35	350,000	Sunk	Formosa
1945-06-15	Carrier	36	360,000	Sunk	Formosa
1945-07-01	Carrier	37	370,000	Sunk	Formosa
1945-07-15	Carrier	38	380,000	Sunk	Formosa
1945-08-01	Carrier	39	390,000	Sunk	Formosa
1945-08-15	Carrier	40	400,000	Sunk	Formosa
1945-09-01	Carrier	41	410,000	Sunk	Formosa
1945-09-15	Carrier	42	420,000	Sunk	Formosa
1945-10-01	Carrier	43	430,000	Sunk	Formosa
1945-10-15	Carrier	44	440,000	Sunk	Formosa
1945-11-01	Carrier	45	450,000	Sunk	Formosa
1945-11-15	Carrier	46	460,000	Sunk	Formosa
1945-12-01	Carrier	47	470,000	Sunk	Formosa
1945-12-15	Carrier	48	480,000	Sunk	Formosa
1946-01-01	Carrier	49	490,000	Sunk	Formosa
1946-01-15	Carrier	50	500,000	Sunk	Formosa

4. Attack Data, by Type of Target Attacked

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OFFENSIVE AIR EFFORT DIRECTED AGAINST EACH MAJOR
TYPE OF TARGET, BY YEARS

TYPE OF TARGET	SORTIES ATTACKING TARGETS					TONS OF BOMBS ON TARGETS				
	1942	1943	1944	1945	TOTAL	1942	1943	1944	1945	TOTAL
<u>CARRIER-BASED ATTACKS</u>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>LAND TARGETS</u>	52.3	87.3	76.9	86.5	81.2	38.5	83.1	76.8	84.4	80.0
Airfields	14.0	42.4	23.5	42.5	32.5	9.8	39.3	19.0	37.3	28.3
Other Military Targets	29.6	41.8	48.2	33.4	41.1	25.5	41.2	53.3	36.4	44.4
Land Transportation	0.4	0.0	2.0	2.8	2.3	0.6	0.0	1.4	2.7	1.9
Harbor Areas	1.3	2.4	0.7	3.1	1.8	1.1	1.8	0.8	3.3	2.0
Other and Unknown Land	7.0	0.7	2.5	4.7	3.5	1.5	.8	2.3	4.7	3.4
<u>SHIPPING TARGETS</u>	47.7	12.7	23.1	13.5	18.8	61.5	16.9	23.2	15.6	20.0
Armored Warships	33.3	6.0	2.9	2.8	3.4	47.7	9.1	4.5	5.0	5.6
Unarmored Warships	3.3	1.4	3.0	2.1	2.5	2.1	2.2	2.6	2.2	2.4
Merchant, Over 500 Tons	8.1	4.4	12.1	5.6	8.9	9.9	5.3	13.9	6.5	10.0
Merchant, Under 500 Tons	1.3	0.9	4.7	2.8	3.6	0.7	0.3	1.6	1.5	1.5
Unknown Shipping*	1.7	0.0	0.4	0.2	0.4	1.1	0.0	0.6	0.4	0.5
<u>LAND-BASED ATTACKS</u>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<u>LAND TARGETS</u>	42.2	88.0	91.8	94.1	91.6	34.7	89.3	94.9	97.1	94.6
Airfields	6.7	36.4	13.2	12.5	15.1	4.0	38.7	15.5	14.8	18.0
Other Military Targets	29.5	46.1	71.8	67.1	66.9	28.3	45.9	74.1	70.9	68.8
Land Transportation	0.6	0.6	3.3	5.6	3.9	0.0	0.4	2.5	4.5	3.1
Harbor Areas	4.5	3.7	0.8	4.9	2.7	2.2	2.9	0.9	4.2	2.5
Other and Unknown Land	0.9	1.2	2.7	4.0	3.0	0.2	1.4	1.9	2.7	2.2
<u>SHIPPING TARGETS</u>	57.8	12.0	8.2	5.9	8.4	65.3	10.7	5.1	2.9	5.4
Armored Warships	16.2	0.2	0.0	0.0	0.3	24.6	0.4	0.1	0.0	0.3
Unarmored Warships	17.6	3.7	0.4	0.3	0.9	14.9	3.5	0.4	0.2	0.8
Merchant, Over 500 Tons	14.6	2.2	1.9	1.1	1.8	20.2	3.4	1.8	0.9	1.8
Merchant, Under 500 Tons	9.1	3.8	5.4	4.4	4.9	5.0	0.5	1.9	1.4	1.6
Unknown Shipping*	0.3	2.1	0.5	0.1	0.5	0.6	2.9	0.9	0.4	0.9

* Including minelaying.

NOTES TO TABLE 36

This is the first of a series of tables breaking down the Naval air offensive by types of target attacked, regardless of geographical location of the target. For the most part this series contains data only on number of sorties attacking targets, and bomb tonnage expended. Data on types of bombs, and on rockets, ammunition and torpedoes expended on various types of targets, will be found in the next section of the report.

Table 36 shows where carrier-based and land-based offensive effort was directed in each year of the war. Noteworthy is the concentration of both carrier and land-based offensives on enemy shipping, particularly heavy warships, during the first year of the war, and the increased emphasis on land targets thereafter. Enemy airfields came in for heavy attention in 1943, received less attention in 1944, but in 1945, to counter the kamikaze menace, became the principal carrier target again. In 1943 military installations became the primary target of land-based planes; and except for the attacks by VPB, shipping targets became of continuously less importance for land-based planes.

For the carriers, shipping remained an important target until the end of the war, though most important in 1944 because of dwindling opportunities for major attacks thereafter. For land-based planes most shipping attacks after 1944 were on small vessels, the only types ordinarily within range.

The table makes clear that Naval aviation's most important offensive function in terms of volume was reduction of enemy ground defenses, in direct support of our own ground forces or before their arrival in the landing area. Second in importance was destruction or neutralization

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of enemy air force installations, and planes on the ground. Third was destruction of enemy warships and merchant vessels, particularly of the larger types. Miscellaneous land targets, including transportation, harbor and industrial areas, were attacked in the least volume.

It may be noted that airfields (in attacks by carrier planes) and small merchant vessels generally receive a lower share of the total bomb tonnage than of the attack sorties, while military targets and heavy warships received more tonnage. This results from extensive use of VF rockets and strafing against the first and lighter classes of targets, and maximum bomber forces and heavy bomb loads against the heavier targets.

NOTES TO TABLE 37

This table illustrates the offensive uses made of the various models of aircraft. Attention is invited to;

- (a) The extensive use of the carrier F6F and F4U against airfields, and of the F6F against merchant shipping. The FM, based on CVEs, was used primarily against military targets in air-ground support operations.
- (b) The heavy use of carrier VSB (25% of total attack sorties) against shipping, and especially against heavy warships. The use of carrier VTB against shipping, and against airfields, is reduced by inclusion in the figures of CVE VTB which engaged primarily in air-ground support operations.
- (c) The predominant use of land-based VF and VSB against military targets. The land-based VTB data indicate a heavy use against airfields largely because their offensive use was principally in the Solomons campaign of 1943 and early 1944, when airfields were the principal target. Note also the extensive use of land-based VF against small vessels, largely barges in the Solomons and Marshalls areas.
- (d) The heavy use of the PBJ and PV against land targets, contrasted with the primary employment of other VPB against merchant shipping.

See also Table 38, for more detailed data for 1944 only.

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TABLE 37. SORTIES ATTACKING TARGETS, BY PLANE MODEL
AND TYPE OF TARGET ATTACKED, FOR ENTIRE WAR
With Percentages for Each Type of Aircraft, Carrier and Land-Based

BASE, PLANE MODEL	AIR- FIELDS	OTHER MILI- TARY TARGETS	LAND TRANS- PORTA- TION	HARBOR AREAS	OTHER & UN- KNOWN LAND	WARSHIPS		MERCHANTMEN		SHIPS, TYPE UN- KNOWN*	TOTAL
						Ar- mored	Unar- mored	Over 500 Tons	Under 500 Tons		
CARRIER-BASED											
F6F	22,716	19,111	1,258	958	1,594	1,013	1,779	5,473	2,965	185	57,052
F4U, FG	4,115	1,869	171	275	489	263	140	472	195	4	7,993
FM	2,334	7,281	559	180	536	203	122	170	523	5	11,913
F4F	129	211	0	24	97	20	32	26	12	12	563
SB2C, SBW	3,982	9,008	267	284	769	924	638	2,729	490	42	19,133
SBD	1,765	2,338	20	37	86	639	157	726	77	57	5,902
TBF, TBM	9,750	16,842	859	725	1,272	1,511	638	2,626	773	183	35,179
TBD	27	0	0	0	0	107	0	35	0	0	169
LAND-BASED											
F4U, FG	6,095	30,901	2,647	1,820	1,688	0	105	327	2,977	19	46,579
F6F	359	1,482	22	94	690	0	0	32	245	4	2,928
F4F, FM	39	76	0	50	3	12	87	17	35	0	319
U/i VF	39	12	0	0	0	0	0	0	0	0	51
SBD	5,368	34,075	1,365	484	689	155	471	483	759	41	43,890
SB2C, SBW	194	1,758	41	85	21	0	0	0	96	0	2,195
SB2U	0	0	0	0	0	17	0	0	0	0	17
TBF, TBM	2,695	5,570	216	385	129	88	140	290	78	250	9,841
PBJ	2,309	4,875	257	209	269	0	18	97	70	25	8,129
PV	621	1,303	17	56	63	0	28	43	249	52	2,432
PB4Y	411	482	181	102	104	5	132	492	1,055	91	3,055
PBY	131	484	7	46	22	16	60	214	202	89	1,271
PBM	15	76	1	1	2	6	34	115	169	5	424
PB2Y	50	15	0	0	1	0	1	18	14	13	112
U/i VPB	8	11	0	0	7	0	0	3	3	8	40
PERCENTAGES, BY PLANE TYPE:											
Carrier VF	37.8	36.7	2.6	1.8	3.5	1.9	2.7	7.9	4.8	0.3	100.0
Carrier VSB	22.9	45.3	1.1	1.3	3.4	6.3	3.2	13.8	2.3	0.4	100.0
Carrier VTB	27.6	47.7	2.4	2.1	3.6	4.6	1.8	7.5	2.2	0.5	100.0
Land-Based VF	13.1	65.1	5.4	3.9	4.8	0.0	0.4	0.8	6.5	0.0	100.0
Land-Based VSB	12.1	77.7	3.0	1.2	1.5	0.4	1.0	1.1	1.9	0.1	100.0
Land-Based VTB	27.4	56.6	2.2	3.9	1.3	0.9	1.4	3.0	0.8	2.5	100.0
VPB, 2/E Land	27.8	58.5	2.6	2.5	3.2	0.0	0.4	1.3	3.0	0.7	100.0
VPB, 2/E Sea	8.9	32.9	0.5	2.7	1.8	1.3	5.4	19.1	21.5	5.9	100.0
VPB, 4/E	14.5	15.7	5.7	3.2	3.3	0.2	4.2	16.1	33.8	3.3	100.0

* Including minelaying.

PV U/F 77.5
 VSB-VTB 55.4
 127.5 988 77
 111.5 858 77 Land U/F 49.9
 VSB-VTB 56
 VPB 15.4
 AA Loss 756
 672
 232
 186
 136
 76
 97
 1.20
 .46
 .33
 0.88

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TABLE 38. SORTIES ATTACKING TARGETS, BY DETAILED TARGET TYPE
AND BY PLANE MODEL, CARRIER-BASED AND LAND-BASED, 1944 ONLY

TYPE OF TARGET	CARRIER-BASED					LAND-BASED					TOTAL
	CV-CVL			CVE							
	F6F	SBD SB2C	TBF TBM	FM F6F	SBD TBF	F4U F6F	SBD	TBF TBM	PBJ	Other VPB	
Grounded Aircraft	5285	1029	800	518	87	219	9	7	42	65	8,061 16,268
Airfield Runways	3906	2116	2101	392	194	2826	2169	944	817	803	
Defense Installations, Guns	6777	3622	2459	1967	1252	9403	9405	1703	221	790	37,599
Personnel and Bivouac Areas	900	490	692	1193	664	4823	2066	442	664	315	12,249
Buildings, Storage Areas*	5080	3620	3083	1158	628	6675	4446	559	851	531	26,631
Docks and Waterfront	228	81	110	23	17	227	120	18	26	85	935
Roads, Bridges, Vehicles	398	151	116	641	101	1268	523	115	36	20	3,369
Other and Unknown Land	675	349	303	214	225	1209	140	25	150	89	3,379
Armored Warships	572	534	422	233	250	0	0	2	0	11	2,024
Unarmored Warships	1153	530	290	105	26	78	47	22	3	82	2,336
Merchant, Over 500 Tons	3797	2714	1654	191	69	330	176	171	20	418	9,540
Merchant, Under 500 Tons	1899	450	377	432	114	2078	567	59	33	481	6,490
Ships, Type Unknown#	126	54	117	5	1	12	38	32	17	184	586
Total Land Targets	23249	11458	9664	6106	3168	26650	18878	3813	2807	2698	108,491
Total Ship Targets	7547	4282	2860	966	460	2498	828	286	73	1176	20,976
TOTAL ALL TARGETS	30796	15740	12524	7072	3628	29148	19706	4099	2880	3874	129,467

* Including airfield buildings and buildings of unidentified types, but excluding barracks.
Including minelaying.

NOTES TO TABLE 38

This table presents the additional target detail available for 1944 only, plus a division of the carrier-based offensive between fast carriers and CVEs, and thus illustrates in more detail the employment of various models of carrier aircraft. Among items worthy of note are:

- The concentration of fast carrier F6Fs on parked aircraft, while the bombers concentrated on runways and other airfield installations.
- The fast carrier emphasis on the larger land targets, as contrasted with the CVE emphasis on personnel, guns and vehicles.
- The CVEs' concentration of 75% of their offensive effort on land targets other than airfields, against the fast carriers' 50%.
- The fast carriers' 25% on shipping targets, against the CVEs' 13%, much of the latter representing the Leyte Gulf battle.
- The fast carriers' 25% on airfields, against the CVE's 11%.
- The dearth of grounded aircraft, warships, and large merchant vessels available for attack by land-based planes other than VPB.
- The predominant neutralization nature of the employment of land-based VF, VSB, VTB, and PBJs (PVs and PBVs to a lesser extent); in 1944 these plane types were used primarily against by-passed enemy bases in the Solomons, Bismarcks, Marshalls and Western Carolines. Typical is the concentration on airfield runways, defenses, guns, personnel, transportation, and small craft.

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TABLE 39. ATTACKS, AND ORDNANCE EXPENDITURES ON TARGETS,
BY ALL CARRIER-BASED AND LAND-BASED AIRCRAFT, 1944 ONLY.
By Detailed Type of Target

TYPE OF TARGET	CARRIER-BASED ATTACKS				LAND-BASED ATTACKS			
	SORTIES ATTACKING TARGETS	EXPENDITURES		M.G. AMMO.*	SORTIES ATTACKING TARGETS	EXPENDITURES		M.G. AMMO.*
		TONS OF BOMBS	ROCKETS			TONS OF BOMBS	ROCKETS	
Grounded Aircraft	7,719	1,084	3,699	2,243	342	87	0	122
Airfield Runways	8,709	3,024	1,002	3,135	7,559	3,809	136	1,282
Defense Installations, Guns	16,077	5,014	6,413	6,095	21,522	9,704	240	4,274
Personnel and Bivouac Areas	3,939	1,262	2,987	1,523	8,310	3,320	72	2,841
Buildings, Storage Areas #	13,569	5,250	5,380	4,263	13,062	5,590	376	3,832
Docks and Waterfront	459	168	309	136	476	217	6	94
Roads, Bridges, Vehicles	1,407	299	1,119	593	1,962	619	0	652
Industrial Facilities	681	249	452	209	77	19	0	27
Urban Areas	544	166	112	152	1,107	394	0	303
Other and Unknown Land	541	86	246	57	429	69	24	27
Armored Warships	2,011	973	780	454	13	14	0	2
Unarmored Warships	2,104	573	617	642	232	94	8	74
Merchant, Over 500 Tons	8,425	3,011	2,805	1,805	1,115	463	102	452
Merchant, Under 500 Tons	3,272	347	897	840	3,218	475	127	786
Ships, Type Unknown @	303	125	12	69	283	232	58	23
Total Land Targets	53,645	16,602	21,719	18,406	54,846	23,828	854	13,454
Total Ship Targets	16,115	5,029	5,111	3,810	4,861	1,278	295	1,337
TOTAL ALL TARGETS	69,760	21,631	26,830	22,216	59,707	25,106	1,149	14,791

* In thousands of rounds expended on targets.

Including airfield buildings and buildings of unidentified types, but excluding barracks.

@ Including minelaying.

NOTES TO TABLE 39

This table sums up the data for 1944 given in Table 38, and provides additional figures on ordnance expenditures on targets.

The carrier emphasis on strafing and rocket attacks on grounded aircraft may be noted, together with the heavy volume of bombing attack on other airfield targets (Note that sorties classified as attacking primarily aircraft runways may have expended some of their bombs, and the bulk of their rockets and strafing fire, on grounded aircraft and airfield buildings and installations).

It may also be noted that carrier planes expended over 50% of their rockets and strafing fire, and land-based planes 75%, on military land targets.

The table illustrates the intensity of attack on large merchant vessels during 1944, the considerable volume of strafing attacks on small vessels, and the heavy tonnage per sortie against armored warships. Also of interest are the attacks on land transportation targets. The urban areas attacked included principally towns on Guam and Palau, and the cities of Davao and Naha. Industrial facilities included oil storage and manufacturing facilities in the Philippines and Formosa.

From the table may be calculated average ordnance expenditures per sortie against each type of target. Note, however, that rockets were not fully utilized during 1944.

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TABLE 40. ATTACKS ON SHIPPING, BY ALL NAVAL AND MARINE
CARRIER-BASED AND LAND-BASED AIRCRAFT
By Type of Ship Attacked, Monthly

MONTH	ARMORED WARSHIPS		UNARMORED WARSHIPS		MERCHANT SHIPS OVER 500 TONS		MERCHANT SHIPS UNDER 500 TONS		TOTAL, ALL TYPES*	
	Sorties Attack- ing	Tons of Bombs	Sorties Attack- ing	Tons of Bombs	Sorties Attack- ing	Tons of Bombs	Sorties Attack- ing	Tons of Bombs	Sorties Attack- ing	Tons of Bombs
1941 - December	4	-	23	-	5	5	2	-	34	5
1942 - January	-	-	-	-	3	-	-	-	3	-
February	35	18	1	-	37	11	-	-	73	29
March	29	11	-	-	56	29	-	-	85	40
April	-	-	4	1	-	-	2	-	6	1
May	166	114	18	7	36	18	-	-	220	139
June	289	109	26	6	3	3	1	-	319	118
July	-	-	1	-	-	-	-	-	1	-
August	50	28	13	4	22	12	11	5	99	52
September	46	23	23	8	4	9	101	17	174	57
October	150	76	146	50	43	16	21	2	360	144
November	123	77	51	7	164	70	2	1	373	163
December	13	10	35	12	16	6	27	7	93	35
1943 - January	-	-	54	20	48	26	24	5	127	51
February	-	-	72	40	33	69	1	1	106	110
March	-	-	-	-	-	-	-	-	95	95
April	1	1	-	-	14	12	17	1	32	14
May	-	-	22	10	8	6	-	-	127	97
June	-	-	15	4	-	-	3	3	18	7
July	18	18	222	134	40	23	30	3	310	178
August	-	-	19	26	42	30	35	3	96	59
September	-	-	2	1	4	3	87	1	93	5
October	-	-	8	1	47	18	110	8	166	27
November	179	105	45	28	64	39	123	7	455	207
December	86	63	42	26	150	110	63	13	345	217
1944 - January	36	27	123	67	670	141	167	19	1128	352
February	176	86	350	86	805	368	241	47	1631	607
March	64	24	146	41	918	313	547	80	1810	612
April	2	3	56	6	436	42	409	48	979	125
May	-	-	7	4	89	28	177	12	316	93
June	152	99	63	5	500	132	611	33	1326	269
July	-	-	76	25	402	146	471	82	952	255
August	68	21	230	96	276	95	272	55	867	270
September	34	6	419	78	1756	654	1035	102	3268	842
October	1405	653	404	111	1895	709	1215	136	4931	1609
November	90	65	341	127	1391	761	751	147	2651	1103
December	10	3	120	20	402	85	593	61	1127	169
1945 - January	29	15	530	201	1524	677	617	74	2700	967
February	11	3	97	3	264	59	441	17	813	82
March	159	93	375	114	570	176	631	107	1735	490
April	253	189	118	58	202	66	580	99	1153	412
May	2	4	20	15	155	76	470	84	661	181
June	2	-	14	9	116	35	302	55	487	186
July	1275	773	125	52	891	406	608	189	3040	1495
August	28	14	125	59	293	126	196	65	648	264
1941-42 Total	905	466	341	95	389	179	167	32	1840	783
1943 Total	284	187	501	290	450	336	493	45	1970	1067
1944 Total	2037	987	2335	666	9540	3474	6489	822	20986	6306
1945 Total	1759	1091	1404	511	4015	1621	3845	690	11237	4077
GRAND TOTAL	4985	2731	4581	1562	14394	5610	10994	1589	36033	12233

* Including ships of unknown types, and minelaying, not shown separately (total 1079 sorties, 741 tons).

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NOTES TO TABLE 40

This table is the monthly summary of all Naval air attack on enemy shipping. Comparison is invited between the attack effort expended, as shown above, and the monthly results accomplished, as shown in the Appendix.

It may be noted that merchant shipping received its first heavy weight of attack in February-March 1944, and was next attacked in the greatest force in the Philippines-China Sea campaigns of September 1944 - January 1945. Thereafter, only in July 1945 was enough shipping found to permit repetition of this scale of attack. It is also interesting to note that about half of the total Naval air offensive against armored warships was expended in three brief campaigns; the Leyte Gulf Battle of 24-26 October 1944, the Yamato attack on 7 April 1945, and the Inland Sea strikes of 18 July and 24-28 July 1945.

5. Ordnance Data

This section of the report consists of three separate groups of tables:

Tables 41-42, providing summary data on ordnance expenditures of all types, and average ordnance expended per attack.

Tables 43 to 49, giving data on bomb expenditures by type of bomb, with detail by plane type, target type, and operation.

Tables 50 to 54, giving data on rocket and ammunition expenditures, with detail by plane type, target type, and month.

a. Ordnance Expenditures, in General

NOTES TO TABLE 41

Naval and Marine aircraft during the war expended against the enemy nearly 103,000 tons of bombs, over 210,000 aircraft rockets, and about 85 million rounds of ammunition.

45% of the bomb tonnage, 87% of the rockets, and 60% of the ammunition were expended by carrier aircraft. Approximately 95% of the totals for carrier and land-based aircraft combined were expended in dive, glide or masthead bombing, rocket or strafing attack from altitudes of 50 to 5000 feet, usually 3500 feet or less. Thus the amounts expended are hardly comparable in tonnage terms with ordnance expenditures for air forces employing less accurate methods of attack. They may, however, generally be compared between types of Naval aircraft, since normally only the PBJ, of all Naval aircraft, employed horizontal bombing from altitudes of over 5000 feet as more than an occasional method of attack.

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TABLE 41. ATTACK SORTIES, AND ORDNANCE EXPENDED,
ON LAND AND SHIPPING TARGETS, FOR ENTIRE WAR
By Plane Model, Carrier-Based and Land-Based

BASE, PLANE MODEL	LAND TARGETS				SHIPPING TARGETS			
	Sorties Attack- ing Targets	Expenditures on Targets			Sorties Attack- ing Targets	Expenditures on Targets		
		Tons of Bombs	Rockets	Ammu- nition (1000)		Tons of Bombs	Rockets	Ammu- nition (1000)
CARRIER-BASED	111,938	36,542	165,532	42,529	25,966	9,117	17,037	7,665
F6F	45,637	5,093	59,420	25,895	11,415	901	10,997	5,257
F4U, FG	6,919	1,112	21,272	4,075	1,074	200	2,397	571
FM	10,890	143	27,287	6,376	1,023	5	1,050	611
F4F	461	6	0	*	102	0	0	*
SB2C, SBW	14,310	8,269	4,383	1,722	4,823	2,725	195	514
SBD	4,246	1,888	0	410*	1,656	636	0	93*
TBF, TBM	29,448	20,011	53,170	4,051	5,731	4,536	2,398	619
TBD	27	20	0	*	142	114	0	*
LAND-BASED	111,228	54,130	25,477	27,512	10,055	3,114	2,010	4,791
F4U, FG	43,151	14,107	14,809	14,600	3,428	204	390	944
F6F	2,647	504	892	638	281	11	28	85
F4F, FM	168	0	144	31*	151	0	0	*
U/i VF	51	14	0	0	0	0	0	0
SBD	41,981	19,733	144	6,581*	1,909	685	88	123*
SB2C, SBW	2,099	1,178	917	332	96	12	47	22
SB2U	0	0	0	*	17	4	0	*
TBF, TDM	8,995	7,454	4,486	1,087*	846	726	122	43*
PB4Y	1,280	689	0	898	1,775	714	0	2,910
PV	2,060	1,802	2,219	733	372	112	250	178
PBJ	7,919	7,966	1,866	2,471	210	35	1,085	28
PBY	690	544	0	75*	581	406	0	175*
PBM	95	57	0	54	329	147	0	268
PB2Y	66	56	0	12	46	41	0	15
U/i VPB	26	26	0	0	14	17	0	0
TOTAL	223,166	90,672	191,009	70,041	36,021	12,231	19,047	12,456

NOTE: Ammunition expenditure data do not cover the period prior to August 1943 in the case of carrier-based planes, or prior to October 1943 in the case of land-based planes. Expenditures were not generally given in action reports prior to these dates (nor were they completely reported thereafter, particularly by land-based VSB and VTB in the Solomons). It is estimated that between 2 and 3 million additional rounds were expended in strafing but not reported, of which approximately 80% was by land-based planes, and 80% against land targets. The lack of data for the early part of the war affects materially (5% or more) only the figures indicated by an asterisk (*). For other plane models the ammunition expenditure data are believed to be 95% or more complete.

The table above indicates that the TBF-TBM torpedo bomber, accounting for a total of over 32% of total bomb expenditures, and 29% of all rocket expenditures, was the Navy's principal carrier of heavy ordnance. All types of fighters combined carried less than 22% of the total bomb tonnage to target, though they flew half the attack sorties; however, they expended nearly 2/3 of all rockets, and 70% of all ammunition.

Dive bombers of all types combined carried a total of 34% of all Navy bomb tonnage, but were relatively negligible factors as rocket carriers. Patrol bombers (aside from the Marine PBJs, which carried 8% of total bomb tonnage) accounted for less than 5% of total bomb tonnage, and about 7% of the ammunition expenditures.

Most ammunition was expended against non-airborne targets. Data distinguishing such target expenditures from those in air combat are not available, but only 14,308 Naval planes engaged in air combat, some but briefly, or only 5% of a total of 284,073 action sorties involving 259,187 attacks on targets. It is estimated that not over 20% of all ammunition expenditures were in air combat, leaving a minimum of perhaps 70 million rounds expended on other targets.

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TABLE 42. SUMMARY OF BOMB, ROCKET, AND AMMUNITION EXPENDITURES,
By Model of Aircraft, Land-Based, and Carrier-Based by Type of Carrier,
1945 ONLY

BASE, PLANE MODEL	ACTION SORTIES	SORTIES ATTACKING TARGETS	TONS OF BOMBS ON TARGETS	ROCKETS ON TARGETS	ROUNDS OF AMMUNITION EXPENDED		AVERAGE EXPENDITURES PER ATTACK SORTIE		1000 Rounds Per Action Sortie#
					30-.50 (1000)	20 MM. (1000)	Bomb		
							Tons	Rockets	
CV-BASED									
F6F	17,383	13,830	2,069	29,136	8,891	7	.15	2.1	.51
F4U	9,130	7,591	1,231	22,107	4,688	135	.16	2.9	.53
SB2C	6,874	6,555	4,036	4,535	326	474	.62	0.7	.12
TBM	7,620	7,243	5,736	3,395	820	-	.79	0.5	.11
CVL-BASED									
F6F	6,513	5,414	1,013	15,582	3,905	-	.19	2.9	.60
TBM	3,069	2,970	2,399	1,869	385	-	.81	0.6	.13
CVE-BASED									
FM	8,479	7,651	89	28,277	4,616	-	.01	3.7	.54
F6F	2,826	2,721	612	10,402	1,654	-	.22	3.8	.59
F4U	443	402	81	1,562	275	6	.20	3.9	.63
TBM	7,829	7,574	4,332	38,878	1,284	-	.57	5.1	.16
LAND-BASED									
F4U	19,833	18,047	6,391	15,199	6,653	297	.35	0.8	.35
F6F	1,310	1,191	303	920	192	-	.25	0.8	.15
FM	28	27	0	144	31	-	*	*	*
SBD	17,471	17,013	8,125	0	2,940	-	.48	0.0	.17
SB2C	2,355	2,195	1,190	964	164	225	.54	0.4	.17
TBM	1,605	1,530	1,033	4,332	299	-	.68	2.8	.19
FB4Y	2,106	1,769	852	0	3,299	7	.48	0.0	1.57
PBJ	5,415	5,249	5,938	2,539	1,672	-	1.13	0.5	.31
PV	622	569	304	2,240	409	-	.53	3.9	.66
PBM	462	387	191	0	332	-	.49	0.0	.72
PB2Y	51	36	18	0	19	-	*	*	*
PBY	58	55	28	0	9	-	*	*	*
CARRIER TOTAL	70,166	61,951	21,598	155,743	26,844	622	.34	2.5	.39
LAND-BASED TOTAL	51,316	48,068	24,373	26,338	16,019	529	.51	.5	.32
GRAND TOTAL	121,482	110,019	45,971	182,081	42,863	1,151	.42	1.7	.36

All calibers combined.

* Not computed; less than 100 sorties.

NOTES TO TABLE 42

Because of the varying periods, conditions, and plane types involved, and the incompleteness of ammunition expenditure data for 1942-43, it has not been thought desirable to prepare data on average ordnance expenditures per attack covering the entire war as a whole. The above table provides such data for 1945 only. For the most part the 1945 performance in respect to ordnance expenditure per plane is believed superior to that for previous years.

Most significant item in the above table is the relatively low average bomb and rocket load expended by carrier VF per sortie attacking targets. It is also interesting to note that both the average bomb load and the average rocket load were greatest for CVE-based VF, least for CV-based VF. It would not appear from these data that maximum advantage was taken of the offensive ordnance-carrying capabilities of carrier VF, or that the fighter bomber successfully competed with the dive and torpedo bombers it displaced, so far as offensive use of heavy ordnance was concerned.

The table indicates that credit must be awarded to the CVE forces, for placing 750 lbs. of
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bombs and rockets on target per F6F attack, against less than 600 lbs. per CV F6F; for putting an average of 3 3/4 rockets on target per attacking fighter (against a per-plane capacity of 6, and a fast carrier average of 2 1/2); for placing over 5 rockets on target per TBM attacking, and a total bomb-and-rocket load per TBM nearly equal to the CV-CVL average; and for out-strafting CV and CVL planes of the same types.

The table indicates that land-based fighters, though free from the take-off limitations of the carrier VF, and less burdened by air combat, also did not average in practice the rocket and bomb carrying capabilities urged in behalf of VBF by advocates of the fighter-bomber; they carried more bombs but far fewer rockets than carrier fighters.

Carrier VSB and VTB in general averaged 80% or better of their standard maximum loadings of 1,500 lbs. and 2,000 lbs. respectively. CVE VTB carried less weight of bombs but made up for it with the largest average rocket loadings of any plane.

Land-based SBDs reported excellent loadings relative to their normal loadings; land-based SB2Cs and TBMs carried less ordnance than the same types on carriers.

PBJs, performing largely short-range bombing missions, generally carried their maximum loads of 1-1 1/2 tons, depending on type of bomb carried. Other types of VPB, usually flying long-range search, rarely tried to carry or expend full bomb loads on the targets of opportunity encountered, and often destroyed them with only a part of the load carried.

In ammunition expenditure the carrier fighter excelled, averaging 500 to over 600 rounds per action sortie, exceeded among major types only by the PB4Ys' 1,570 rounds - PB4Y strafing has set afire and destroyed many a small vessel and silenced many an A/A gun. The PV and PBM averaged less than half as many rounds per sortie, and single-engine bomber expenditures were consistently under 200 rounds. Land-based VF averaged only 60% as high a rate of expenditure as carrier VF, largely because the types of targets generally encountered were less vulnerable to strafing.

An interesting inquiry in the field of ordnance expenditures is the total weight of ordnance of all types expended on target per plane lost to anti-aircraft. This provides a rough measure of attack effectiveness against targets, although the limitations are obvious. The differing nature of the targets, and of the defenses of these targets, attacked by fast carrier, CVE, and land-based planes affect the figures. Also, tonnage measurements, while they may reflect with fair accuracy the effectiveness of rockets, probably do not do justice to the value of strafing fire. Subject to these limitations, the following figures are presented:

TONS OF ORDNANCE EXPENDED ON TARGET, PER
AIRCRAFT LOST TO ENEMY ANTI-AIRCRAFT FIRE, 1945 ONLY

Carrier Type, Plane Model		Tons of Ordnance Per A/A Loss	Land-Based Plane Model	Tons of Ordnance Per A/A Loss
CV	F6F	32.4	F4U	99.6
	F4U	25.6	F6F	56.0
	SB2C	43.1	SBD	647.6
	TBM	72.1	SB2C	440.3
			TBM	151.9
CVL	F6F	46.3	PB4Y	29.4
	TBM	71.4	PV	46.6
CVE	FM	44.9	PBJ	903.6
	F6F	77.2	PBM	21.2
	TBM	130.6		

NOTE: Rockets and ammunition added to bomb tonnage on basis of approximate weight of complete round (1000 .50 cal. rounds equal 250 lbs., etc.) Plane models expending less than 200 tons of ordnance in 1945 are excluded from the table.

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The relatively higher efficiency of the TBM over the SB2C is apparent above; the extent to which a lesser bombing accuracy may reduce its superiority is not known. The apparent relative ineffectiveness of VF is conditioned by the consideration that 50% or more of the total weight of ordnance carried by carrier VF was rockets or ammunition (20% to 30% was ammunition) which may have been more effective, ton for ton, than bombs.

The apparent CVE superiority over fast carriers of course reflects the use of their planes against targets previously partially neutralized by fast carrier planes and surface gunfire. The apparent superiority of land-based VF, VSB and VTB and PBJs reflects their use against thoroughly neutralized by-passed bases, and targets with light defenses, and in the case of PBJs reflects the effect of medium altitude bombing in addition. Yet the superior performance of the SBDs, operating largely in the Philippines, may well be noted.

The PB4Y and PBM averages reflect use of only partial bomb loads, coupled with heavy strafing, in masthead attack.